Discharge Location: Extension of Existing Harbour Outfall into the Channel

Description

Presently, the Raglan WWTP has consent to discharge up to 2,600m³ of treated wastewater daily into the Whāingaroa Harbour on outgoing tides. The existing treated wastewater outfall could be optimised by extending it further into the channel, such that it is further from the harbour edge. This would lead to improved dispersion efficiency due to deeper water and stronger currents, and a reduction in likelihood of treated wastewater re-entering the harbour or being retained further around the coast due to eddying.

Any new discharge structure would be fitted with a diffuser or duck-bill type arrangement to improve initial mixing of the discharged treated wastewater. The new outfall could be either trenched or directionally drilled to depths between 2-4m at low tide depending on the nature of the bed material at the outfall site. Possible cross-sections are shown below.

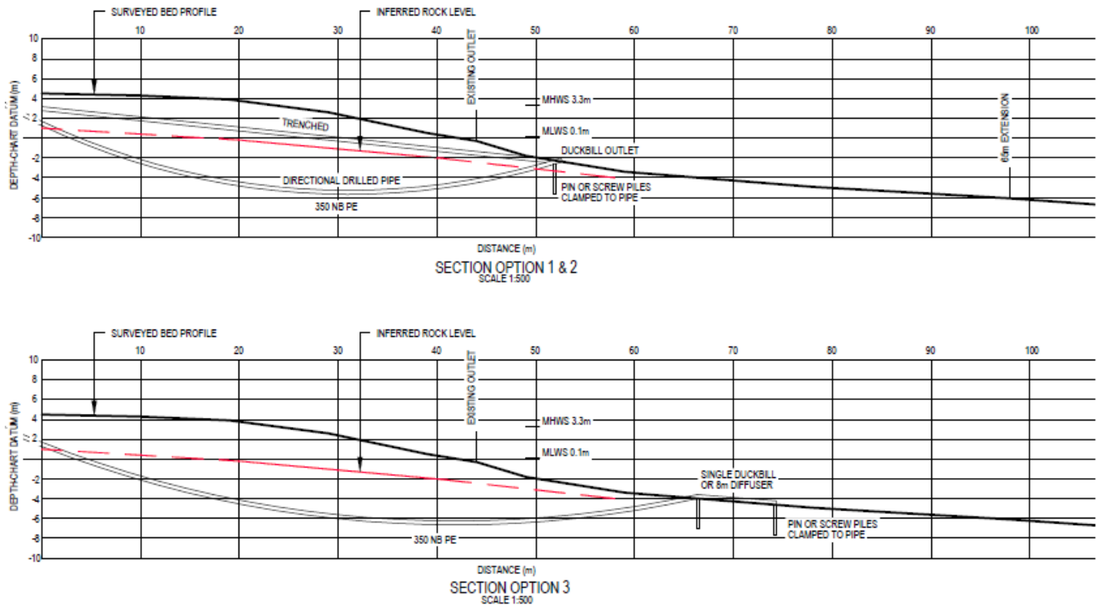

Figure 1: Cross-Sections for Potential Extended Outfall Options

Location

The treated wastewater enters the Whāingaroa Harbour at a location close to the harbour mouth, at a depth of between 2 and 4m (at low tide), marked on Figure 2.

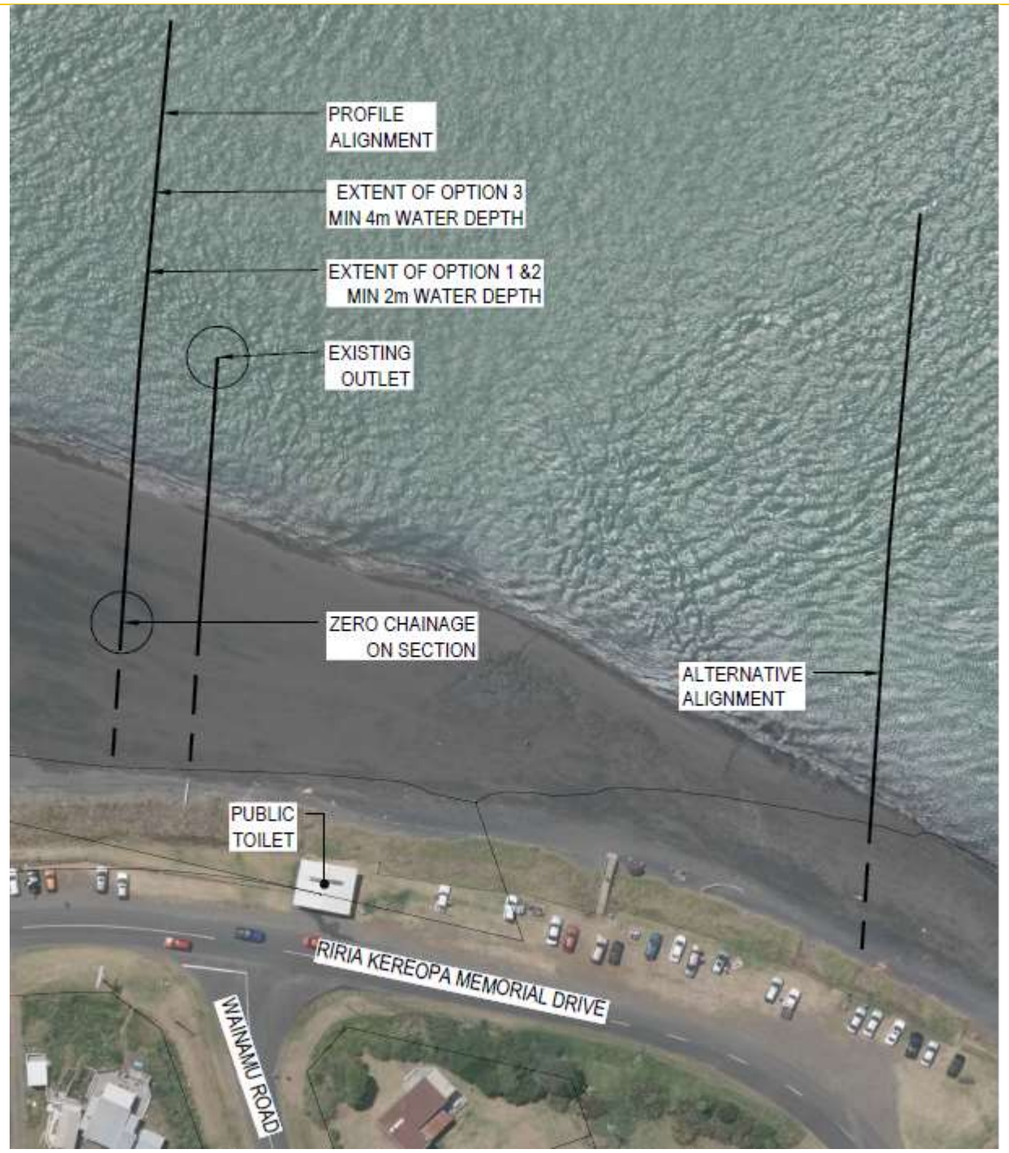

Figure 2: Extended Outfall Possible Location and Alternative Alignment Options

Given the high current speeds and semi-exposed nature of the outfall location to larger waves, constructing a longer outfall at this location would be challenging. Maintenance would also be an issue given the large changes in seabed levels from shifting sand. For these reasons relatively short outfall extensions are proposed.

Treatment Options

Treatment Option	Description
Existing ponds & UV	Wastewater is received at the inlet works, from where wastewater is piped to aerated ponds with aquamats installed. The pond wastewater discharges into a day pond for storage prior to discharge on the outgoing tide. From the day pond treated wastewater is pumped via an inline UV disinfection system to the discharge point near the mouth of the Whāingaroa (Raglan) Harbour.
Existing ponds & UV incl TSS removal	Additional TSS removal can be achieved via tertiary treatment using a membrane. Wastewater flows through membrane modules, allowing only smaller particles to pass through. Some pathogens are removed through the membrane by a filtration process, whilst UV disinfection would provide additional pathogen removal.
Convert pond to activated sludge & UV	Converting one or more of the current ponds to an activated sludge process will target the TSS, BOD and ammoniacal nitrogen parameters. Total nitrogen and phosphorus can also be targeted if required. A new clarifier would need to be installed.
New separate activated sludge plant & UV	Construction of a new purpose-built activated sludge plant at the existing location, which is a more resilient option than conversion of one of the existing ponds to the activated sludge process.
MBR & UV	A membrane bioreactor is an activated sludge process which uses membranes instead of a clarifier to separate solids from the treated wastewater. Nitrogen and phosphorus can be removed from this process.
Existing ponds + fixed film process with clarification + UV	Utilising the same bacteria as activated sludge, a fixed film process (e.g. submerged aerated filter, trickling filter) uses biological material (biofilm) attached to media in a tank to treat the wastewater. A clarification step is also required to separate the solids that slough off the media. Fixed film processes could be used with the existing ponds, and will target BOD and ammoniacal nitrogen parameters.

Options Assessment Criteria

Criteria	Issue/Topic	Description/Explanation
Public Health	Microbiological quality of treated wastewater	Risk of public exposure to waterborne pathogens through:
		- Direct contact with the conveyance or treatment process
		- Direct contact with the receiving environment, for example through contact recreation
		- Indirect exposure, through food gathering (such as shellfish, fish, watercress, etc) and groundwater use.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.
	Treated wastewater re-use	Risk of contamination from treated water for non-potable re-use.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments
	Aquatic ecology	Potential effects on aquatic ecosystems
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils
	Coastal environment and resources	Potential effects on significant coastal and marine areas, existing harbour and coastal processes, and physical footprint within the harbour and coastal marine area.
Cultural	Mauri	Potential effects on mauri of land, water and air
	Kai moana	Potential effects on kai moana and the kaitiaki management of customary fishing
	Cultural values	Potential effects on the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga
	Health and Wellbeing	Potential effects on the ability of the land, sea and air to support wairua in order to maintain health and wellbeing for Maori
Social and community	Amenity value and aesthetics	Potential effects on the natural and built environment (e.g. visual, odour, noise)
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area
	Access to the coast	Extent to which an option effects access to the coastal marine area.
	Re-use potential of option	Extent that treatment by-products can be utilised beneficially now and into the future (i.e. irrigation/nutrients for food production)
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing
	Existing infrastructure	Potential to maximise use of existing infrastructure that has a valuable remaining economic life, e.g. power supply, treatment plants, pumps, conveyance pipes and existing sites.
Technology	Reliable, proven and robust technology	To be sustainable, an option should be based on proven technology and have adequate redundancy (spare operational capacity to provide back-up in case of failure)
	Adaptable and flexible	Due to the uncertainty associated with future growth, a feasible option must be able to adapt to changing conditions such as increased flows and loads, discharge quality requirements, input requirements, and energy availability.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?
	Whole of life cost	How do the whole of life costs pf the various options compare?
	Financial risk	Is the option affordable even if growth does not occur as predicted?
Opportunities and Benefits	Opportunity for resource recovery	The provision of beneficial reuse of treated wastewater. (i.e. with emphasis on food production)
		The potential for beneficial reuse of biosolids. (i.e. with emphasis on food production)
Statutory Considerations	Consistency of the option with National Policy Statements (NPS)	Includes consistency with the New Zealand National Coastal Policy Statement (NZCPS), National Policy Statement for Freshwater Management (NPS-FM) and any other relevant NPS

	Consistency of the option with any other relevant legislation outside of the Resource Management Act	Includes consistency with the Reserves Act, and any other relevant Act

Options Assessment

Treatment options for this discharge location are assessed based on the above criteria in the following table.

Key: Red – Largely fails to meet the criteria, Amber - Marginally meets the criteria, Green - Meets criteria well

Treatment Process Option	Public Health	Environment	Cultural	Social & Community	Sustainability	Constructability	Technology	Financial Implications	Opportunities and Benefits	Statutory Considerations	Comments	Carry forward to short list?
Existing ponds & UV	Quantitative Microbial Risk Assessment (QMRA) for existing discharge shows human health effects for recreational water users and consumers of uncooked shellfish are generally low. Improved dilution would reduce health risks further.	Discharge on outgoing tide minimises adverse environmental effects on the Whāingaroa Harbour. Hydrodynamic modelling has established a zone of reasonable mixing of 150m, outside which adverse effects on water quality are predicted to be negligible.	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Low energy treatment and conveyance system, very low additional embodied carbon.	Only new infrastructure is replacement of outfall. New outfall difficult to construct in coastal area with high-currents. Further geotechnical investigation required to confirm construction methods for outfall.	Reliable and proven technology.	Low cost solution.	Limited opportunities for beneficial reuse of treated wastewater. Some opportunity for beneficial reuse of biosolids.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The existing treated wastewater discharge is of a relatively high quality and adverse effects on ecosystems and habitats are likely to be avoided.	Community opposition to existing discharge quality.	No
Existing ponds & UV Incl TSS removal	Membrane treatment will provide additional pathogen removal (multi-barrier approach). Human health effects will be lower than	Improved treatment quality compared to existing	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Low energy treatment and conveyance system. Additional embodied and operational carbon associated with membrane treatment.	Membrane process can be readily constructed. New outfall difficult to construct in coastal area with high-currents. Further geotechnical investigation	Reliable and proven technology.	Relatively low cost solution.	Membrane treatment will produce a treated wastewater quality suitable for non-potable reuse.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The upgraded existing treated wastewater discharge will be of a relatively high quality and adverse effects on	A membrane upgrade will provide additional pathogen and TSS removal with an overall improvement in treated wastewater quality delivered at an affordable cost. Extended outfall will	**YES**

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Treatment Process Option	Public Health	Environment	Cultural	Social & Community	Sustainability	Constructability	Technology	Financial Implications	Opportunities and Benefits	Statutory Considerations	Comments	Carry forward to short list?
	existing discharge.					required to confirm construction methods for outfall.				ecosystems and habitats are likely to be avoided.	provide greater dilution and dispersion of the discharge on the outgoing tide.	
Convert pond to activated sludge & UV	Provides a similar (or possibly lower) quality discharge than existing process (in terms of pathogens).	Improved treatment quality compared to existing	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Moderate energy requirements associated with activated sludge treatment process. Low embodied carbon as existing assets reused.	Replacement of existing outfall and conversion to activated sludge can be readily constructed. New outfall difficult to construct in coastal area with high-currents. Further geotechnical investigation required to confirm construction methods for outfall.	Reuse of existing pond liner is a risk – potential leakage resulting from damaged liner.	Moderate cost option	Activated sludge and UV will produce a treated wastewater quality suitable for non-potable reuse. Possibly some form of tertiary filtration may be required.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The upgraded existing treated wastewater discharge will be of a relatively high quality and adverse effects on ecosystems and habitats are likely to be avoided.	Additional nutrient removal provided by activated sludge process not likely to be required from an environmental effects perspective. Higher-cost than membrane upgrade.	No
New separate activated sludge plant & UV	Provides a similar (or possibly lower) quality discharge than existing process (in terms of pathogens).	Improved treatment quality compared to existing	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Moderate energy requirements associated with activated sludge treatment process. Moderate embodied carbon as new treatment assets required.	Replacement of existing outfall and new activated sludge process can be constructed. Further site investigations needed to determine site suitability for new tanks. New outfall difficult to construct in coastal area with high-currents. Further geotechnical	Reliable and proven technology.	High CAPEX & OPEX cost	Activated sludge and UV will produce a treated wastewater quality suitable for non-potable reuse. Possibly some form of tertiary filtration may be required.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The upgraded existing treated wastewater discharge will be of a relatively high quality and adverse effects on ecosystems and habitats are likely to be avoided.	Additional nutrient removal provided by activated sludge process not likely to be required from an environmental effects perspective. Higher-cost than membrane upgrade.	No

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Treatment Process Option	Public Health	Environment	Cultural	Social & Community	Sustainability	Constructability	Technology	Financial Implications	Opportunities and Benefits	Statutory Considerations	Comments	Carry forward to short list?
						investigation required to confirm construction methods for outfall.						
MBR & UV	MBR and UV will provide additional pathogen removal. Human health effects will be lower than the existing discharge.	Improved treatment quality compared to existing	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Carbon footprint higher	Replacement of existing outfall and new MBR process can be constructed. Further site investigations needed to determine site suitability for new tanks. New outfall difficult to construct in coastal area with high-currents. Further geotechnical investigation required to confirm construction methods for outfall.	Reliable and proven technology.	High CAPEX & OPEX cost	Very-high quality treated wastewater suitable for non-potable reuse.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The upgraded existing treated wastewater discharge will be of a relatively high quality and adverse effects on ecosystems and habitats are likely to be avoided.	Additional nutrient removal provided by MBR process not likely to be required from an environmental effects perspective. Higher-cost than membrane only upgrade.	No
Fixed media process & UV	Provides a similar (or possibly lower) quality discharge than existing process (in terms of pathogens).	Improved treatment quality compared to existing	Hapū have reiterated opposition to marine options and support for re-use options.	Improved dilution and dispersion may improve community perception. Some opposition from community to marine discharge.	Carbon footprint higher	Replacement of existing outfall and new fixed media process can be constructed. Further site investigations needed to determine site suitability for new tanks. New outfall difficult to	Reliable and proven technology.	Moderate CAPEX and OPEX cost option.	Fixed media and UV will produce a treated wastewater quality suitable for non-potable reuse. Possibly some form of tertiary filtration may be required.	Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS) has relevance - see notes below. The upgraded existing treated wastewater discharge will be of a relatively high quality and adverse effects on ecosystems and habitats are	Provides only marginally better treated wastewater standard than existing process, less pathogen removal when compared to membrane upgrade.	No

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Treatment Process Option	Public Health	Environment	Cultural	Social & Community	Sustainability	Constructability	Technology	Financial Implications	Opportunities and Benefits	Statutory Considerations	Comments	Carry forward to short list?
						construct in coastal area with high-currents. Further geotechnical investigation required to confirm construction methods for outfall.				likely to be avoided.		
Notes In reference to Policy 23(2)(b)(ii) of the New Zealand Coastal Policy Statement 2010 (NZCPS), a clear understanding from Raglan tangata whenua after engagement is that the present treated wastewater marine discharge is offensive to their values, with a substantial adverse effect resulting. Any alternative discharge method that enables satisfactory whenua contact and re-use potential, should have in principle support.												