Porangahau and Te Paerahi Wastewater Treatment and Discharge – Best Practicable Option

(LEI, 2021:P:C.12)

Prepared for

Central Hawke's Bay District Council

Prepared by

L E
Environmental
I m p a c t

April 2021

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Central Hawke's Bay

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1 EXECUTIVE SUMMARY

The Porangahau Wastewater Treatment Plant (PWWTP) currently discharges treated wastewater to the Porangahau River under resource consent DP030233W. This consent permits a discharge volume of no more than 1.5 l/s (130 m^3/day) for more than 50% of the time over any 12 month period. Furthermore, discharge shall not exceed 4.8 l/s (415 m^3/day) for more than 5% of the time for any 12 month period.

Te Paerahi currently discharges treated wastewater to coastal sand dunes under resource consent DP030234La. This consent permits a discharge volume of no more than 87 m^3/day for more than 50% of the time, nor shall it exceed 190 m^3/day for more than 5% of the time.

These consents are due to expire on the 31st of May 2021.

A comprehensive Best Practicable Option (BPO) selection process has been undertaken by CHBDC involving environmental advisors, affected parties (landowners and iwi) and the Porangahau and Te Paerahi communities. Community consultation aimed to understand concerns, aspirations, and potential design constraints from interested parties to assess plant, discharge, and treatment options. For each component of the wastewater system, a series of options have been considered, with these narrowed down through community engagement and technical advice and refined in conformance with BPO principles to arrive at a BPO.

For discharge of Porangahau and Te Paerahi's wastewater, the BPO is the construction of a new WWTP servicing both communities where the discharge regime is to land under combination of a deficit and non-deficit irrigation system. The choice of suitable soil type and the optimisation of the irrigation system through storage, will effectively allow the ceasing of any direct discharge to the Porangahau River and dunes. The Site for land application is 474 Beach Road, Porangahau, located between the townships. This particular site happens to be within the Coastal Margin, however, it provides the most suitable balance of soil types, meaning that the use of other sites would require a river discharge component during wet weather.

The components of the BPO include:

- construction of a new WWTP between Porangahau and Te Paerahi servicing both communities;
- a combined wastewater discharge for both communities to land under combination of deficit and non-deficit irrigation systems depending on soil type and the optimisation of storage, allowing the ceasing the discharge to the Porangahau River entirely;
- the construction of a storage pond of between 10,000 m^3, up to 35,000 m^3 to capture wastewater flows; and
- the desired discharge site is 474 Beach Road, Porangahau located between the two communities.

Each of these aspects are believed to be the BPO for Porangahau and Te Paerahi's wastewater discharge system because:

- all components of the BPO have been selected in order to function effectively as an integrated wastewater management and discharge system;
- although costly initially, construction of a new WWTP servicing both communities is considered to be beneficial long term. This also involves the removal of the Te Paerahi WWTP;
- implementation of a land discharge regime is affordable to the respective communities in comparison to other discharge options;

- wastewater flows are to be applied to the land under deficit and non-deficit irrigation, aligning with community aspirations of ceasing a river discharge entirely;
- wastewater is able to be beneficially returned to the land, increasing pasture productivity rather than wasted under a river discharge, rapid infiltration basin, ocean outfall or deep bore injection system;
- environmental impacts are expected to be reduced as wastewater can be filtered through the soil, reducing risks of nitrogen leaching or contamination of waterways;
- combination of a non-deficit and deficit system enables wastewater to be selectively discharged to varying locations across the proposed site at varying rates, reducing the demand for excessively high storage requirements; and
- the BPO system has the ability of accommodating for future flows in response to projected population growth for each of the townships.

The BPO can form the foundation for refining the details of the design, operation, and implementation timing for each aspect of the treatment, storage, and discharge systems. Many of these details are intended to be developed and described in the Conceptual Design report (LEI, 2021:P:C.15). The BPO needed to be developed and confirmed to provide certainty of the key aspects of the future systems before such a conceptual design process could commence.

The future resource consent application documents will rely upon the conceptual design details for assessing its likely effects on the environment and developing appropriate resource consent conditions. The consent application will also rely upon this BPO report to satisfy the RMA requirement that the nominated discharge is the BPO for the system and its locality.

2 INTRODUCTION

2.1 Background

Porangahau and Te Paerahi are two rural/coastal communities located in the south-eastern extent of the Central Hawke's region, situated in proximity to the Porangahau River and coastline, approximately 45 km south of Waipukurau. These communities are six kilometres apart from one another, with Te Paerahi located at the coast. As of 2019, Porangahau contained a population of 210, with Te Paerahi having a population 312, with this doubling over summer months (Beca, 2021:P:B.31c).

The Porangahau WWTP is located at the end of Jones Street, adjacent to the Porangahau River, approximately 800 m east of the town centre. CHBDC hold resource consent (DP030233W) permitting discharge of treated wastewater from the plant to the river. This consent expired on the 31st of May 2021.

The Te Paerahi WWTP is located at the end of Te Paerahi Road, approximately 900 m north of the community, amongst coastal sand dunes and a forestry plantation. CHBDC hold resource consent (DP030234La) permitting discharge of treated wastewater from the plant to a discharge field within these dunes via soakage. As with Porangahau, this consent expired on the 31st of May 2021.

A transitional consent has been lodged with Hawke's Bay Regional Council (HBRC) for the continuation of the current discharges at the Porangahau and Te Paerahi WWTPs. This consent will enable wastewater discharge to be managed during the development and implementation of the long term discharge option.

A key aspect of seeking any discharge consent is the Resource Management Act (RMA) requiring the applicant to demonstrate the proposed discharge regime adopts the Best Practicable Option (BPO). The BPO uses the most appropriate current technologies, providing the most benefits for the least impacts on the selected receiving environment, all whilst being at an affordable cost to the Porangahau and Te Paerahi communities.

2.2 Purpose

This report assesses available treatment and discharging options, describes the selection process, and identifies the BPO for the discharge of Porangahau and Te Paerahi's wastewater. It is intended that the described BPO can form the foundation for the conceptual design, operation, and implementation timing for each aspect of the reticulation, treatment, storage, and discharge systems.

The BPO and conceptual design can be relied upon to develop the future discharge consent application which will include assessing environmental effects and developing consent conditions to mitigate potentially adverse effects. The application will rely upon this report to satisfy the RMA requirement that the nominated discharge is the BPO. These documents will be relied upon by Hawke's Bay Regional Council (HBRC) to grant or decline the resource consents sought by CHBDC.

2.3 Scope

The scope of this report includes the following:

- Section 3 outlines the BPO definition and underlines the drivers and selection process;
- Section 4 outlines community aspirations and drivers for WWTP system changes;
- Section 5 presents existing discharge, treatment and wastewater parameters;
- Section 6 outlines current and alternative receiving environments;
- Section 7 presents available discharge methods and considerations;
- Section 8 presents WWTP location, treatment, reticulation, and storage options;
- Section 9 evaluates initial and refined wastewater system component options;
- Section 10 outlines site selection for alternative receiving environments to river discharges;
- Section 11 presents the WWTP location, discharge, treatment and storage BPO; and
- Section 12 presents a summary and conclusions for the BPO selection.

3 BPO DEFINITION AND SELECTION PROCESS

3.1 BPO Definition

The BPO, in relation to the discharge of a contaminant, is defined within the Resource Management Act (1991) as meaning:

> *"the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—*
> *a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
> *b) the financial implications, and the effects on the environment, of that option when compared with other options; and*
> *c) the current state of technical knowledge and the likelihood that the option can be successfully applied."*

Simplifying this, the BPO must use appropriate technologies providing the greatest benefits for the least impacts to the receiving environment, all whilst being at an affordable cost to the community. The BPO isn't the option with lowest level of environmental disturbance or cheapest outcome, but rather a combination of competing values, where the aim is to achieve a compromise between these. Ideally, the most effective and affordable treatment and discharge options are nominated, and the least sensitive receiving environment selected, however this is not always the case, thus an investigation to develop a BPO is required.

3.2 Drivers and Guidance for Identifying the BPO

Schedule 4 of the RMA (RMA, 1991) identifies the minimum types of information that an Assessment of Environmental Effects (AEE) must include, and clause 6 states in part:

> "*(1) An assessment of the activity's effects on the environment must include the following information:*
> *…*
> *(d) if the activity includes the discharge of any contaminant, a description of—*
> *(i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
> *(ii) any possible alternative methods of discharge, including discharge into any other receiving environment"*

Clause 7 states in part:

> "*(1) An assessment of the activity's effects on the environment must address the following matters:*
> *…*
> *(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants"*

3.3 BPO Selection Process

For development of the BPO, processes need to be followed so conclusions reached are valid. The selection process must be transparent and consider all options regardless of their initial practicability (within reason) in providing for the Porangahau and Te Paerahi communities, alongside tāngata whenua. To come to an unbiased and representative BPO decision, a committee consisting of community members, iwi, Council staff and environmental consultants should be formed, ensuring that the BPO is widely accepted across all parties. Engaging with multiple parties allows ideas and perspectives to be shared and understood, further developing the effectiveness and likely approval of the BPO decision.

The committee's role is to consider all options, without discounting options too early in the selection process. Criteria for assessing the acceptability options needs to be developed, representing both Council and community values. The selection criteria needs to be scorable and/or ranked objectively and where values are prioritised over others, an appropriate weighting system needs to be transparently developed and applied. This scoring system allows for varying options to be directly comparable, thus aiding with the BPO selection.

As options are discounted and the remaining field of contenders narrowed, decisions to discount or retain options need to be rationally explained and justified. An objective ranking system should reliably support each choice. The decisions to discount or retain an option should represent the consensus of the BPO selection committee.

Figure 3.13.1 presents a simplified flowchart to be used by CHBDC for the nomination of a BPO to attain a discharge consent for the Porangahau and Te Paerahi WWTPs.

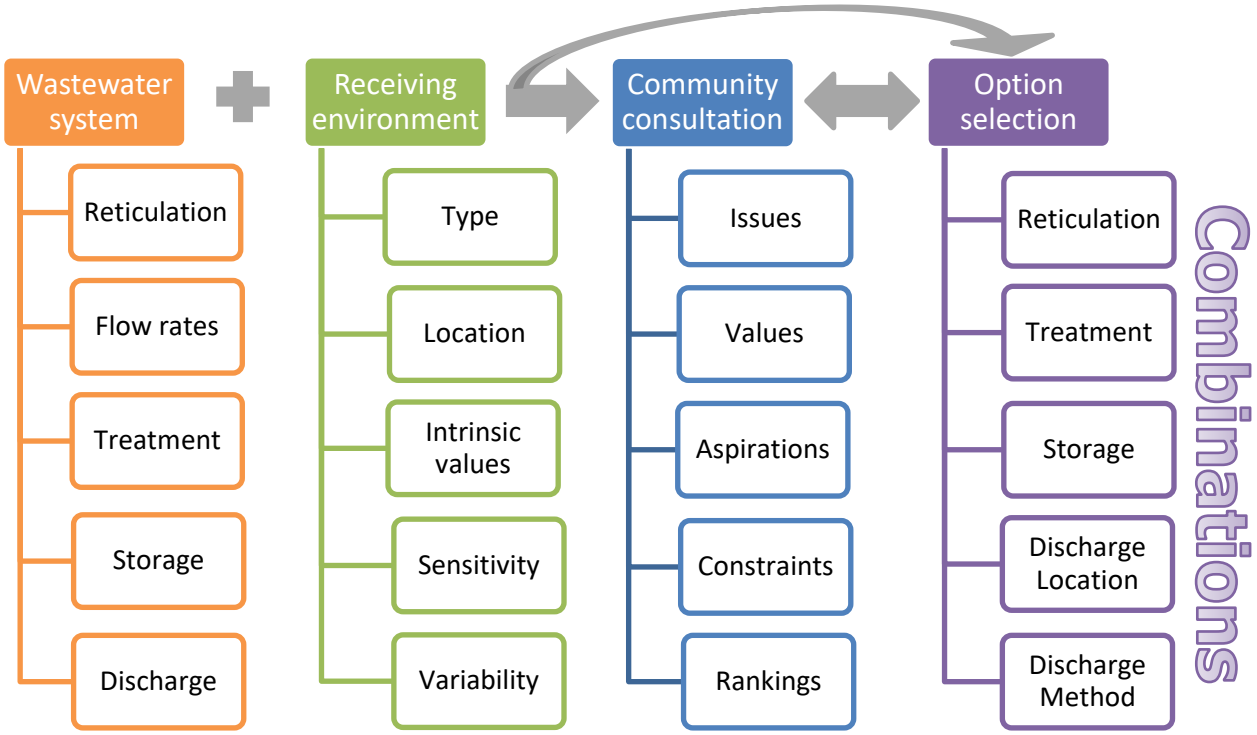

Figure 3.1: BPO Selection Process Overview

3.3.1 Reticulation and Treatment

The volume, quality, and effects of the discharge are all related to and largely controlled by the entire wastewater system upstream of the discharge point. Activities taking place at the WWTPs, as well as in the townships themselves, will inevitably influence wastewater quality, either is a positive or negative way, regardless of the discharge method. The sensitivity and assimilative capacity of the receiving environment to absorb or disperse discharged contaminants while avoiding adverse effects on its ecology is another factor to be considered. It is therefore important to understand what can be done with the wastewater system reducing effects from the discharge, as well as understand the environment's capacity to receive the discharge at various locations and environmental conditions (variations in weather, seasons, and ecology).

3.3.2 Discharge Regimes and Storage Implications

Discharge regimes can vary to reflect the receiving environment and community values. Timing of discharges can be designed to reflect seasonal variations. Discharge systems can also be designed to use more than one discharge site and type of receiving environment; for example, river and land discharges can often be complementary.

Discharge regimes also strongly determine storage volume requirements to retain flows when the environment is unsuited to receiving wastewater. Varying the discharge criteria can optimise storage volumes while managing the scale of effects on the environment within acceptable ranges.

3.4 Broad Environmental Factors

In considering adverse effects of the discharge on the environment, a broad definition of the environment was applied. It factored in ecological, social, cultural, and economic factors, and is consistent with the broad definition of environment within the RMA:

> *"(a) ecosystems and their constituent parts, including people and communities; and*
> *(b) all natural and physical resources; and*
> *(c) amenity values; and*
> *(d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters."*

These factors can be used in consultation to define and rank the importance of values which can be used to evaluate how each option matches with RMA principles and community aspirations.

3.5 Multicriteria Analysis (MCA)

Community engagement for a complex wastewater upgrade system involving multiple receiving environments, discharge, treatment, and storage options, typically requires some form of a multicriteria analysis (MCA) to evaluate options. An MCA is an evaluation of options through a ranking system where options are assigned scores based on parameters. For wastewater upgrades parameters may include cost, community values, engineering requirements, availability of materials, compatibility with other components, etc. Scores can be assigned to parameters to calculate a total score that is directly comparable to alternative options. MCA evaluations enable the community to become directly involved in the decision making and option evaluation process, ensuring that the nominated BPO is likely to be supported by the community.

For the Porangahau/Te Paerahi wastewater upgrade, an MCA wasn't strictly followed as traditionally done due to multiple reasons. The community are considered well educated on wastewater issues, having been involved in the previous reconsenting process. This previous process included much of the option assessment and evaluation as undertaken for the existing reconsenting with the greatest limitation then being cost and funding. In the past the community provided strong guidance as to preferred outcomes, reducing the need for an MCA.

4 CONSULTATION

4.1 General

Community values need to be reflected in the selection process as the community pays for the selected systems. Consultation is necessary when investing in community infrastructure, particularly when a longer term consent is desired. Consultation allows interested parties to voice opinions and concerns, enabling the nominated BPO to have higher support following extensive engagement, instead of generating unnecessary levels of opposition during the consenting process.

Community consultation takes many forms, using various communication methods addressing public audiences or specific individuals. It involves a continuum of detail and level of expertise as appropriate to the parties involved and their project roles. Additionally, direct consultation is also often required with Māori representatives.

Appendix A presents a detailed Community Consultation Summary (LEI, 2021:P:C.34) for the Porangahau and Te Paerahi WWTP upgrades summarising key engagement and outcomes between CHBDC and relevant parties for both the existing consents, as well as the current consultation for the reconsenting process.

4.2 Community Aspirations

Consultation strongly influences the BPO as the discharge environment and the effects of the discharge will be visible within their surrounding environment. Due to consent renewals being infrequent, it is understandable for the community to want improvements to the discharge regime and for advanced treatment technologies to improve wastewater quality. For Porangahau and Te Paerahi, there are a series of outcomes relating to the discharge and treatment that the community desire for the BPO. These are:

4.2.1 Porangahau WWTP and Discharge

Following community consultation, the consensus was the desire to cease discharge to the river due to the negative perception and effects of wastewater and accompanying nutrients being discharged to an environment used for recreational activity and considered taonga by tāngata whenua.

By ceasing the river discharge, the community have identified the desire to discharge wastewater to land. They see this to be a better alternative to a river discharge and support the idea of the beneficial return of nutrients to land, closing the wastewater nutrient cycle. Furthermore, they wish to see nutrients within wastewater be reused to facilitate pasture or crop growth, rather than be wasted through a river discharge.

4.2.2 Te Paerahi WWTP and Discharge

For Te Paerahi, the current location of the WWTP and discharge field is considered wāhi tapu and therefore there is strong community desire to cease the discharge and remove the WWTP from its location. Continuation of the Te Paerahi discharge will not be acceptable. A new discharge location is required for Te Paerahi's wastewater and ideally, wastewater needs to be conveyed to a new WWTP either at Porangahau or a new WWTP altogether. Should the Te Paerahi WWTP remain operational or whether wastewater flows are pumped elsewhere, the community would like an improvement to the treatment system to supplement the current oxidation pond.

5 DESCRIPTION OF EXISTING SYSTEMS

5.1 General

To assess future options surrounding the Porangahau and Te Paerahi WWTP discharges, the existing systems and their operating constraints need to be discussed. Porangahau's wastewater is reticulated to the WWTP, operated by CHBDC, who have consent (DP030233W) permitting discharge of treated wastewater to the Porangahau River at a rate no more than 1.5 l/s (130 m^3/day) for more than 50% of the time over any 12 month period. Furthermore, discharge shall not exceed 4.8 l/s (415 m^3/day) for more than 5% of the time for any 12 month period.

Te Paerahi's wastewater is reticulated to the Te Paerahi WWTP, operated by CHBDC, who have consent (DP030234La) permitting discharge of treated wastewater to culturally significant sand dunes at a rate that shall not exceed 87 m^3/day for more than 50% of the time, nor shall it exceed 190 m^3/day for more than 5% of the time.

5.2 Wastewater Reticulation

For Porangahau, the existing wastewater reticulation system consists of a series of gravity mains and a rising main conveying wastewater from the community to the Porangahau WWTP where it enters an oxidation pond. The greatest pipeline distance to the WWTP from the furthest household is approximately 1.2 km with all households being between 400 m to 1.2 km.

From the pond, wastewater is discharged to a drain entering the Porangahau River via an effluent chamber. This distance between the pond to the point at which wastewater enters the Porangahau River is 80 m.

For Te Paerahi, the existing reticulation system consists of a series of gravity mains and a rising main conveying wastewater from the community to the Te Paerahi WWTP where it enters an oxidation pond. The greatest pipeline distance to the WWTP from the furthest household is approximately 1.5 km with all households being between 500 m to 1.5 km.

Wastewater is then discharged to culturally significant sand dunes via soakage approximately 10 m from the pond.

5.3 Wastewater Treatment, Storage and Discharge

The Porangahau WWTP consists of a single, clay lined, stabilisation pond approximately 0.3 ha in size with a small discharge outlet to the drain entering the Porangahau River.

For treatment, there is no incoming flow monitoring or screening facilities, thus the only treatment comes from the pond (Beca, 2020:P:C.10). Within the pond, a proportion of solids settle on the pond bed in the sediment layer, where non-aerobic conditions prevail, providing further treatment. A portion of solids remaining in suspension along with nutrients and soluble solids are treated by bacteria and algae in aerobic conditions. Oxygen for this process is provided by wind and photosynthesising algae.

At the pond outlet, an effluent chamber containing a perforated basket to catch eels and debris which didn't settle in the pond, prevents these from entering the river (Beca, 2020:P:C.10). Upon discharge, the outflow is recorded and monitored as per current consent conditions.

The Te Paerahi WWTP consists of a 0.1 ha single clay lined oxidation pond. As with Porangahau, there are no incoming flow monitoring or screening facilities. Again, solids settle on the pond bed where anaerobic conditions prevail, with suspended solids and nutrients treated through bacteria and algae within the pond. This WWTP differs to Porangahau in that it contains a surface aerator incorporating oxygen. Furthermore, following treatment in the pond effluent is passed through a covered area of the pond for the final polishing before discharge. It was intended to establish a surface wetland on the top of this cover, however the installation was unsuccessful and only weed growth is evident (Beca, 2020:P:C.10).

Beca, 2020:P:C.10 provides a summary of the existing Porangahau and Te Paerahi WWTP system and current performance.

5.4 Wastewater Flows and Quality

Beca (2020:P:C.10) include daily flows and water quality statistics for Porangahau and Te Paerahi WWTPs represented within Table 5.1 through Table 5.4. Each of the flow tables represent effluent volume, used to estimate actual flow per capita.

Table 5.1: Porangahau WWTP Flow Statistics (2008-2020) (Beca, 2020:P:C.10)

Parameters	Effluent Volume (m^3/day)	Actual Flow per Capita (l/p/d)
Dry Weather Flow	31	127
Average Daily Flow (ADF)	144	542 (208)*
95%ile Flow	634	-
Maximum Flow	2,250	9,183

*A wet weather factor of 1.6 is applied to determine dry weather actual flow per capita, hence the actual dry weather flow per capita is 148 l/p/d.

Table 5.2: Porangahau WWTP Incoming Wastewater Quality (2014-2019) (Beca, 2020:P:C.10)

Parameters	Units	Min	Average	90th %ile	Max
COD	mg/l	35	297	706	1,420
Unfiltered cBODs	mg/l	3	103	307	566
TSS	mg/l	2	92	240	551
VSS	mg/l	2	82	218	511
ISS	mg/l	0	10	26	42
TKN	mg/l	2	25	42	58
Ammonia	mg/l	1	18	30	34
TP	mg/l	1	4	7	12
SRP	mg/l	0	3	5	10
Faecal Coliforms	cfu/100 ml	680	2.7M	6.8M	15.6M
E. coli	cfu/100 ml	669	1.9M	4.8M	8.9M

Table 5.3: Te Paerahi WWTP Flow Statistics (2014-2020) (Beca, 2020:P:C.10)

Parameters	Effluent Volume (m^3/day)	Actual Flow per Capita (l/p/d)
Dry Weather Flow	37	118
Average Daily Flow (ADF)	74	237 (148)*
95%ile Flow	136	436
Maximum Flow	407	1,305

*A wet weather factor of 1.6 is applied to determine dry weather actual flow per capita, hence the actual dry weather flow per capita is 148 l/p/d.

Table 5.4: Te Paerahi WWTP Incoming Wastewater Quality (2014-2019) (Beca, P:C.10)

Parameters	Units	Min	Average	90th %ile	Max
COD	mg/l	15	381	1,326	1,780
Unfiltered cBODs	mg/l	3	137	494	1,150
TSS	mg/l	1.5	136	403	1,030
VSS	mg/l	1.5	118	361	834
ISS	mg/l	0	19	40	196
TKN	mg/l	5.6	36.2	68.3	112
Ammonia	mg/l	3.8	23.2	40.7	63.2
TP	mg/l	0.6	5.7	12.6	26.8
SRP	mg/l	0.6	3.9	6.1	21.9
Faecal Coliforms	cfu/100 ml	7,400	0.31M	0.71M	0.85M
E. coli	cfu/100 ml	7,400	0.26M	0.62M	0.76M

6 RECEIVING ENVIRONMENT OPTIONS

6.1 General

The receiving environment is one of, if not the most important component of the wastewater system and any impact is influenced by prior reticulation, treatment, and storage components.

6.2 Current Receiving Environment

The Porangahau River is the existing receiving environment for Porangahau's wastewater, with the catchment draining largely hill country farmland in the southern Hawke's Bay region. This catchment has undergone significant conversion to hill country sheep & beef farmland and forestry, with only a fraction of the original native vegetation remaining.

Along the low-land reaches of the Porangahau River, HBRC and CHBDC monitor water quality at three locations. These are 200 m upstream and downstream of the existing wastewater discharge from the Porangahau community, and at Kate's Quarry, 5.6 km upstream of this discharge point. Beca (2020:P:B.24a) outlines water quality issues at these points. Upstream of the discharge point, the Porangahau River exceeds total nitrogen, total phosphorus and dissolved reactive phosphorus guideline values, with additional exceedances of faecal coliform and ammoniacal nitrogen downstream of the wastewater discharge during low flow conditions.

A detailed water quality assessment of the Porangahau River and the effects of the current wastewater discharge is provided within Beca (2020:P:B.24a).

Coastal dunes adjacent to the Te Paerahi WWTP are the receiving environment for Te Paerahi's wastewater. A discharge field is located approximately 20 m to the north-west from the Te Paerahi WWTP, where wastewater is discharged via soakage which drains to groundwater and in a south-easterly direction to the coast (Beca, 2021:P:D.60)

For the Te Paerahi WWTP, environmental effects of the existing discharge to coastal dunes are expected to be negligible (Beca, 2021:P:D.60). Very low levels of pathogens are noticed within surrounding groundwater monitoring bores with negligible effects anticipated for the marine environment and risk to shellfish gathering (Beca, 2021:P:D.60). Furthermore, residual contaminants in groundwater are highly unlikely to enter surface freshwater or migrate towards the public drinking water supply bore (Beca, 2021:P:D.60).

6.3 Alternative Receiving Environments

Appendix B provides a summary of three alternative receiving environments to the existing river and land discharges at the respective communities. These alternative environments are land, groundwater, and ocean. It is suggested that the reader consults this appendix as part of this reporting package.

7 DISCHARGE METHODS AND CONSIDERATIONS

7.1 General

When developing a discharge regime, it is important to understand each component of the regime for the selected receiving environment. Each regime will have altering advantages and disadvantages relating to environmental affects, community values and interests and cost.

For a discharge to be acceptable within a specific environment, there may be target parameters for the wastewater to adhere to, meaning changes may be required within upstream reticulation and/or treatment components. A key inclusion is often the need to provide storage of wastewater when discharge cannot occur or a specific effluent quality standard. The proximity of the receiving environment, alongside the potential of combining receiving environments and discharge regimes are additional factors that should be considered.

The complexity of considerations increases with increasing options, thus a methodology and criteria for excluding or maintaining/refining options early in the BPO process should be developed. This can streamline and simplify the selection process so that evaluators are not overloaded, and time isn't unnecessarily wasted.

Appendix B provides a summary of three alternative receiving environments to the existing river discharge at Porangahau and the land discharge to culturally significant sand dunes at Te Paerahi. It is suggested that the reader consults this appendix as part of this reporting package.

7.2 River Discharge

7.2.1 Discharge Regime

The existing discharge regime for the Porangahau WWTP will remain a considered option, however, should this become the BPO, changes will be required in response to anticipated tighter consent regulations. With potential for continuation of the existing Porangahau discharge and the cessation of the Te Paerahi discharge, an option could be the inclusion of Te Paerahi's wastewater flows to the Porangahau WWTP with these collectively discharged to the river. The inclusion of Te Paerahi's flows to the Porangahau River at Porangahau does not necessarily have to occur, however due to Te Paerahi requiring a new discharge location, it is an option worth considering. Although, a river discharge is undesired, this needs to be included, providing a baseline to assess proposed options against.

Currently, the Porangahau River discharge shall not exceed 1.5 l/s (130 m^3/day) for more than 50% of the time over any 12 month period, nor is it allowed to exceed 4.8 l/s (415 m^3/day) for more than 5% of the time over any 12 month period. With the possibility of including Te Paerahi's flows to the Porangahau WWTP, volume restrictions may need to increase, accounting for this increased flow. With the discharge location tidally influenced, restrictions could be implemented to limit discharges to outgoing tides only when the river is not affected by low flow conditions, preventing accumulation of contaminants and pathogens around the discharge point, diluting added wastewater. Both the beach and the Porangahau River Bridge at Beach Road are recreational locations meaning restricting discharges to these timeframes would likely reduce public health risk.

If a river discharge were to be the or part of the BPO, future conditions may be desired to further improve wastewater quality prior to discharge. Neither WWTP has had compliance issues over the consent duration relating to wastewater quality, with the only consent breaches for the

Porangahau WWTP coming from excessive wastewater volumes in 2017 following two ex-tropical cyclone events (Beca, 2020:P:C.10).

For a river discharge, additional work may be undertaken to develop a natural wetland within the drain receiving wastewater from the WWTP prior to entering the river. The inclusion of this would help to assimilate contaminant loadings within wastewater prior to entering the river.

7.2.2 Location and Design

For the location of a river discharge, there are two locations CHBDC could consider; the current discharge at the WWTP or downstream of this. The current discharge would be suitable, should the Porangahau WWTP remain operational. Maintaining the current location would reduce reticulation costs with the only considerable cost coming from treatment upgrades or wetland enhancements.

If a new WWTP were to be established between the two communities and a river discharge component adopted, a new discharge site and associated pipeline would need to be constructed.

7.2.3 Values and Relevant Factors

Appendix B provides a summary of values and relevant associated with a river discharge regime for Porangahau and Te Paerahi's wastewater discharge. It is suggested that the reader consults this appendix as part of this reporting package.

7.3 Land Discharge

7.3.1 Discharge Regime

There is a continuum of land discharge options:

- high rate rapid infiltration basin (RIB); to
- deficit/non deficit irrigation with no river discharge; to
- deficit/non deficit irrigation with a river discharge; and
- wastewater reuse (plant nursery/wetland restoration).

The discharge regime needs to match the ability for selected land areas to receive the volume and nutrient application rates without causing unintended land instability, plant cover failure, soil degradation, or groundwater contamination effects.

7.3.2 Location and Design

Location:

Potential application sites need to be in proximity to both communities (ideally between), minimising length and cost of reticulation and pumping from the WWTPs to the Site. Whilst not essential, the Site should be at similar or lower elevation to the WWTPs, minimising pipeline pressures and pumping head requirements. Furthermore, the Site should be on landforms and soil types and under appropriate farm management having potential to receive wastewater, whilst not having significant limitations to achieving this.

Prior to nominating a discharge location, relevant policy documents relating to a Site should be identified as these may influence the consenting process through existing rules and regulations governing Site changes or activities. For the case of the Porangahau/Te Paerahi, two policy documents are the Regional Resource Management Plan (RRMP) and the Regional Coastal Environment Plan (RCEP), each of which have rules and regulations applying to varying areas that may influence Site selection.

Within the Porangahau/Te Paerahi area, there multiple landowners who have expressed interest in receiving wastewater, with these properties having their advantages/disadvantages. Identifying suitable land for irrigation should not be an issue with multiple landowners identified. Engagement with a preferred landowner is underway to understand their property and farming system and to assess land suitability and owner perception to receive wastewater.

Design - Rapid Infiltration Basins (RIBs):
RIBs can be simple low pressure systems, requiring well drained soils, generally growing wetland plants or no plants at all. RIBs enable wastewater to be applied to land at high volumes facilitating soil drainage, by which nutrients move through the soil profile and become dispersed and diluted prior to entering groundwater. RIBs require minimal to no storage due to high discharge volumes and can be considered culturally acceptable due to the avoidance of a direct river discharge. Groundwater interaction may see the requirement for additional treatment.

Design – Deficit/Non-Deficit Irrigation:
In comparison to RIBs, wastewater can be applied at lower rates under deficit or non-deficit irrigation systems. Deficit irrigation is where water is applied at rates to minimise soil drainage, typically irrigating the profile to field capacity. Due to low application rates under a deficit irrigation scheme, storage volumes need to be high to capture all wastewater flows, preventing discharges to an alternative receiving environment. Furthermore, due to prevention of drainage, deficit systems require larger land areas than what is available to manage incoming flows, which can be expensive.

Non-deficit irrigation is similar to deficit however the difference is that non-deficit facilitates small volumes of drainage per event through the 'over-watering' of the soil profile. Due to this over-watering, non-deficit irrigation enables larger volumes of wastewater to be applied per event, reducing either storage requirements (if all flows are to land) or the volume discharging to an alternative receiving environment. In contrast to deficit systems, non-deficit irrigation requires smaller land area to manage flows, with total land area required dependent on wastewater flow volume, soil types, storage and alternative discharge environments (i.e. river discharges).

For deficit/non-deficit irrigation, the design of the system can vary considerably and be customised aligning with owner aspirations and land management. Controls can be included to manage climatic conditions, soil moisture, application events and monitoring requirements. The discharge system can include large centre pivot or smaller travelling irrigators, fixed sprinklers to fenceposts or small moveable pods. Sub-surface dripper lines can also be installed. Reticulation to operate these systems can be permanent or temporary (using disconnection fittings) and be trenched underground or laid on the surface.

Combined Discharges:
A challenge with land treatment of wastewater revolves around the management of the system when soils cannot receive wastewater under deficit/non-deficit systems. This develops the requirement for storage to capture and hold wastewater flows until a period for when the soil can receive wastewater. Although storage provides a buffer to the system, there will be periods where the soil cannot receive wastewater for agronomic benefit, and storage is at capacity. Constructing storage to capture all flows is typically not feasible due to cost which develops the need for a contingency discharge by which wastewater can either be discharged to a surface waterway or land passage under certain conditions, to relieve these flows than cannot be managed.

A common combined discharge regime is primarily land irrigation, with a contingency discharge either directly to a surface water body or through a form of land passage, by which high volumes of wastewater are applied and move through the soil before reaching either surface or

groundwater. Although emphasis is placed on land irrigation, this contingency discharge buffers the entire system as wastewater flows are continuous and cannot simply be stopped.

This develops the idea that the discharge regime may not necessarily may not be to a single receiving environment, but rather have the ability of discharging to multiple environments depending on climatic conditions, wastewater flows and system design.

Wastewater Reuse:
In addition to large scale community irrigation schemes, wastewater can supplement smaller projects, which although cannot be relied upon as a continuous and sufficient use of wastewater, can be beneficial for community involvement. These projects may be assisting with nursery plant growth and/or establishing existing or newly planted wetland species as part of restoration projects. A potential project which has been discussed amongst the community is the proposed restoration of the Wanstead Wetland 17 km north of Porangahau. Here wastewater could be utilised to establishment wetland plant species to increase growth and quality of the wetland.

Similarly, within the Porangahau region is the need for erosion control of slopes through poplar planting by which wastewater could be a beneficial water source. Such activities have potential of receiving Government funding, another incentive to include this as part of the BPO.

7.3.3 Values and Relevant Factors

Appendix B provides a summary of values and relevant associated with a land discharge regime for Porangahau and Te Paerahi's wastewater discharge. It is suggested that the reader consults this appendix as part of this reporting package.

7.4 Groundwater Discharge

7.4.1 Discharge Regime

Wastewater can be discharged to groundwater year round through deep bore injection. The feasibility depends on the assimilative capacity of groundwater, flow rate and the location, abstraction rates and sensitivities of downstream users. Groundwater flow rates, typically through heavier soils are slow, thus careful management around the discharged wastewater quality and volume per event, as well as existing groundwater depth and flow rate is required.

7.4.2 Location and Design

It is best practice to establish groundwater injection sites downstream of any groundwater users, reducing risk of groundwater contamination to those users. Due to Porangahau being coastal and adjacent to the river, it is likely groundwater will flow towards the river and out to the coast, or if deeper directly towards the coast. It is likely there are minimal users of groundwater aquifers downstream, due to Porangahau being semi-coastal, however this will need determining.

This option potentially leaves a minimal environmental footprint and could possibly occur year round. It is likely that Porangahau and Te Paerahi wastewater would require additional treatment to close to a potable standard before being injected into a groundwater aquifer.

7.4.3 Values and Relevant Factors

Appendix B provides a summary of values and relevant associated with a groundwater discharge regime for Porangahau and Te Paerahi's wastewater discharge. It is suggested that the reader consults this appendix as part of this reporting package.

7.5 Ocean Discharge

7.5.1 Discharge Regime

For coastal communities, wastewater can be treated at the WWTP and piped into the ocean. As with groundwater injection, this option can be beneficial as large quantities of wastewater can be discharged in a single event, leaving minimal environmental footprint. An ocean discharge can occur year round with no restrictions relating to land or waterway conditions as experienced for land or river discharges.

7.5.2 Location and Design

Ocean discharges contain a pipeline entering the ocean environment where wastewater can be discharged and mixed with seawater where it becomes diluted. The greater the distance of the pipeline offshore, the greater the cost of piping and pumping to that location. Therefore, a compromise between distance offshore to reduce adverse effects and cost will need to be considered.

Ocean discharges tend to be expensive in that infrastructure needs to be constructed to pipe wastewater to a given distance and built in a way that can withstand constant wave energy. As with groundwater injection, this option may be considered too expensive for communities the size of Porangahau and Te Paerahi. Furthermore, due to being discharged to an environment where locals retrieve kaimoana, additional treatment to improve wastewater quality and reduce the risk to public health will also be required.

Due to Porangahau not being directly at the coast as with Te Paerahi, this option may be considered for Te Paerahi only to replace the current discharge to sand dunes. This would save a portion of the costs in that wastewater will not have to be piped from Porangahau, however Porangahau would require a separate discharge regime.

7.5.3 Values and Relevant Factors

Appendix B provides a summary of values and relevant associated with an ocean discharge regime for Porangahau and Te Paerahi's wastewater discharge. It is suggested that the reader consults this appendix as part of this reporting package.

8 WWTP, RETICULATION, TREATMENT AND STORAGE OPTIONS

8.1 General

Each wastewater system component has potential to be modified, however modifications need to be reliable and have beneficial effects on the design and operation of the rest of the system. Incompatible options need to be avoided. Flow rate is probably the most important parameter and needs to be correctly factored into every component of the system, with flow rate mostly being controlled by the reticulation design and condition.

With and existing wastewater treatment system it is important to have a good understanding of the reasons why change is being considered for each component. This ensures that there is a benchmark or goal, against which the potential changes can be assessed to determine how effectively the change can assist with achieving it.

There is no sense in changing something at great expense if there is no need for it, it conflicts with another aspect of the system, or if there is no measurable benefit resulting from that change. There may be strong reasons for maintaining the status quo for various components; these reasons need to be articulated and borne in mind when considering making changes to other parts of the system.

8.2 Wastewater Treatment Plant Upgrades

As part of the reconsenting for Porangahau and Te Paerahi, there have been discussions and interest into the potential of a new WWTP to be built either at Porangahau or at a new location to receive wastewater for both Porangahau and Te Paerahi. The large driver behind this is the desired removal of the Te Paerahi WWTP from its existing location and outdated Porangahau WWTP.

There are three options relating to the two WWTPs that are considered. These are:

8.2.1 Scheme 1 – Treatment at each site with discharge at Porangahau

This scheme would see treatment at the Porangahau and Te Paerahi WWTPs as is currently, however there would be no discharge to Te Paerahi sand dunes. Wastewater would be pumped to Porangahau, the two wastewater flows blended and discharged to the drain (or a small, enhanced wetland), draining into the river. Tertiary treatment could be considered for blended wastewater before discharge if required to meet discharge consent regulations.

8.2.2 Scheme 2 – Combined Treatment at Porangahau

This scheme would see a new treatment plant built at the Porangahau WWTP site, treating wastewater for Porangahau and Te Paerahi. This scheme allows complete removal of the WWTP from the Te Paerahi site with the new plant including additional treatment facilities, improving wastewater quality.

8.2.3 Scheme 3 – Combined Treatment at a new site and application/Discharge to land

This scheme would see a new treatment plant built, treating wastewater from Porangahau and Te Paerahi at a new location, removing both WWTPs from their current locations and cease discharge to the river and sand dunes. Raw wastewater from both communities will be pumped to the new WWTP, treated and pumped off site for land discharge ideally. As land surrounding

Porangahau contains a mixture of soil types, both high and low rate applications could be considered as sub-options.

Site location would need to consider conveyance efficiency, access provisions, wāhi tapu, residential buffer zones, power supply, foundations and protection from natural hazards such as fresh-water flooding and/or sea level rise.

8.3 Wastewater Sources

An aspect of the wastewater system worth considering is what could be done to reduce or avoid the production of wastewater. For obvious reasons, it is impracticable to entirely avoid producing wastewater, so reduction of volumes is the only feasible option. CHBDC has a public health duty to collect and treat wastewater for its communities, so a treated wastewater stream cannot be avoided and can only be reduced or controlled. The wastewater treatment system also needs to be capable of accommodating future population growth which can easily exceed reductions in volumes generated by wastewater minimisation measures. For Porangahau, the community is expected to increase to 837 by 2057, with Te Paerahi's population projected to remain relatively constant at 312 people until 2057, with this continuing to double over summer months (Beca, 2021:P:C.16).

8.4 Wastewater Reticulation

The nominated BPO will determine the modifications required to the current reticulation network. Currently, wastewater is pumped from the communities to the respective WWTPs and then to the discharge sites. Reticulation within the communities will remain the same, however pipelines may need constructing if either of the WWTPs were to change location.

Furthermore, any discharge away from the existing discharges will require new reticulation networks to be established, conveying wastewater from the WWTP to the discharge site.

8.5 Wastewater Treatment

The receiving environment determines the discharge regime, with this determining the implemented treatment options. Treatment options considered for Porangahau and Te Paerahi are introduced and described in Beca (2020:P:C.10) and presented in Appendix B.

8.6 Wastewater Storage

The existing Porangahau and Te Paerahi WWTP stabilisation ponds have total surface areas of 0.3 ha and 0.1 ha respectively with no current storage capacity. A series of representative options considered for storage were:

- Status quo
- Small (3 days - buffer)
- Large to very large (3 weeks - 3 months)

Storage volumes are typically dependent on daily wastewater flows (and direct rainfall into the WWTP pond) and the criteria used to discharge to a given environment. Essentially, the type of discharge, will govern the type and size of storage required.

Smaller storage volumes (less than about 8,000 m^3) can be accommodated within tanks, however larger volumes need to use lined ponds or dams.

Increasing storage volumes incur increasing costs of construction, however cost per cubic metre are slightly cheaper for larger ponds due to efficiencies of scale. Regardless, the cost of storage is generally a significant factor in a wastewater treatment system and is often minimised to focus expenditure on treatment and discharge components.

9 OPTION EVALUATION AND SELECTION

9.1 General

Many options are available for each wastewater system component, with some being compatible, and others not, thus development of an efficient and effective integrated system is essential. The integrated system needs to achieve a balance between affordability to CHBDC and environmental effects.

9.2 Initial Options

The evaluation process considered the advantages, disadvantages, and community values for each component of the wastewater system, and their ability to be combined with one another as part of an integrated system. A summary of options for each component of the wastewater system are as follows:

- **Wastewater Treatment Plant Options**
  1. Treatment at existing WWTPs with combined discharge from Porangahau;
  2. Combined treatment at Porangahau; or
  3. Combined treatment at a new site and application/discharge to land.

Continuation of the Te Paerahi WWTP in its current location is unacceptable to the land owners, thus the location of the plant and discharge field must be relocated. Scheme 1 involves wastewater being treated at the existing WWTPs, with Te Paerahi's then being piped to the Porangahau WWTP and collectively discharged. This scheme is undesired as although the Te Paerahi discharge field ceases operation, the WWTP remains operational.

Scheme 2 ceases operation of the Te Paerahi WWTP and discharge field with Te Paerahi's raw wastewater being pumped to the Porangahau WWTP and discharged. This scheme is considered more desirable than Scheme 1, due to the complete removal of the Te Paerahi WWTP. Should a land discharge be the BPO, double pumping of wastewater to Porangahau and then to a discharge site may seem unnecessary than if a new combined WWTP were to be built at a discharge site.

Scheme 3 sees the construction of a new combined WWTP servicing both communities, likely at the nominated discharge location. Having a new WWTP allows greater flexibility for its location to suit the discharge site, minimising piping costs that would occur for Scheme 2. Having a new plant enables treatment modifications from the existing systems to be included easier, which although may be expensive to construct, from a longer term perspective this may be preferred.

- **Receiving Environment Options**
  1. Status quo;
  2. Ocean;
  3. Land;
  4. Groundwater; or
  5. Combination

Five receiving environment options were considered in initial discussions and were used to develop the discharge regime options. These are detailed as follows:

- **Discharge Regime Options**
    1. Existing river discharge;
    2. Ocean discharge;
    3. Land irrigation – non deficit;
    4. Land irrigation – deficit;
    5. Land irrigation – rapid infiltration basin; or
    6. Deep bore injection

The existing river discharge for Porangahau (with inclusion of Te Paerahi) could continue due to its minimal cost in comparison to alternative options. It is likely that should this be the sole receiving environment, consent may be difficult to sought due to stricter freshwater guidelines and community perception. Due to the preference of ceasing the existing river discharge, it is likely that a continued sole river discharge will not be supported by the community. For a river discharge, additional treatment and incorporation of high flow/outgoing tide restrictions could be included, ensuring discharges maintain minimal impact to water quality. Storage could be developed to provide for restrictions on discharge under certain river flows.

Land discharges are typically preferred as wastewater can be applied to the surface where water and nutrients assist plant growth. Nutrients have potential for leaching, however this can be mitigated by application rates and site investigations. Land discharges are considered culturally acceptable by the community (particularly tangata whenua) as wastewater is passed through the soil profile rather than a direct river discharge. Irrigation can be via deficit or non-deficit where rates are designed for pasture growth, facilitating no to minor or minor to moderate groundwater drainage, respectively. Depending on the desired regime, varying volumes of storage can be included (greater for deficit irrigation), allowing wastewater to be stored for when soil conditions cannot receive irrigation and to prevent discharge to the Porangahau River.

Rapid infiltration was considered due to requiring small storage volumes than deficit/non-deficit systems, avoiding surface water discharges and ensuring treated wastewater passes through the soil profile. Rapid infiltration has been effectively implemented elsewhere around New Zealand for community wastewater system so is considered an option.

An ocean discharge was considered due to proximities of the communities from the coast. This discharge enables large volumes to be discharged per event, year round, however as mentioned is considered costly and conflicts with community values.

Deep bore injection was also considered due to its limited footprint, its ability to discharge year round and through large volumes per event, whilst preventing a direct river discharge.

- **Storage Options**
    1. Status quo (2-3 days);
    2. Small (3-21 days - buffer); or
    3. Large to very large (3 weeks-3 months)

The number of days storage will need to reflect the nominated discharge regime. All storage volumes, irrespective of the discharge regime need to reflect future flows in response to population growth, as well as seasonal fluctuations of flows, particularly of Te Paerahi over summer months.

The current 2-3 days storage at each of the plants is unlikely to be adequate for a sole river discharge with flow discharge restrictions, and would certainly not be adequate for a land or groundwater receiving environment. An increase of the pond size to 21 days storage will be adequate for a river discharge regime, however a larger storage size may be required depending

on low flow discharge restrictions. A 21 day retention time may be suitable for a rapid infiltration or a groundwater injection system, where larger volumes of wastewater can be discharged per event, thus reducing the importance of larger storage.

Three months storage would be suitable for land discharge regimes under a deficit or non-deficit irrigation system, with or without a river discharge component. A non-deficit system will require smaller storage volumes than a deficit discharge.

Essentially, the larger the storage, the larger the construction cost. Although the larger the storage pond, the cheaper the cost per cubic metre due to economies of scale. It is important that the storage pond size closely reflects the desired discharge regime.

9.3 Refined Options

Refined discharge, treatment and storage options were presented by CHBDC to the communities, with feedback sought to refine these options further. Community consultation was undertaken to eliminate options deemed unrealistic and undesired by the community and to further refine and scrutinise remaining options. Consultation was largely centred around the discharge regime as this influences the required treatment and storage parameters. Disregarded options were rationally justified for why they were eliminated, as well as why other options remained. Appendix A (LEI, 2021:P:C.34) outlines a community consultation summary for the consent process. Initial options were underlined by Beca (2020:P:C.10) above, with these narrowed down to four options. These were:

- River – Status quo river discharge;
- Land – Deficit irrigation with/without river discharge;
- Land – Non-deficit irrigation with/without river discharge; and/or
- Land – Rapid infiltration basin.

Community consultation directed the strong interest to cease the sole discharge from Porangahau to the Porangahau River. For Te Paerahi, under no circumstances did the community want the continuation of the Te Paerahi discharge, with a strong interest to remove the Te Paerahi WWTP from its location also.

An ocean discharge was deemed inappropriate due to high costs and conflict with cultural values. With Porangahau being inland, this option would either have been for Te Paerahi only with Porangahau either requiring a separate discharge regime or a pipeline would have to be constructed to Te Paerahi, both options were deemed too expensive. Furthermore, the ocean environment is considered taonga to Māori, meaning there was opposition to an ocean discharge.

Groundwater discharges were also deemed too expensive and conflicted with many community values. A groundwater discharge required substantial treatment and high engineering costs. As with ocean environments, groundwater is valued by Māori with the expectance that water quality will be pristine and not contaminated. Due to this risk, the community felt alternative receiving environments may be better suited.

For the existing river discharge, the community ideally want there to be no river discharge whatsoever for the future consent, with a strong interest in land application. Although unwanted, the community may support a continued river discharge under a combined scheme with land application. For a land application regime, the community want an emphasis to apply wastewater to land as much as possible, and to only apply to the river under circumstances when land cannot receive wastewater, there is limited storage capacity, or the river has to ability to receive the discharge.

Although land and river discharges are commonly combined as the nominated BPO, a deficit and non-deficit irrigation system can effectively provide the same outcome. This results in all wastewater being applied to land, ceasing a direct river discharge. Wastewater can be applied to land under a non-deficit system, with conditions permitting irrigation above soil moisture limits so that drainage to groundwater occurs. This 'overirrigation' is essentially a discharge system where wastewater is no longer applied for pasture growth, but rather to releave pressures on storage volumes and large land area requirements. Although this system facilitates drainage, wastewater contaminants can be attenuated within the soil profile, prior to entering a surface water body and has thus undergone another form of treatment.

It is preferred that a combination of a deficit and non-deficit irrigation is used. A non-deficit system will allow for more wastewater to be applied per event, reducing demand for significantly sized storage. This scheme will likely be adopted for paddocks overlying sand dunes, where soil has greater assimilative capacity to receive higher wastewater volumes. A deficit system will likely be adopted for clay soils, where there is reduced assimilative capacity of receiving high wastewater volumes due to a lower permeability status. A suitability sized storage pond will be required to for each of these regimes, however this will be smaller than if only a deficit system were to be used. Having the potential for non-deficit on the sand dunes, large volumes of wastewater can be discharged per event, reducing the demand for excessive storage volumes. This combination of both regimes is considered to be affordable to the community.

An RIB system remained an option due to the presence of coastal sand dunes within proximity to the two WWTPs. These dunes have potential of receiving large quantities of wastewater per event that will rapidly infiltrate to groundwater. As with the two other land discharge options, this option is considered acceptable by the community. A key downside to this scheme is wastewater is not necessarily recycled, but rather disposed at high quantities to groundwater via the land.

10LAND AVAILABILITY AND SELECTION

10.1 Land Availability

To cease wastewater discharges to the existing receiving environments and discharge this to an alternative land based environment, suitable and sufficient land area needs to be identified. Land closer to the WWTPs, does not necessarily mean that it is preferred, but rather land needs to have desirable characteristics for wastewater discharge. It is also preferred that land is at similar to lower elevation than the WWTPs, reducing pumping pressures.

Dependant on the discharge regime, selected land should have appropriate soil characteristics and land management to receive wastewater, without developing adverse environmental effects. For land discharges, the regime can be designed to suit a range of soil conditions and land management types. Factors such soil texture, soil structure, pans, stoniness, past and present land use, nutrient status, flood risk and erodibility can all heavily influence the discharge regime.

Ownership status is another component influencing land selection. For wastewater discharges, consent is sought for longer durations (35 years), thus CHBDC need to have confidence that the discharge land holding will be available for the consent duration. CHBDC can purchase land themselves for discharge, lease land, or enter into a secured long term access agreement with a landowner.

10.2 Land Selection

Once regions surrounding the WWTP are identified to receive wastewater, an individual site or a series of sites need to be identified where site assessments can occur to better understand soil characteristics and design effective discharge rates. Once land is identified, discussions with landowners can commence to understand their interests in receiving wastewater, as well as any information that may influence discharges to their land.

For Porangahau and Te Paerahi, investigations to identify suitable land within 10 km of the WWTPs has been undertaken (LEI, 2020:P:B.11) with there being no clear limitations where wastewater could be applied (Figure 10.1). This is due to extensive land area being relatively flat and alluvially derived and currently used for sheep/beef farming, all suitable characteristics to receiving wastewater. Figure 10.1 is a zone map representing suitable land within 10 km of the two WWTPs where Zone A (green) land is considered to be best suited for receiving wastewater.

In the area between the two WWTPs, approximately five properties were shortlisted as having qualities suitable to receiving wastewater. Early high level engagement was had with each of these landowners to understand their farming system and interest in receiving wastewater irrigation and working with CHBDC. Additionally, iwi members were invited on a bus tour to view and provide feedback on any sites of significance within the area between Porangahau and Te Paerahi, enabling a preferred discharge property to be identified.

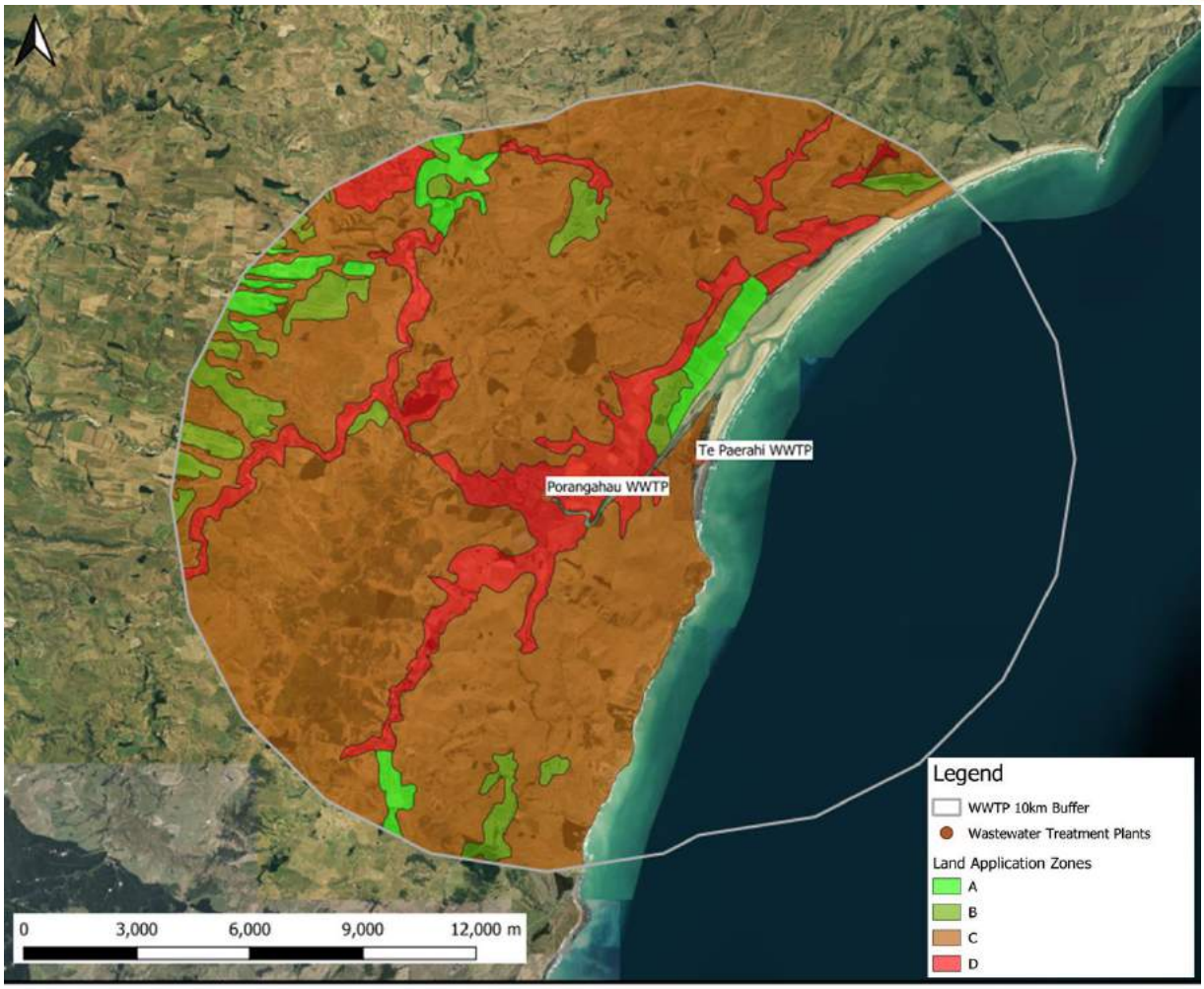

Figure 10.1: Land Suitability Zone Map For Porangahau and Te Paerahi

10.2.1 474 Beach Road, Porangahau

The site of 474 Beach Road, Porangahau is located directly between the Porangahau and Te Paerahi townships on the corner of Hunter and Beach Roads and was found to be a suitable site to receive wastewater. This was due to the site being close to the WWTPs, with suitable soil and land management conditions to suit a variety of discharge regimes. In addition to this, initial correspondence with the landowner revealed a strong interest in receiving wastewater and working with CHBDC. Because of this positive engagement and the site having no clear limitations to receiving wastewater, this site was selected to be the proposed receiving environment for discharges outside of a river discharge. Correspondence with neighbouring land owners to gauge their interest was also undertaken, however 474 Beach Road was nominated due to its location, land management, soil characteristics and landowner engagement.

The property itself is a total of 114.3 ha, encompassing two land parcels located between Porangahau and Te Paerahi on the corner of Beach and Hunter Roads, adjacent to the Porangahau River. Site investigations were undertaken on the 23rd, 24th and 25th of November 2020, investigating site conditions and soil characteristics. LEI (2020:P:B.15) represents the report associated with these initial field investigations. Soils within the southern and north-eastern extents of the property residing on the alluvial plain contain a silty topsoil with a heavy clay subsoil, whereas soils residing on the sand dunes through the central to north-western extent contain more of a sandy silty topsoil with a raw sandy subsoil. Clay soils are considered to be poorly to moderately draining, with sandy soils being well draining. Aside from the clay soils which can be effectively managed, there does not appear to be any significant limitations for a

wastewater discharge to the site. Figure 10.2 below represents the site location of 474 Beach Road, Porangahau in relation to each of the towns.

Figure 10.2: 474 Beach Road, Porangahau

10.2.2 Coastal Environment/Coastal Margin

The inland boundary for the Hawke's Bay Coastal Environment runs along Beach and Hunter Road and entirely encompasses the proposed discharge area at 474 Beach Road. This Coastal Environment can be divided into two regions, the Coastal Margin and the Coastal Marine Area; both having differing rules, policies and objectives in affect. The Stoddart property is located within the Coastal Margin of the Coastal Environment. Although discharging within the Coastal Environment is not ideal, had the proposed discharge site be outside of this, the accessibility to coastal sand dunes would not be possible. This would likely mean there would be a need to discharge to the Porangahau River during wet weather. A direct discharge to the Porangahau River is considered to be of greater environmental impact than a discharge to sand dunes within the Coastal Environment.

11 BPO ASSESSMENT

11.1 BPO Aims

As noted, the BPO must use the most appropriate current technologies that provide the most benefits for the least impacts on the selected receiving environment, whilst being at an affordable cost for the Porangahau and Te Paerahi communities. Due to competing and often conflicting demands, the BPO is typically the best balance of the range of options and perspectives.

11.2 Wastewater Treatment Plant BPO

There are three options CHBDC could making to the existing Porangahau and Te Paerahi WWTPs. Scheme 1 continues with the two WWTPs at their existing locations with Te Paerahi's wastewater pumped to the Porangahau WWTP and both wastewater flows collectively discharged to the river. This option maintains operation of the Te Paerahi WWTP and continues with a sole river discharge. Due to the continuation of the river discharge and WWTPs remaining in their existing locations, this option is **not the BPO.**

Scheme 2 involved the removal of the Te Paerahi WWTP and the construction of a new WWTP at Porangahau with wastewater discharged to any receiving environment. This option received support due to removal of the Te Paerahi WWTP, however the construction of a new plant within proximity to the existing plant restricts potential receiving environments due to being further away from possible land application areas. Therefore, this scheme is **not the BPO.**

Scheme 3 involves the removal of the Te Paerahi and Porangahau WWTPs and sees the construction of a new WWTP servicing both communities with upgraded technologies ideally located between Porangahau and Te Paerahi, and within proximity to the discharge site. Due to the Porangahau and Te Paerahi WWTPs potentially requiring upgrades and with the Te Paerahi WWTP ideally to cease operation, the construction of a new plant would bypass these upgrades. Although expensive within the short-term, this scheme is seen to be beneficial for the long term and is therefore **considered to be the BPO.**

11.3 Discharge BPO

An RIB system was disregarded due to the community's desire to see wastewater beneficially reused, rather than flooding this over a small area where it leaches to groundwater, or indirectly to the Porangahau River. Due to the Central Hawke's Bay regularly suffering droughts, the community's desire is to see wastewater applied to the land, increasing pasture growth and land productivity, rather than simply losing this resource under an RIB system. The community did not support the idea of high wastewater volumes directly discharged to groundwater due to social and aesthetic reasons. Therefore, this option is **not** a component of the BPO.

For Porangahau, the existing sole river discharge regime was not supported by the community due to conflict with cultural, social, environmental and recreational values. Despite potential for additional treatment to improve wastewater quality at the outlet, the community would rather see wastewater applied to a different receiving environment. Therefore, a status quo continuous discharge of wastewater to the Porangahau River is **not** considered to be the discharge BPO.

The ideal receiving environment from both an environmental alongside a cultural/social perspective is to irrigate Porangahau and Te Paerahi's wastewater to land. Irrigation to land will allow nutrients to be beneficially reused maximising plant uptake and improve soil fertility, reducing the requirement for both freshwater irrigation, alongside fertiliser usage. Land

application closes the wastewater loop where nutrients once derived from the land can beneficially be returned.

Land irrigation will see combination of non-deficit and deficit irrigation. Non-deficit is preferred for dunes having the ability to receive greater wastewater volumes, with deficit irrigation being suitable for dry weather conditions on the lower permeability clay soils. A combination of these regimes is not expected to cause adverse effects to the land due to varying management of landform types. The issue with these irrigation regimes relate to the management of wastewater irrigation when soil conditions cannot receive wastewater and storage is at capacity. This develops the need for conditions permitting non-deficit irrigation irrespective of soil moisture conditions when storage cannot accommodate wastewater flows. This 'overirrigation' is essentially a dispersal system where wastewater is no longer applied for pasture growth, but rather to relieve pressures on storage volumes. Although this system facilitates drainage, wastewater contaminants can be attenuated within the soil profile, prior to entering a surface water body and has thus undergone another form of treatment. **Therefore, the discharge BPO for Porangahau and Te Paerahi is a combination of a non-deficit and deficit land irrigation of wastewater, with the ability to discharge to the dunes in excess of plant requirements when soil conditions are not suitable for irrigation and storage is at capacity.**

Under a combination of a non-deficit and deficit irrigation system, a new storage pond is required, enabling wastewater to be stored prior to discharge. Additionally, storage needs to have the ability of storing wastewater for long time periods if soil conditions are not suitable for irrigation. Therefore, storage needs to be of a designated size to accommodate regular wastewater flows where wastewater can be discharged regularly, but also needs to have a buffering volume for when land irrigation cannot occur. It is proposed that a storage pond for Porangahau and Te Paerahi will need to be in the range of 10,000 m^3 to 35,000 m^3, depending on when land irrigation can occur and conditions surrounding overirrigation of wastewater to the dunes.

12CONCLUSIONS

A comprehensive BPO selection process has been undertaken by CHBDC involving environmental advisors, affected parties (landowners and iwi) and the Porangahau and Te Paerahi communities. Community consultation aimed to understand concerns, aspirations, and potential design constraints from interested parties to assess plant, discharge, and treatment options. For each component of the wastewater system, a series of options have been considered, with these narrowed down through community engagement and technical advice and refined in conformance with BPO principles to arrive at a BPO.

For the discharge of Porangahau and Te Paerahi's wastewater, the BPO is considered to be the construction of a new WWTP servicing both communities where the discharge regime is to land under a combination of deficit and non-deficit irrigation systems depending on soil type and the optimisation of the irrigation system through storage, effectively ceasing a direct discharge to the Porangahau River entirely. The site where land application is to commence is 474 Beach Road, Porangahau located between the townships.

The respective aspects of the BPO include:

- the construction of a new WWTP located between Porangahau and Te Paerahi servicing both communities;
- a combined wastewater discharge for both communities to land under combination of deficit and non-deficit irrigation systems depending on soil type and the optimisation of storage, ceasing the discharge to the Porangahau River entirely;
- the construction of a storage pond of between 10,000 m^3, up to 35,000 m^3 to capture wastewater flows; and
- the desired discharge site is 474 Beach Road, Porangahau located between the two communities.

Each of these aspects are believed to be the BPO for Porangahau and Te Paerahi's wastewater discharge system because:

- all components of the BPO have been selected in order to function effectively as an integrated wastewater management and discharge system;
- although costly initially, construction of a new WWTP servicing both communities is considered to be beneficial long term. This also involves the removal of the Te Paerahi WWTP.
- implementation of a land discharge regime is affordable to the respective communities in comparison to other discharge options;
- wastewater flows are to be applied to land under deficit and non-deficit irrigation, aligning with community aspirations of ceasing a river discharge entirely;
- wastewater is able to be beneficially returned to the land, increasing pasture productivity rather than wasted under a river discharge, rapid infiltration basin, ocean outfall or deep bore injection system;
- inclusion of the community in small, additional projects to receive wastewater is seen to have very high support from the community;
- environmental impacts are expected to be reduced as wastewater can be filtered through the soil, reducing risks of nitrogen leaching or contamination of waterways;
- combination of a non-deficit and deficit system enables wastewater to be selectively discharged to varying locations across the proposed site at varying rates, reducing the demand for excessively high storage requirements;
- the BPO system has the ability of accommodating for future flows in response to projected population growth for each of the townships;

The BPO can form the foundation for refining the details of the design, operation, and implementation timing for each aspect of the treatment, storage, and discharge systems. Many of these details are intended to be developed and described in the Conceptual Design report. The BPO needed to be developed and confirmed to provide certainty of the key aspects of the future systems before such a conceptual design process could commence.

The future resource consent application documents will rely upon the conceptual design details for assessing its likely effects on the environment and developing appropriate resource consent conditions. The consent application will also rely upon this BPO report to satisfy the RMA requirement that a nominated discharge is the BPO for the system and its locality.

13REFERENCES

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Beca. (2020:P:C.10). *Te Paerahi and Porangahau Option Report.*

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LEI. (2020:P:B.11). *Porangahau and Te Paerahi Wastewater Upgrade Land Suitability for Discharge*

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Resource Management Act. (1991). *Part 1 - Interpretation and Application.*

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14APPENDICES

Appendix A Consultation Summary (LEI, 2021:P:C.34)
Appendix B Receiving Environment & Treatment Considerations

APPENDIX A

Community Consultation Summary
LEI (2021:P:C.34)

MEMORANDUM **Job 10684**

To:	Darren de Klerk (Central Hawke's Bay District Council)
From:	Sam Morris (Lowe Environmental Impact)
Date:	1st April 2021
Subject:	P:C.34 – Poranghau/Te Paerahi Consultation Summary

This memo outlines community consultation undertaken by Central Hawke's Bay District Council (CHBDC) prior to lodging of the existing discharge consents for the two communities (transitional consents). Additionally, it summarises consultation undertaken for the proposed combined land application of Porangahau and Te Paerahi's wastewater, which informs the Best Practicable Option (BPO) decision. This memo is to be used as an appendix, supplementing the Porangahau and Te Paerahi BPO report (LEI, 2021:P:C.12)[1].

BACKGROUND

CHBDC manages the Porangahau and Te Paerahi Wastewater Treatment Plants (WWTPs) servicing the respective communities. For Porangahau, CHBDC hold consent (DP030233W) permitting discharge from the PWWTP to the Porangahau River, granted on October 22nd, 2009. For Te Paerahi, CHBDC hold consent (DP030234La) permitting discharge from the TPWWTP to culturally significant sand dunes, granted on May 14th, 2012. Both consents expired on May 31st, 2021, with transitional consents for the WWTPs being lodged to continue with the existing discharges under new conditions, whilst a combined land discharge regime is developed.

For Porangahau, the community desire is to cease the existing river discharge, and apply this to an alternative receiving environment, preferentially land. For Te Paerahi, under no circumstances do the community want discharge to culturally significant sand dunes to continue, thus an alternative receiving environment for Te Paerahi wastewater must occur and be consented. With potential for a combined land discharge regime, CHBDC must undertake community consultation, to gauge interest and acceptance for this alternative regime and to collectively agree that this is to be the BPO moving forward.

HISTORIC APPROACH

This section provides an overview of the consultation undertaken by CHBDC with iwi, the Porangahau and Te Paerahi communities and remaining key stakeholders for the existing discharge consents prior to granting in 2009 and 2012, respectively. A summary relating to CHBDC's consultation process for these consents which is incorporated into this memo is provided within Staff (2007)[2].

[1] LEI. (2021:P:C.12). *Porangahau and Te Paerahi Wastewater Treatment and Discharge – Best Practicable Option.*

[2] Staff, R. (2007). *Porangahau Wastewater Treatment and Disposal – Resource Consent Application.* OPUS International Consultants.

- **Iwi**

Consultation with Māori was undertaken using Te Taiwhenua O Tamatea (Tamatea Taiwhenua), an incorporated society representing nine local maraes within the Central Hawke's Bay region, acting as a means of interacting with the Māori community at Porangahau. Additionally, CHBDC used their Māori Consultive Committee to provide guidance and assistance facilitating positive consultation with iwi. There are three iwi within the Porangahau region; Ngāti Kere, Ngāti Manuhiri and Ngāti Pihere, all of which are overarched by Ngāti Kahungunu.

Three key huis for the consent process were attended by representatives within the Central Hawke's Bay area. The first was to explain the consent renewal process for the plants and to invite feedback relating to the existing discharges and the outcomes they wish to see reflected within the renewed consents. The second hui featured the findings of the Issues and Options report[3] developed by OPUS, with a series of proposed options being presented. The third hui involved feedback and discussion of these options, refining and development of a BPO decision.

Outcomes from these huis were positive with support shown from iwi for the various options presented, however they recognised the financial strains an alternative discharge would have to the communities. Iwi expressed concerns relating to the Porangahau discharge, stating they did not feel safe retrieving shellfish and whitebait from the river whilst the discharge was operational and expressed disappointment that it had taken Council so long to consider alternative discharges. Māori wished to see the mauri of the river restored as quickly as possible.

Part of the process with gaining the existing consents for Porangahau and Te Paerahi, was the establishment of the Porangahau Environmental Management Team (PEMT). The PEMT is an agreement between the tāngata whenua of Porangahau (Ngāti Kere, Ngāti Manuhiri, Ngāti Pihere and Puketauhinu) and CHBDC, with the aim of developing a solution to wastewater discharge for the two communities. During the consent renewal process, the PEMT regularly met, discussing ideas to 'pave the way' forward for community wastewater discharge, with the agreement providing detail as to how principles and ideas should be implemented. The agreement seeks solutions, providing for social, cultural, economic, and environmental well-being to the communities and was officially signed on the 12th of December 2009. For the existing consents, investigations commenced for several discharge options outlined in the Issues and Options report[3] but for several reasons were not pursued at this time.

As part of the PEMT, Māori identified the desire of having a partnership role with CHBDC, particularly around environmental monitoring for many WWTPs within the Central Hawke's Bay region. A Kaitiaki Liaison group was to be established containing Ngāti Kere and CHBDC representatives. This group focused on issues at the WWTPs of Otane, Waipukurau and Waipawa, as well as Porangahau and Te Paerahi.

- **Porangahau and Te Paerahi Communities**

Consultation with the communities was through flyer drops to all ratepayers in the community, articles in the news media and a public meeting held at Porangahau. CHBDC invited submissions on the flyer drop relating both to the type and level of upgrades, alongside the funding method for any system component should the upgrade proceed. For Porangahau, there were five submissions, with these supporting the upgrades outlined in the Issues and Options report[3].

[3] OPUS. (2003). *Wastewater Treatment Plants – Discharge Consent Renewal Application – Engineering Options Report.*

Of the submissions, the majority stated that funding of upgrades should be on a user pays basis, however there were arguments stating that rural ratepayers should also pay a small annual charge to recognise the public benefit of the upgrade. Concerns were raised over the cost of varying upgrades being too high and that cheaper alternatives should be found.

- **Key Stakeholders**

CHBDC engaged with Fish and Game, the Department of Conservation, the Public Health Unit of the District Health Board, Stream2000 and individual landowners directly affected by the existing discharges. Each party were individually consulted with areas of concern identified and feedback received. Consultation with stakeholders continued following engagement with the Porangahau community as options were developed and newly refined options included in discussions.

The outcome from stakeholder consultation was support for the options outlined within the Issues and Option report, however as with iwi and the community, they recognised the financial implications of the upgrades. Based on consultation with all affected parties, it was apparent that the greatest limitation to the improvement of the wastewater quality and discharge for the communities was around cost and funding for the upgrades.

CURRENT APPROACH

This section provides an overview of community consultation undertaken by CHBDC for the proposed combined land application and construction of a new WWTP and storage pond at the discharge property for Porangahau and Te Paerahi's wastewater. The focus is action since December 2019.

- **Iwi**

As with the previous consenting process, early iwi engagement was seen as being critical for this project, despite being significantly impacted by COVID-19 alert levels 2-4. Iwi consultation was undertaken through a series of formal and informal meetings at the Porangahau Hall, Rongomaraeroa Marae and multiple site visits to relevant locations.

Differing to the previous consenting process, since 2019, a district wide wastewater strategy (CHBDC, 2020:A:O.3)[4] for wastewater management was developed, renewing engagement with iwi. In addition to community meetings, which were well attended by iwi, separate consultation has been undertaken with iwi.

Multiple receiving environments in addition to a land discharge were assessed as part of the BPO process outlined in LEI (2021:P:C.12)[1]. Although all proposed receiving environments had their opposition by iwi, a land discharge regime was nominated as being the most appropriate from an early stage over surface water, groundwater or ocean outfall discharges.

A specific community meeting with iwi occurred on July 26, 2020 at the Rongomaraeroa Marae, Porangahau, attended by eight technical representatives and six members of Ngāti Kere. Here a series of schematic diagrams, alongside a project timeline encompassing stages for a preferred combined land discharge regime was presented. These schematics outlined how each stage of the upgrade scheme would look and how the treatment and discharge components will operate. For a land discharge, CHBDC invited feedback from the community to understand their perspectives and understandings on archaeological sites in the area, to ensure cultural values

[4] CHBDC. (2020:A:O.3). *The Big Wastewater Story – District Wastewater Treatment and Discharge Management Strategy.*

were understood and respected. A summary of the minutes for this meeting are provided within Annex A.

Following this meeting with iwi, CHBDC, in collaboration with Lowe Environmental Impact (LEI) and Beca, organised a bus trip with iwi on the 3rd of October 2020. This trip included site visits around the Porangahau and Te Paerahi area where iwi members identified sites of cultural significance where avoidance with wastewater irrigation was advised. This trip allowed for representatives and iwi to collaboratively identify suitable regions for wastewater irrigation and a new WWTP and storage pond, whilst avoiding sites of significance.

A follow up meeting was held with the chair of Rongomaraeroa Marae on the 5th of November 2020 to discuss the proposed land discharge sites and to gain some direction on locations that could be investigated. Recommendation was made by the chair to commission an archaeological assessment of the proposed land site to better understand the sites of cultural significance.

On the 21st January 2021 a zoom meeting was held with four of the five trustees of the Puketauhinu trust land where the Te Paerahi wastewater pond and discharge is located. The trust were verbally supportive of the short term and long term plans. Further information has been circulated and engagement continues with the trust.

Another bus trip was organised on the 13th of February 2021 for interested members of local iwi and hapū to visit examples of wastewater land application systems that are currently operating. This was an opportunity to see actual examples of systems such as those proposed for the long term solution for Te Paerahi and Porangahau and enabled many questions to be discussed. A wide range of attendees took part in the bus trip, members from Rongomaraeroa Marae, Ngāti Kere Rohe trustees, Ngāti Kere Hapū Authority, Puketauhinu trust, Porangahau Māori Committee all attended the bus trip along with members of the Porangahau Catchment Group, as well as the mayor and deputy mayor of the Central Hawke's Bay District.

The discharge of Te Paerahi's wastewater to coastal sand dunes is within the coastal environment and thus Section 62 of the Resource Management Act (RMA)[5] requires consultation to be undertaken with Customary Marine Title (CMT) applicants for discharge activities within the immediate area. CMT applicants between Te Paerahi in the south and Blackhead Point in the north are Ngāti Kere and Heretaunga Tamatea[6] (Figure 1). CHBDC has consulted with each of these parties through a formal letter outlining CHBDC's intentions for ceasing the discharge and removal of the WWTP at Te Paerahi, of which both parties are supportive of.

Additionally, CHBDC have engaged iwi to prepare a Cultural Impact Assessment (CIA) to outline Māori cultural values, interests and associations with the Porangahau/Te Paerahi area and their thoughts and views on the Project, as well as a Mahinga Kai Assessment.

[5] Resource Management Act. (1991). *Section 62 – Rights conferred by Customary Marine Title.*
[6] Te Arawhiti. (2021). *Te Kete Kōrero a Te Takutai Moana Information Hub*.

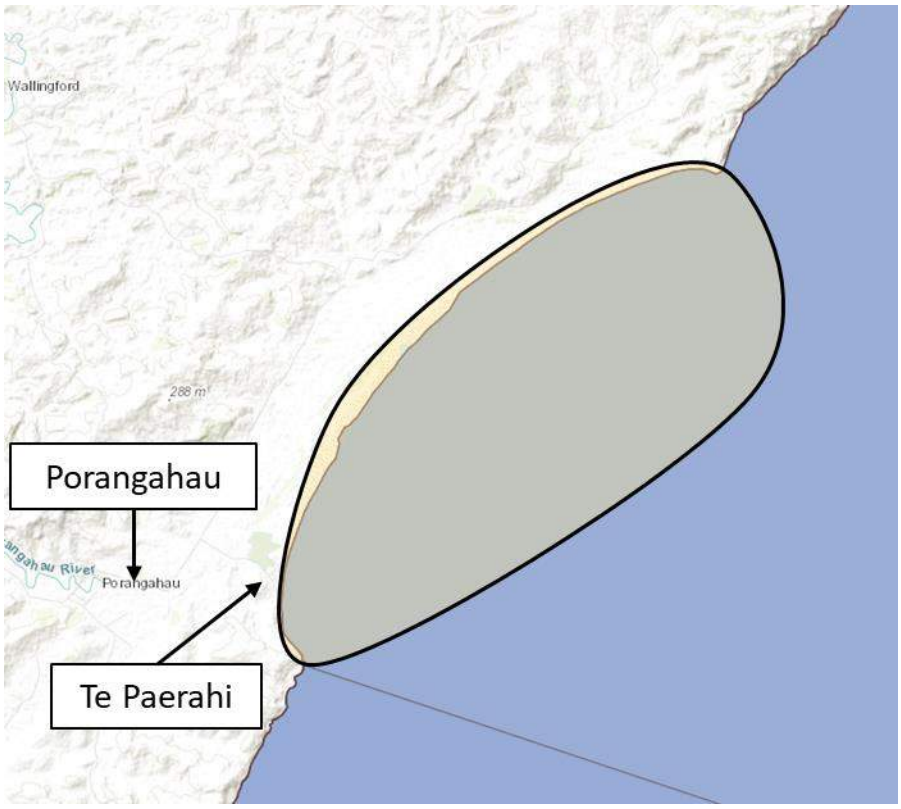

Figure 1: Customary Marine Title Applicant Areas (retrieved from Te Kete Korero a Te Takutai Moana Information Hub (Korero Takutai))

- **Porangahau and Te Paerahi Communities**

Community consultation around the reconsenting of the WWTPs has involved multiple meetings, preparation of newsletters and online communication through the CHBDC portal. Despite being significantly impact by COVID-19 alert levels 2-4, two community meetings occurred on the 16th of December 2019 and the 18th of March 2020 with a third being scheduled for the 15th of February 2021, with this was unfortunately cancelled due to COVID-19 alert level changes. Additionally, a Long Term Plan (LTP) meeting was held at the Porangahau Hall on the 18th of March 2021.

Consultation between CHBDC and the community began in December 2019, with the first meeting held at the Porangahau Community Hall. This meeting, chaired by CHBDC, with support from Hawke's Bay Regional Council (HBRC), LEI and Beca provided an overview of CHBDC's intentions for the reconsenting and discharge regime for the two WWTPs. This meeting included introducing the technical team, background of wastewater discharges and treatment, an overview of the WWTPs performance and options around determining a discharge regime. A wastewater summary was undertaken, with CHBDC inviting feedback and/or suggestions around the discharge regime that could be considered when nominating a BPO. 12 technical representatives and 14 community/iwi members attended this meeting.

Following this, breakout groups were formed, discussing community expectations, aspirations and to seek direction for future planning. The direction to the Council was to develop the options (particularly around a land discharge) to enable the community to assess how they could operate in the Porangahau and Te Paerahi context prior to a next meeting.

Received feedback included the community's surprise of CHBDC having no plan around the removal of the Te Paerahi oxidation pond, despite mentioning its removal pre-2000s. Due to

being involved within consultation for the existing consents, the community again wished to have responsibility and collaboratively work with CHBDC for the Porangahau and Te Paerahi WWTP reconsenting. Ultimately, the community wished to be a contractor to CHBDC, running and managing the WWTPs themselves. A summary of the minutes for this meeting is provided within Annex B.

A second community meeting occurred on March 18, 2020 at The Duke of Edinburgh House, Porangahau, attended by HBRC, LEI, iwi and community members. This subsequent meeting included the initial announcement of three proposed land discharge options with, CHBDC inviting feedback on these. These were 100% land application, 100% river discharge, and a combination of a land and river discharge. Supplementing these options CHBDC presented estimated costs and treatment options to the community, with associated figures outlining suitable land for wastewater discharge in proximity to the WWTPs. This meeting was attended by 9 technical representatives and 14 community/iwi members. A summary of the minutes for this meeting a provided within Annex C.

Following community consultation, came the need to engage with potential landowners and understand their interest in working with CHBDC, receiving wastewater to their property and the potential for construction of a new WWTP and storage pond on their land. A total of five landowners were consulted with a preferred property identified. This property is owned by the Stoddart family, located at 474 Beach Road, Porangahau and comprises 114.3 ha and is deemed best suited of all available land for wastewater irrigation (Figure 1). Following initial engagement, substantial progress has occurred with the Stoddarts over a series of meetings, site visits and a bus tour with the Stoddarts in October 2020 of sites within the Manawatu Region which currently receive community wastewater.

Discussion and feedback from each community meeting have developed and refined a series of options for inclusion within CHBDC's Long Term Plan (LTP). Outcomes supporting the wastewater project are provided in CHBDC (n.d.)[7]. As mentioned, a meeting was held at the Porangahau Hall on the 18th of March 2021 where a presentation was given to the community around the progress of the Project to date. CHBDC outline that 68 % of the CHB community supported the completion of the wider wastewater programme within 15 years, with a further 21 % within 10 years, equating to 89 % of the community wanting the wastewater strategy to be implemented.

[7] CHBDC. (n.d.). *We've faced the facts: Out the other side – Long Term Plan 2021 – 2031.* Source: https://www.chbdc.govt.nz/assets/Links/003056-LTP-Conclusion-4pg-aSCN

Figure 1: 474 Beach Road, Porangahau Site Location

- **Key Stakeholders**

In addition to iwi and the communities, CHBDC engaged with both the District Health Board and HBRC. CHBDC engaged with the Hawke's Bay District Health Board (HBDHB), with the wider district wastewater strategy communicated (CHBDC, 2020:A:O.3)[4], along with the plan for Porangahau and Te Paerahi reconsenting. CHBDC engaged with Cameron Ormsby (Public Health Officer) who noted there was unlikely any evidence of historical reports linking wastewater discharges to illnesses of the public at the respective communities. Despite being no records, Cameron noted this did not mean there was no risk to the public. The view was expressed that the proposed long term changes to the wastewater treatment and discharge systems, namely ceasing the low flow river discharge was positive.

Additionally, CHBDC have engaged with both the DHB and Fish and Game through comments on the wastewater programme via the LTP.

Furthermore, CHBDC has been in regular contact with HBRC, having been involved in early district wide discussions and the engagement group leading to the formulation of the wastewater strategy (CHBDC, 2020:A:O.3)[4]. HBRC staff have also attended community presentations and meetings and provided advice and assistance with the reconsenting process. Senior CHBDC staff have been regularly meeting with HBRC staff and advising of progress for developing alternative long term wastewater solutions and their consenting requirements.

NOMINATION OF A DISCHARGE PROPERTY – 474 BEACH ROAD, PORANGAHAU

As previously mentioned, the nominated discharge property is owned by the Stoddart family, located at 474 Beach Road, Porangahau. An extensive and robust investigation was undertaken to nominate the proposed discharge property which had input from technical advisors, CHBDC, the two communities, iwi and the individual landowners consulted. A description of how the area around the discharge property was identified as the preferred location for irrigation is provided within LEI (2020:P:B.11)[8].

Relating to community engagement, particularly with iwi, CHBDC consulted Elizabeth Pishief of Heritage Services to undertake an archaeological assessment (Pishief, 2021:P:B.18)[9] of the discharge property to understand sites of significance that may restrict wastewater irrigation. A site visit was undertaken on the 13th of January 2021 led by LEI to which the assessment was based on. This report was extensive and noted multiple sites of significance (Figure 2), enforcing the need to have iwi engaged through the consenting process.

Figure 2: 474 Beach Road Archaeological Sites (Digitised from Pishief, 2021:P:B.18)

[8] LEI. (2020:P:B.11). *Porangahau and Te Paerahi Wastewater Upgrade – Land Suitability for Discharge.*

[9] Pishief. (2021:P:B.18). *Archaeological Assessment of Effects: Porangahau and Te Paerahi Wastewater Upgrade.*

ENGAGEMENT SUMMARY

CHBDC has connected with iwi, the Porangahau and Te Paerahi communities and remaining key stakeholders over numerous meetings and site visits over the course of the reconsenting process. A summary of the key events is provided below.

- 30th August 2018 – Hui at Porangahau Hall to introduce new council team and hear concerns from the community (large focus on wastewater project);
- 16th December 2019 – Introductory meeting for community for the current process;
- 18th March 2020 – Community meeting and presentation discussion of options and technical reports and information sought regarding the values and use of the river and near shore environment;
- 26th July 2020 – Rongomaraeroa Marae hui with Ngāti Kere;
- August 2020 – Long term plan pre-engagement with opportunities for community to interact on options through webinars and online interactive feedback tools (COVID-19 constrained);
- September 2020 – Community hui in Wallingford with Porangahau Catchment Group;
- 3rd October 2020 – Tour of local land sites of significance with iwi representatives;
- 5th November 2020 - Zoom meeting with chair Rongomaraeroa Marae – Land options;
- 24th November 2020 – Bus tour of Manawatu land application sites with preferred landowner;
- 5th December 2020 – Hui with Anthony Tipene-Matua at council to discuss CIA;
- 13th January 2021 – Archaeologist and LEI site visit;
- 21st January 2021 – Zoom meeting with Puketauhinu Trustees describing project, answering questions and offering further engagement opportunities;
- February 2021 – District wide newsletter update on proposed changes wastewater changes, including that at Te Paerahi and Porangahau;
- 13th February 2021 – Irrigation option bus tour with iwi to Manawatu;
- 15th February 2021 – Community meeting – Cancelled due to COVID-19;
- 25th February 2021 – Puketauhinu Trustees email approval for the transitional consents;
- 16th March 2021 – Initial request to Anthony Tipene-Matua for Mahinga Kai Assessment;
- 18th March 2021 – Community hui held as part of Long Term Plan engagement process, with presentation given on wastewater project;
- 2020-2021 – Ongoing discussions with landowners around potential land discharge sites.

As mentioned, dates provided above are for key engagement events with the communities or iwi up until this point in time and will continue to occur up until and beyond consent lodgement. In addition to these, specific engagement with, Customary Marine Title applicants, potential landowners, HBRC and HBDHB have all occurred and will continue to occur.

Discussions and feedback from each meeting have informed the progress of the investigations leading to a series of options for inclusion in CHBDC's Long Term Plan. This consultation has assisted with the long term solution for the wastewater discharge for Porangahau and Te Paerahi and ensured that the community's values, aspirations, and concerns have been respected and factored into the decision making process.

NEXT STEPS

- Refinement of the preferred land discharge option.
- Continued engagement with Customary Marine Title applicants, landowners, iwi and the Porangahau and Te Paerahi communities.
- Apply for resource consents.

If you have any questions, queries, or comments, please do not hesitate to get in contact.

Yours sincerely,

Lowe Environmental Impact

Sam Morris
sam@lei.co.nz

ANNEX

Annex A	Meeting Minutes (26th July 2020 - Rongomaraeroa Marae, Porangahau)
Annex B	Meeting Minutes (16th December 2019 – Porangahau Town Hall, Porangahau)
Annex C	Meeting Minutes (15th March 2020 – Duke of Edinburgh House, Porangahau)

APPENDIX B

Receiving Environment & Treatment Considerations

MEMORANDUM **Job 10684**

To:	Darren de Klerk (Central Hawke's Bay District Council)
From:	Sam Morris (Lowe Environmental Impact)
Date:	1st of April 2021
Subject:	Appendix B – Receiving Environment & Treatment Considerations

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This memo provides a summary of alternative receiving environments for wastewater discharge and outlines values and relevant factors of each that should be considered as part of the BPO selection process. Additionally, it outlines potential treatment options that should be considered for wastewater discharge. It is intended that this memo supplements the Porangahau and Te Paerahi Best Practicable Option (BPO) report (LEI, 2021:P:C.12).

RECEIVING ENVIRONMENT OPTIONS

There are three alternative receiving environments to the status quo that CHBDC may consider for discharge; land, groundwater, or ocean.

Alternative environments need to be in proximity to Porangahau and Te Paerahi (ideally between for land or groundwater discharges) ensuring pipeline costs are affordable. Distances of 10 km are considered upper limits from communities, with distances of <5 km preferential.

An integrated system could develop, using more than one discharge site and receiving environment, protecting each from adverse effects during seasons or conditions of increased sensitivity, enabling greater flexibility for discharge and storage management. Therefore, it is important to consider combined discharges and avoid strictly focussing on a single discharge method. Such systems can provide complementary discharge options where one environment can accommodate the discharge whilst another cannot. Storage capacities and discharge criteria would need to be balanced and optimised for such systems. Alternative environments are:

- **Land**

Surface water discharges have historically been the easiest option when discharging wastewater, however, land application and the beneficial recycling of nutrients is an excellent alternative. Wastewater can be applied to land at varying rates depending on the application method, soil characteristics, landform, and climate. Depending on the application method and irrigated area, storage requirements can vary considerably should this be a component. Land application enables wastewater nutrients to supplement plant requirements, closing the wastewater system loop. Furthermore, wastewater can supplement the need for fertiliser, and freshwater irrigation use.

Differing application methods enable wastewater to be applied to numerous land uses and areas. Urban parks and reserves have ability of receiving wastewater, however these are typically too small and surrounded by sensitive residential properties. Porangahau and Te Paerahi are small communities, surrounded by sparsely populated alluvial plains, coastal sand

dunes and hill country farmland, thus there is sufficient land available for wastewater irrigation.

- **Groundwater**

Groundwater can become a receiving environment through drainage (from irrigation or soakage), or via ground injection. Soakage can be considered land irrigation under high rates, a hybrid of the two receiving environments. Injection involves pumping large volumes of wastewater into deep confined aquifers, where this becomes diluted and flows as groundwater. Wastewater is heavily treated almost where it is considered potable, ensuring groundwater doesn't become contaminated. This level of treatment, in conjunction with substantial engineering requirements results in this discharge regime being relatively expensive to ensure groundwater isn't adversely affected. Although expensive, this regime is considered to visually leave minimal environmental footprint at the surface, however heavy emphasis is placed on treatment, ensuring a minimal environmental footprint is noticed at depth.

- **Ocean**

The ocean is not always available for discharge (often communities are too far inland), however for Porangahau and Te Paerahi, this option may be feasible.

Ocean discharges involve a pipeline extending from the WWTP to the sea, discharging wastewater into the ocean environment. This discharge regime can discharge year round and convey large wastewater volumes. As with groundwater injection, visually, this regime leaves minimal environmental footprint, however issues can arise if the discharge does not undergo considerable mixing diluting discharged wastewater, resulting in a plume that may stagnate offshore or wash back onshore.

Ocean discharges can also be expensive in that extensive engineering works are required to construct a pipeline offshore that can withstand constant wave energy, with additional treatment often required to improve wastewater quality.

DISCHARGE METHODS AND CONSIDERATIONS

- **River Discharge - Values and Relevant Factors**

As common with most surface water discharges, concerns relate to cultural and public health values. Strong emphasis has been placed by the community to cease the river discharge. Although undesired, a river discharge may be acceptable so long as the wastewater has undergone additional treatment and has percolated through the land surface first. A series of consent conditions may also provide a degree of acceptance and reassurance of the discharge to the community.

Community concerns relate to the presence of pathogens and public health risks. Beca (2020:P:B.24a) outline existing issues around *E.coli* and faecal coliforms which have been known breach guidelines upstream of the discharge point primarily due to higher flow events. Additionally, faecal coliform concentrations are known to breach trigger values downstream of the discharge point, particularly during low flow conditions. Furthermore, Porangahau River is considered highly impacted by agriculture and contains elevated nitrogen and phosphorus

concentrations upstream of the discharge point, indicating the river is already in poor condition. Should this be the sole discharge option, the community are unlikely to be supportive due to the potential for further degradation of the river.

Concerns surrounding river discharges also relate to the infection of people through fish consumption (shell and finned). District Health Boards and medical records indicate there is no known evidence of illness (linking to wastewater discharge) from the consumption of kaimoana gathered from the locality of a wastewater discharge, however this is another aspect that the community will recognise and would want reassurance to be accurate. Due to the township's proximity to the coast and with multiple access locations, fishing, and the consumption of fish within the lower reaches of the Porangahau River is considered to be good, further facilitating the community's reluctance for a river discharge. Restricting discharges to outgoing tides may reduce the risk of infection through contact recreation such as fishing, however higher tides correspond with increased fishing opportunities.

To achieve compliance with discharge restrictions, wastewater may need to be stored and probably discharged to another environment. If a land discharge forms that "other environment" then it will be suited to receive discharges during summer, minimising required storage volumes. If no alternative discharge is developed, the volume and cost of storage required, preventing low river flow discharges would be enormous. This is primarily due to the Central Hawke's Bay region experiencing regular extended drought periods meaning low flow storage would likely be for extensive time periods. This would also force subsequent river discharges to occur in larger volumes over shorter durations when river flows are higher, and this consequently may cause greater adverse effects during those periods than the existing discharge regime.

- **Land Discharge - Values and Relevant Factors**

In comparison to river discharges, land application is typically perceived as being more environmentally friendly by the community and tāngata whenua. Land is typically the preferred discharge environment for cultural, public health, social/recreational and environmental reasons so long as the discharge does not adversely affect soils, plants, grazing animals, groundwater, or downstream surface water. Although there is potential for wastewater to enter groundwater, the support for land application comes from the beneficial recycling of nutrients where it can be filtered through the land surface, rather than being directly lost to water through a direct discharge.

Despite being preferred to river discharges, care and appropriate management of a land application system is still essential. Careful management regarding irrigation application rates, timing and duration, alongside investigations into soil characteristics and wastewater quality is needed to minimise risks of adverse environmental effects.

Financial implications of irrigation can be high as costs reflect the length of pipelines, pumping costs and storage requirements. Despite being beneficial, farmers may not want wastewater irrigation for varying reasons, meaning should landowner interest be low, CHBDC could consider purchasing land within the vicinity of the WWTPs for themselves, instead of leasing from landowners. Although directly purchasing land has its advantages, it is also another cost that will need to be considered.

Inclusion of activities for wastewater reuse such as wetland restoration or irrigation for nurseries can be perceived very well by the community. Activities such as these enable the community to become directly involved with the project, increasing support and perception for wastewater utilisation, building relationships, and providing jobs and involvement for the community. However, the ability and extent of water use should be considered.

- **Groundwater Discharge - Values and Relevant Factors**

Groundwater generally has value when it recharges streams and rivers or is abstracted for uses such as drinking water (particularly valuable for human drinking water) or irrigation. There are no recreational values associated with groundwater, but there is a social value of expecting the groundwater resource to be maintained with high purity and available for use wherever people need to access it. Due to this, prior to discharge, wastewater essentially needs to be considered potable, ensuring that there is no degradation to this resource and no adverse effects or risk to downstream users. It is uncertain how this option may be perceived by tāngata whenua primarily due to limited examples where this has been the nominated BPO, however it is likely that cultural values will be compromised if contaminants were found to be entering groundwater.

Financially, the cost of implementing a groundwater injection system is very expensive, particularly for communities the size of Porangahau and Te Paerahi. This is due to the typically high level of treatment and extensive engineering works required to treat and inject wastewater and ensure that added wastewater will not adversely affect a groundwater reservoir.

- **Ocean Discharge - Values and Relevant Factors**

The ocean environment is considered to be of high importance to tāngata whenua both spiritually and culturally, having relied on the water to provide a food source, for access along the coast and for recreation for centuries. The potential for perceived pollution is likely to receive considerable opposition. Although this discharge is to a differing environment to a river discharge, it may still be considered as being directly to a water body.

As mentioned, one of the aspirations of the Porangahau and Te Paerahi communities is to see wastewater passed through a medium where nutrients and contaminants can be filtered and beneficially reused prior to interacting with groundwater. As this does not occur for this discharge regime, the communities may not be in support of this.

TREATMENT OPTIONS

Pond Enhancements

Pond enhancements are as the name suggests, enhancements to the ponds, improving wastewater quality. Although there is a broad spectrum of potential upgrades, these can be comparatively cheap and simple to upgrade existing ponds. Currently, both ponds are in conformance with consent conditions, however some form of quality improvement could realistically be expected within the foreseeable future. This could be done through UV treatment, or the additional removal of TSS, enhancing this UV treatment. Further enhancements could be upgrading current aeration and mixing capabilities or the consideration of similar processes targeting higher treatment, particularly for TSS, BOD and/or

ammonia. As mentioned, pond enhancements vary considerably, however Beca (2020:P:C.10) separate these into in-pond and post-pond enhancements. Further detail for each option is described within Beca (2020:P:C.10).

Activated Sludge Treatment or Fixed Film Process

Activated sludge is a common form of wastewater treatment, specifically targeting TSS, BOD, TN and P through aeration and a biological floc composed of bacteria and protozoa. Oxygen becomes incorporated into wastewater through an aerator, where wastewater flows into a settling tank (final clarifier), allowing biological sludge to settle, thus removing this from wastewater. This process aims to either, oxidise carbonaceous biological matter or nitrogenous matter (mainly ammonium and nitrogen within biological matter) or to simply remove nutrients such as N or P. Activated sludge treatments can be classified into membrane bioreactors (MBRs) or sequenced batch reactors (SBRs).

Using the same bacteria and protozoa, a fixed film process utilises a biofilm attached to a media (wood, plastic, rock or another natural or synthetic material) within a tank supporting biomass on its surface and within the material to treat wastewater. These processes include a submerged aerated filter, trickling filter or a rotating biological contactor.

Tertiary Treatment

As with pond enhancements, tertiary wastewater treatment comes in many forms whether this be as a membrane filter, clarification, tertiary wetlands or filtration. Each method aims to target specific wastewater characteristics, improving quality depending on the option, and therefore its usage capabilities.

Chemical Precipitation

Chemical precipitation can specifically target P concentrations, a nutrient with typically negative adverse environmental effects. This treatment can use one of three chemicals; aluminium salts (primarily alum), iron salts (primarily ferric chloride) or hydrated lime (calcium hydroxide). Either of these can be incorporated into wastewater, binding to phosphorus molecules where through a process of coagulation, can subsequently be removed by a solids separation process.

Worm Farm

This option contains a packed bed reactor where timber shavings are used as a medium. The shavings layer is populated with worms and micro flora. Effluent is applied to the surface where it moves through the system, accumulating within the drainage layer and discharged. With time, a layer of worm humus forms where worms maintain the good bed condition through movement of material and aeration of the bed through borrowing tunnels.

Disinfection

Disinfection is the process where pathogens are targeted and deactivated, improving water quality, through UV light. Effective UV disinfection relies upon light being able to pass through the water to reach microorganisms which can be prevented through either high suspended solid concentrations or light being absorbed by contaminants. For Porangahau and Te Paerahi, this treatment option ranges between moderate to very good effectiveness, meaning if suspended solids can be managed, UV disinfection has the potential to dramatically improve pathogen concentrations.

If you have any questions, please do not hesitate to get in contact.

Yours sincerely,

Lowe Environmental Impact

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