Raglan Wastewater Treatment Plant Consenting Project

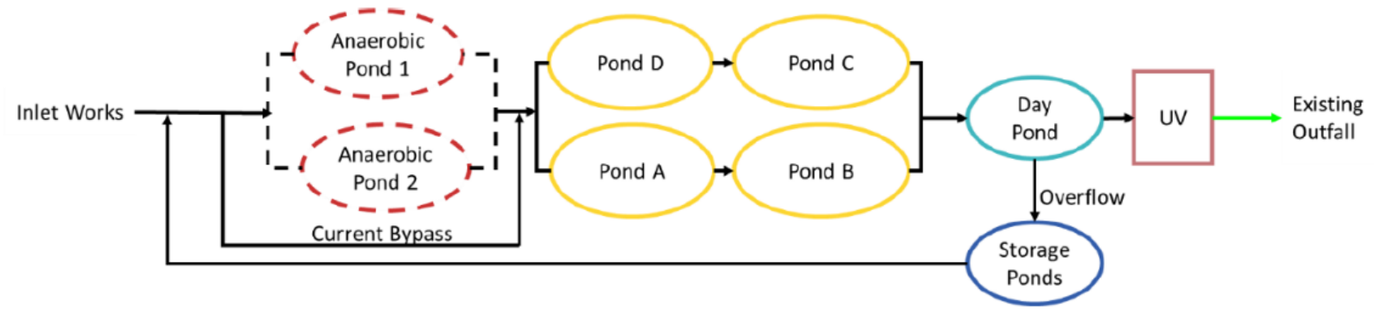
The resource consent for the discharge to the Whāingaroa Harbour (in the coastal marine area) for the Raglan Wastewater Treatment Plant (WWTP) expired in February 2020 and a consent application was submitted prior to that for a short term consent while long term options were being further considered. The discharge is able to continue under section 124 of the Resource Management Act (RMA) until a decision is made on the consent.

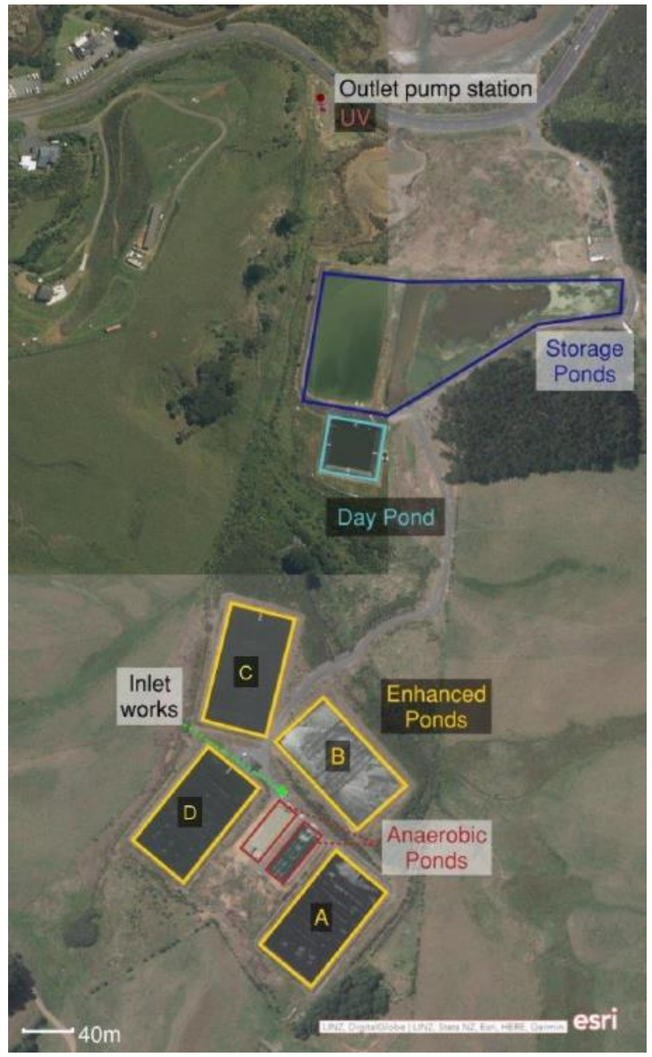
Over the last few years the WWTP has experienced re-occurring non-compliances with the existing resource consent conditions for the discharge of contaminants, mostly breaching the total suspended solids (TSS) consent parameter. An options assessment is required to inform Watercare's preferred future plans for the discharge and support a resource consent application to be made under the Resource Management Act (RMA) for the long term wastewater solution.

Existing WWTP

The Raglan WWTP is administered and operated by Watercare on behalf of Waikato District Council. The existing site layout at Raglan WWTP is shown to the right:

The current discharge consent allows a discharge of up to 2,600m³ of treated wastewater per day to Whāingaroa Harbour. Discharge is only permitted for a maximum of 5.5 hours per outgoing tide, commencing no earlier than 0.5 hours before high tide and ceasing no later than 1 hour before low tide. Discharge duration may exceed this after extreme weather but not for more than 20 days per year.





Project Objectives

The aim of the project is to identify the best practicable option to provide wastewater services for the Whāingaroa community. In doing this we aim to:

- Keep communities healthy
- Protect the environment, particularly the water quality and ecology of the Whāingaroa Harbour
- Recognise the significance of the Whāingaroa Harbour to hapū and support the kaitiaki management of customary fishing
- Protect the community use of the area, along with the visitor experience
- Work in partnership with the community and hapū
- Retain flexibility for future, sustainable, long-term solutions including potential reuse of treated wastewater
- Keep the overall costs of the wastewater solution to affordable levels

Options Development

A "long list" of possible options was identified by Watercare and Beca staff with hapū and stakeholder input. This long list was then assessed to provide a short list of options[1] to be evaluated further within this report, in terms of developing a high-level concept design and costing to inform the preferred option decision making process. The **seven** options assessed in this Multi Criteria Analysis (MCA) assessment are summarised below:

Option	Treatment	Discharge
Option M1	Existing treatment process + tertiary membrane	New harbour outfall
Option M2	Membrane Bioreactor (MBR) and UV disinfection	New harbour outfall
Option F1	MBR and UV disinfection	Freshwater diffuse discharge
Option L1	Existing treatment process + tertiary membrane	Combined public land discharge and new harbour outfall
Option L2	Existing treatment process	Private land discharge and storage
Option L3	Existing treatment process + tertiary membrane	Combined private land discharge and new harbour outfall
Option L4	MBR and UV disinfection	Combined public land discharge and new harbour outfall

Growth is expected to continue in Raglan, due to infill and greenfield residential sites including Rangitahi Peninsula and currently zoned residential land. There is currently little commercial and industrial wastewater production in Raglan and this is not expected to increase. Overall, the average daily inflow at the Raglan WWTP is expected to increase from 1,163m^3/day in 2020 to 1,957m^3/day in 2055[1].

Scoring Matrix

The scoring matrix used to undertake this MCA assessment for each option is set out in the table below:

Criteria	Issue/topic	Score = 1 - 3 (low)	Score = 4 – 7 (mid)	Score = 8 – 10 (high)
Public Health	Public health effects of treated wastewater discharge	Public health risk greater than No Observable Effect (NOEL)	Public health risk less than the NOEL, although some risk remains	Public health risk much less than the NOEL
	Health effects from irrigation	Significant health effects from irrigation	Potential for some health risks if not managed appropriately	Little or no health effects from spray irrigation
Environment	Water quality, aquatic ecology, terrestrial ecology, coastal environment	Little or no improvement to environmental outcomes expected as a result of implementation of the option	Some improvement to environmental outcomes as a result of implementation of option	Implementation of the option would demonstrate significant improvement to long term environmental outcomes
Cultural	Mauri, kai moana, cultural values, health and wellbeing	The option is likely to meet high levels of resistance on cultural grounds	The solution recognises and goes some way to addressing cultural concerns	The solution is expected to meet cultural aspirations for the activity
Social and community	Amenity value and aesthetics	High impact to amenity value and aesthetics	Some impact to amenity value and aesthetics	Little or no impact, or enhancement to amenity value and aesthetics
	Urban development	High impact on urban development, could restrict growth	Implemented option could have some impact on urban development	Unlikely to impact on urban development, allows for growth
	Recreation	Implementation of option would not demonstrate any improvement to recreational use of the environment. Likely to meet significant resistance from stakeholders.	-	Implementation of the option would demonstrate significant improvement to long term recreational outcomes.
	Food gathering	High impact on food gathering, meets significant resistance	Some impact on food gathering, perception issues	Little or no impact on food gathering (or even improvement)
	Access to the coast	Public access to the coast is restricted due to this option	Some impact on public access to the coast	No impact on public access to the coast
Sustainability	Carbon footprint	High embodied and operational carbon footprint	Medium embodied and operational carbon footprint	Low embodied and operational carbon footprint
Constructability	Geology, soil, groundwater conditions	Unknown or unsuitable ground conditions	Some information available, further investigation required	Ground conditions well known and suitable for option
	Land availability, accessibility	Land not accessible or availability not sufficient for option	Land identified as suitable but unknown availability or accessibility	Land identified and likely to be available and accessible
	Existing infrastructure	No existing infrastructure available to utilise	Some existing infrastructure may be available to utilise, further investigation required	Existing infrastructure available to utilise
Technology	Reliable, proven and robust technology	Minimal redundancy, high risk of process failure	Some degree of redundancy and some risk of process failure	High degree of redundancy and proven technology with low risk of process failure
	Adaptable and flexible	Minimal or no flexibility to adapt to increased flows or loads, discharge quality requirements	Some flexibility to adapt to increased flows or loads, discharge quality requirements	High degree of flexibility to adapt to increased flows or loads, discharge quality requirements
	Able to be staged	No staging available	Some staging available	Able to be staged, modular components
	Operational and engineering resilience	Option has limited resilience for natural hazards and operational failure	Option has some resilience for natural hazards and operational failure	Option has a high degree of resilience to natural hazards and operational failure
Financial Implications	Capital cost, operating cost, whole of life cost, risk	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria.		
Opportunities and Benefits	Opportunity for resource recovery	No potential for beneficial resource of treated wastewater or biosolids	Some potential for beneficial resource of treated wastewater or biosolids	High potential for beneficial resource of treated wastewater or biosolids
Statutory Policy Considerations	Consistency of the option with relevant legislation	Option is likely to be inconsistent with relevant legislation or statutory policies	-	Option is likely to be consistent with relevant legislation or statutory policies

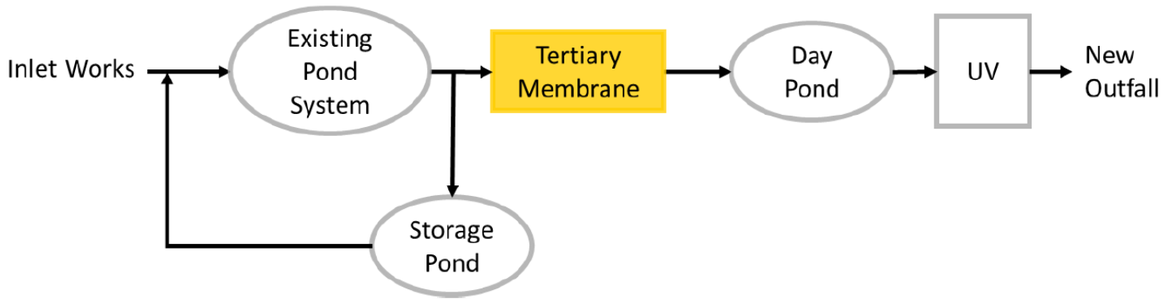
[1] Beca Ltd, February 2021. *Raglan WWTP Optioneering – Short List Design and Costing*. Prepared for Watercare Services Ltd.

Option M1

Existing treatment process with additional tertiary membrane and new harbour outfall

OPTION M1 SUMMARY	
Description	The existing ponds would need to be upgraded to treat the increasing flows. A tertiary membrane unit with 3,000m^3 per day capacity will be installed after the ponds. A new 85m outfall would be located near the existing.
Comment	The tertiary membrane unit will remove suspended solids and pathogens from the discharge. The new discharge structure combined with optimised discharge timing will improve distribution of the treated wastewater on the outgoing tide.

PROCESS FLOW DIAGRAM:

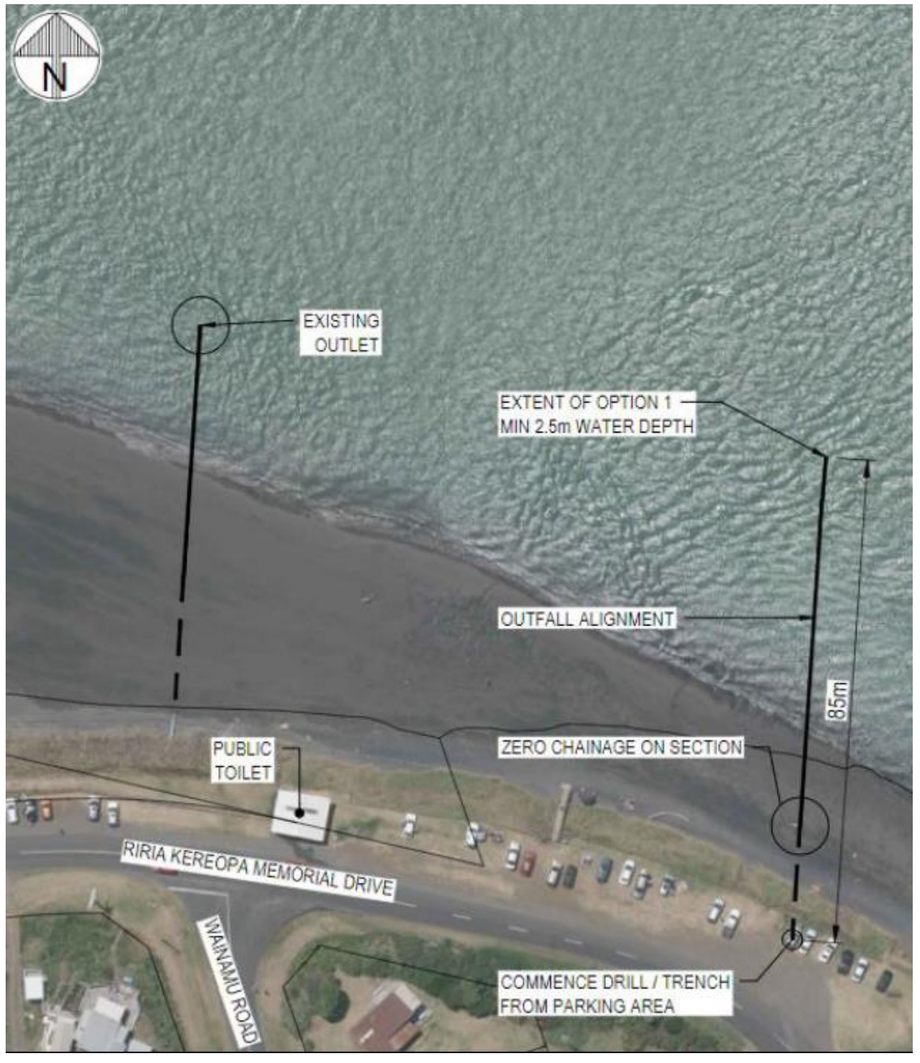


KEY COMPONENTS	
New tertiary membrane	• Polish pond treated wastewater to target a reduction in TSS and pathogen levels
Modifications to Ponds A - D	• Removal of aquamats • New surface aeration system • Reinstating anaerobic ponds to reduce BOD loading in aerobic ponds
New harbour outfall	• Discharge outlet at least 2.5m below chart datum to provide for meaningful improvement in dilution performance

EXPECTED TREATED WASTEWATER QUALITY – TERTIARY MEMBRANE AND UV DISINFECTION						
Parameter	**TSS**	**Biochemical oxygen demand**	**Ammoniacal Nitrogen**	**Total Nitrogen**	**Total Phosphorus***	***E.coli***
90th percentile	< 5 mg/L	< 5 mg/L	14 mg/L	< 20 mg/L	7 mg/L	< 10 cfu/100mL

*Potentially some total phosphorus removal with membranes and without alum dosing. With alum dosing could reduce this to < 1 mg/L.

MAP – NEW HARBOUR OUTFALL:



MCA Scoring Sheet – Option M1

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	6	6	All sites safe for swimming, however some risk remains (albeit below the NOEL)
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		6		All sites safe for secondary contact recreation, however some risk remains (albeit below the NOEL)
		Consumption of raw shellfish		6		All sites safe for shellfish collection, however some risk remains (albeit below the NOEL)
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment	N/A		N/A – no land discharge proposed.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour.	8	8	Treated wastewater will be improved when compared to the existing discharge particularly in terms of TSS, pathogens and TN. The discharge timing will be optimised to ensure no flows occur eastwards up the harbour at the beginning of the discharge period. Nitrogen modelling shows the discharge plume is rapidly discharged from the Harbour.
	Aquatic ecology	Potential effects on aquatic ecosystems		8		There is no evidence for any adverse effects from the existing discharge on marine aquatic ecosystems. Given the improved treated wastewater quality compared to the existing discharge and optimised discharge timing, the potential for adverse environmental effects is likely to be very low.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		10		Physical works are limited to a very small extent for the tertiary membrane unit within the existing designated site.
	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.		6		The new outfall will be constructed over the inter-tidal area to a depth of 2.5m CD, however the new outfall will be designed to not be visible at low tide. The original outfall will be removed which is currently visible as it crosses the foreshore and at the low tide mark.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option). Option M1 discharges a higher quality treated wastewater than the existing discharge but does not incorporate any land treatment or earth contact. The discharge outfall is also located into the Whāingaroa Harbour not far from important kaimoana resources.
	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)	For all options – Beca RMA planner with inputs from project team	8	7	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that.
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe		8		This options is designed to meet projected flows throughout the proposed 35 year consent duration. Additional aeration capacity is proposed to cater for additional flows throughout the consent term.

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities	and community engagement.	6		The current outfall pipe will be removed and replaced with an outfall that will be out of sight. The treated wastewater plume will be much less visible due to the higher degree of treatment and the discharge 'boil' will not be visible due to the installation of a duck-bill on the outfall, resulting in much greater initial mixing. However, the discharge will be still be present and will need to be signposted, which could result in negative community perception effects.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		8		The QMRA has shown that all sites will be safe for shellfish collection.
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		There will be some temporary effects during construction, however the outfall will be visible on the landward side (only the duck-bill and small length of pipe will protrude from the sea bed).
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	9	9	Lowest power use, TM small footprint, limited use of concrete low embodied carbon. Biosolids retained in pond so well stabilised when removed periodically.
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	7	8	Small footprint TM, storage pond rebuilding will be limited by groundwater level. New outfall geology conditions potentially challenging.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		10		No additional land required
	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.		8		Most existing assets being retained aquamats replaced with alternative aeration)
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)	Beca and PDP engineering expert.	9	8	Reliable performance from membranes in NZ. Limited redundancy unless multiple trains are installed.
	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.		8		Pond systems robust to fluctuations in flow and load, TM fixed capacity managed via storage, Limited ability to achieve further improvements to treated wastewater quality.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		10		Addition of extra aeration to pond or additional membrane modules reasonable simple.
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		7		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure? Low potential for pond failure given minimal trade waste activities in Raglan. TM mechanical process with low failure potential. Moderate level of operator skill required. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A

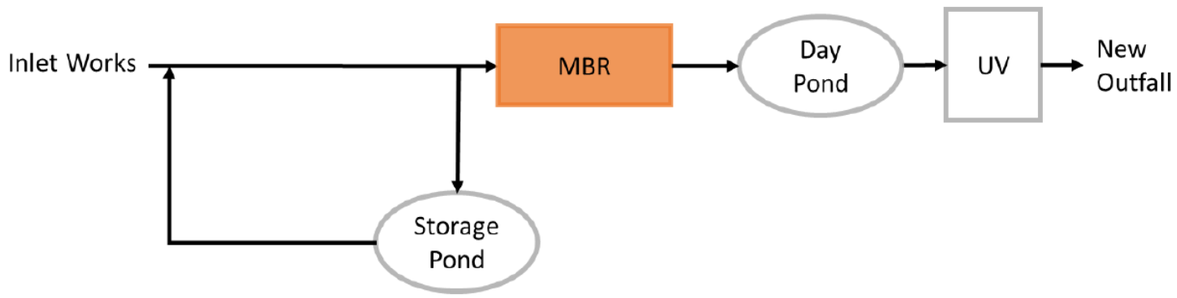
Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	3	3	No beneficial reuse is proposed as part of this option.
Statutory Policy 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	Beca RMA planner	7	7	High-quality discharge of treated wastewater, with low adverse environmental effects. However, this option does not align with hapū and community expectations for land treatment and reuse.
	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		N/A		N/A

Option M2

MBR and UV disinfection with new harbour outfall

OPTION M2 SUMMARY	
Description	The MBR system consists of new screens, flow balancing pond (utilising existing pond) reactor basin, membranes, sludge handling and UV treatment. A new 85m outfall would be located near the existing.
Comment	High quality treated wastewater will be produced by the MBR system. The new discharge structure combined with optimised discharge timing will improve distribution of the treated wastewater on the outgoing tide.

PROCESS FLOW DIAGRAM:



KEY COMPONENTS	
Inlet works facility	• Influent collection chamber, coarse and fine band screens, grit separator, scum collection tank
Reactor and membrane system	• Activated sludge reactors for nitrogen and phosphorus removal • Ultrafiltration membrane separation and alum dosing for additional phosphorus removal where necessary
Tertiary UV disinfection system	• In-channel lamp bank or in-pipe UV disinfection system
Dewatering system	• Screw press, dewatering day tanks etc
New harbour outfall	• Discharge outlet at least 2.5m below chart datum to provide for meaningful improvement in dilution performance

EXPECTED TREATED WASTEWATER QUALITY – MBR AND UV DISINFECTION						
Parameter	**TSS**	**Biochemical oxygen demand**	**Ammoniacal Nitrogen**	**Total Nitrogen**	**Total Phosphorus***	***E.coli***
90th percentile	< 5 mg/L	< 5 mg/L	<1 mg/L	< 8 mg/L	< 1 mg/L	< 10 cfu/100mL

*assumes alum dosing or Bio P configuration

MAP – PROPOSED MBR LAYOUT:

Note that the new harbour outfall would be located as per Option M1.

MCA Scoring Sheet – Option M2

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	7	7	All sites safe for swimming, however some risk remains (albeit below the NOEL). Slightly better treatment process pathogen removal than option M1.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		7		All sites safe for secondary contact recreation, however some risk remains (albeit below the NOEL). Slightly better treatment process pathogen removal than option M1.
		Consumption of raw shellfish		7		All sites safe for shellfish collection, however some risk remains (albeit below the NOEL). Slightly better treatment process pathogen removal than option M1.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment	N/A		N/A – no land discharge proposed.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour.	9	9	Treated wastewater will be improved when compared to the existing discharge particularly in terms of TSS, pathogens, TN and TP. The discharge timing will be optimised to ensure no flows occur eastwards up the harbour at the beginning of the discharge period. Nitrogen modelling shows the discharge plume is rapidly discharged from the Harbour. Nitrogen and phosphorus concentrations are reduced in comparison to the TM treatment process.
	Aquatic ecology	Potential effects on aquatic ecosystems		9		There is no evidence for any adverse effects from the existing discharge on marine aquatic ecosystems. Given the improved treated wastewater quality compared to the existing discharge and optimised discharge timing, the potential for adverse environmental effects is likely to be very low.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		9		Physical works are limited to the new reactor and membrane units within the existing designated site.
	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.		6		The new outfall will be constructed over the inter-tidal area to a depth of 2.5m CD, however the new outfall will be designed to not be visible at low tide. The original outfall will be removed which is currently visible as it crosses the foreshore and at the low tide mark.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option). Option M2 discharges a higher quality treated wastewater than the existing discharge but does not incorporate any land treatment or earth contact. The discharge outfall is also located into the Whāingaroa Harbour not far from important kaimoana resources.
	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)	For all options – Beca RMA planner with inputs from project team	8	8	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that.
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe		9		This options is designed to meet projected flows throughout the proposed 35 year consent duration. MBR technology can be easily expanded in response to population growth.

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities	and community engagement.	6		The current outfall pipe will be removed and replaced with an outfall that will be out of sight. The treated wastewater plume will be much less visible due to the higher degree of treatment and the discharge 'boil' will not be visible due to the installation of a duck-bill on the outfall, resulting in much greater initial mixing. However, the discharge will be still be present and will need to be signposted, which could result in negative community perception effects.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		9		The QMRA has shown that all sites will be safe for shellfish collection. Treatment is to a higher standard than option M1.
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		There will be some temporary effects during construction, however the outfall will be visible on the landward side (only the duck-bill and small length of pipe will protrude from the sea bed).
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	2	2	Highest power use, medium footprint, extensive use of concrete and steel
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	4	6	Moderate footprint MBR reactor with relatively high load, extensive ground improvements expected to be required. Proposed MBR site elevated so unlikely to be impacted by groundwater. New outfall geology conditions potentially challenging.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		10		No additional land required.
	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.		5		Some existing assets being retained (1 pond for buffer storage, holding pond, UV, pipeline to outfall).
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)	Beca and PDP engineering expert.	10	8	Reliable performance from MBRs in NZ. Redundancy typically provided as part of design.
	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.		9		MBR fixed hydraulic capacity managed via raw WW storage. Copes with varying loads up to design capacity. MBR technology has ability to achieve further improvements to treated wastewater quality through carbon dosing or tertiary processes.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		6		Mechanical equipment and membrane modules can be staged. Reactors more difficult to stage. Some of the components need to be sized for ultimate flows.
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		5		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure?. High degree of operator skill required. Spikes in load (seasonal) can be managed. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A

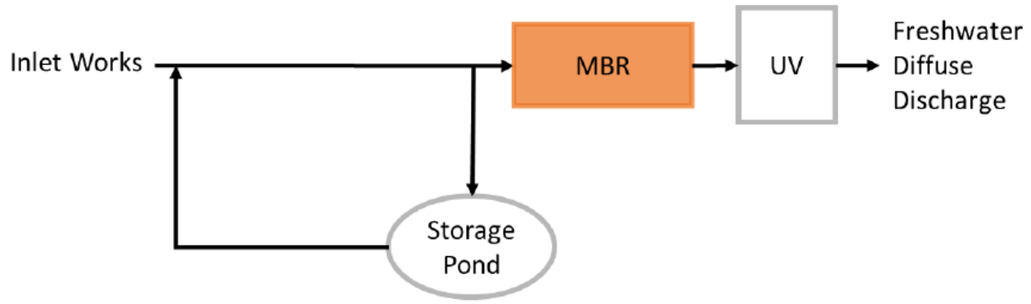
Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	4	4	No beneficial reuse is proposed as part of this option, however high degree of treatment means that reuse could be easily utilised in the future.
Statutory Policy 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	Beca RMA planner	7	7	Very high -quality discharge of treated wastewater, with low adverse environmental effects. However, this option does not align with hapū and community expectations for land treatment and reuse.
	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		N/A		N/A

Option F1

MBR and UV disinfection with freshwater diffuse discharge

OPTION F1 SUMMARY	
Description	The MBR system consists of new screens, flow balancing pond (utilising existing pond) reactor basin, membranes, sludge handling and UV treatment. The treated wastewater would be discharged to the stream within the Raglan WWTP site through a diffuse earth contact discharge system.
Comment	A high-quality treated wastewater will be produced by the MBR system. A diffuse discharge would be created alongside riparian and wetland restoration planting with native species.

PROCESS FLOW DIAGRAM:



MAP – PROPOSED MBR LAYOUT:

KEY COMPONENTS	
Inlet works facility	• Influent collection chamber, coarse and fine band screens, grit separator, scum collection tank
Reactor and membrane system	• Activated sludge reactors for nitrogen and phosphorus removal • Ultrafiltration membrane separation and alum dosing for additional phosphorus removal where necessary
Tertiary UV disinfection system	• In-channel lamp bank or in-pipe UV disinfection system
Dewatering system	• Screw press, dewatering day tanks etc
Freshwater diffuse discharge	• Discharge 100% of the MBR treated wastewater to the stream adjacent to the WWTP

EXPECTED TREATED WASTEWATER QUALITY – MBR AND UV DISINFECTION

Parameter	**TSS**	**Biochemical oxygen demand**	**Ammoniacal Nitrogen**	**Total Nitrogen**	**Total Phosphorus***	***E.coli***
90th percentile	< 5 mg/L	< 5 mg/L	<1 mg/L	< 8 mg/L	< 1 mg/L	< 10 cfu/100mL

*assumes alum dosing or Bio P configuration

MCA Scoring Sheet – Option F1

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	6	4	All sites safe for swimming, however some risk remains (albeit below the NOEL). Slightly better pathogen removal than option M1, however dilution lower with Wainui Arm of the Harbour.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		4		14 out of 16 sites safe for secondary contact recreation in 2025, reducing to 13 out of 16 sites safe for secondary contact recreation in 2055. Sites near discharge in Wainui Arm of the Harbour are impacted.
		Consumption of raw shellfish		4		13 out of 14 sites safe for shellfish collection at both 2025 and 2055. Sites near discharge in Wainui Arm of the Harbour are impacted.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment	N/A		N/A – no land discharge proposed.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour.	3	3	Treated wastewater will be improved when compared to the existing discharge particularly in terms of TSS, pathogens, TN and TP. However, the new discharge location into the Wainui Stream and Whāingaroa Harbour will introduce contaminants into new areas. Nitrogen modelling shows the discharge remaining in the Wainui Arm of the Harbour for some time and increasing concentrations. There is potential for adverse effects both within the Wainui Stream and Harbour.
	Aquatic ecology	Potential effects on aquatic ecosystems		2		Water quality and ecology sampling of the unnamed tributary within the WWTP site has shown moderate water quality and the waterways have moderate ecological value, with potential inanga spawning habitat. Given the potential low dilution and introduction of toxicants including ammonia and nitrate-N, there is the potential for significant adverse effects on aquatic ecosystems.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		9		Physical works are limited to the new reactor and membrane units within the existing designated site.
	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.		3		Although no new outfall is required with this option, the discharge of treated wastewater could adversely affect coastal aquatic ecosystems in the Whāingaroa Harbour.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option). Option F1 discharges a higher quality treated wastewater than the existing treatment and incorporates earth contact. However, given potential adverse effects on shellfish gathering, water quality and ecology this option is likely to have adverse cultural effects.
	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)	For all options – Beca RMA planner with	8	2	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that.

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe	inputs from project team and community engagement.	8		This options is designed to meet projected flows throughout the proposed 35 year consent duration. MBR technology can be easily expanded in response to population growth.
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities		2		The current outfall pipe will be removed. However, treated wastewater will be discharged to a highly utilised recreational areas. There is the potential for some adverse effects on secondary contact recreation (e.g. kayaking) and shellfish gathering.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		2		The QMRA has shown that not all sites will be safe for shellfish collection (low risk at sites in Wainui Arm).
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		Existing outfall will be removed and no new marine discharge structure is proposed.
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	3	3	High power use (similar to M1 but don't need to pump to outfall), medium footprint, extensive use of concrete and steel
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	5	6	Moderate footprint MBR reactor with relatively high load, extensive ground improvements expected to be required. Proposed site elevated so unlikely to be impacted by groundwater
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		10		No additional land required
	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.		4		Limited existing assets being retained (1 pond for buffer storage)
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)	Beca and PDP engineering expert.	10	8	Reliable performance from MBRs in NZ. Redundancy typically provided as part of design.
	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.		9		MBR fixed hydraulic capacity managed via raw WW storage, Copes with varying loads up to design capacity. MBR technology has ability to achieve further improvements to treated wastewater quality through carbon dosing, chemical addition or tertiary processes.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		6		Mechanical equipment and membrane modules can be staged. Reactors more difficult to stage. Some of the components need to be sized for ultimate flows.
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		6		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure?. High degree of operator skill required. Spikes in load (seasonal) can be managed.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	4	4	No beneficial reuse is proposed as part of this option, however high degree of treatment means that reuse could be easily utilised in the future.
Statutory Policy 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	Beca RMA planner	3	3	Very high -quality discharge of treated wastewater, however with potential significant adverse environmental effects (water quality and ecology). Low effects on shellfish gathering and secondary contact recreation.
	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		N/A		N/A

Option L1

Existing treatment process + tertiary membrane, with a combined public land discharge and new harbour outfall

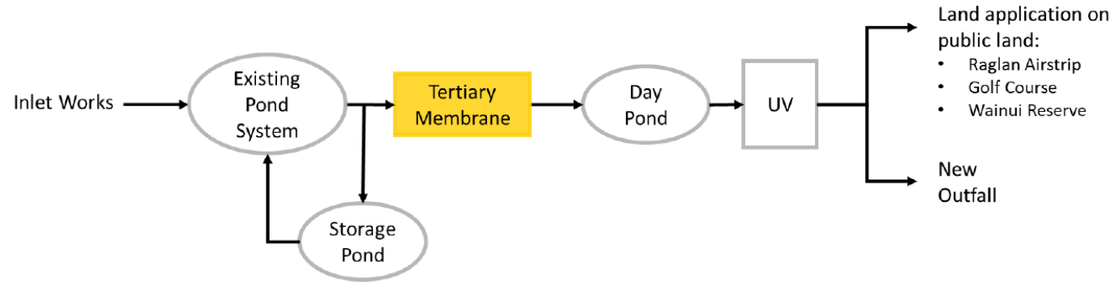
OPTION L1 SUMMARY	
Description	The existing ponds would need to be upgraded to treat the increasing flows. A tertiary membrane unit with 3,000m^3 per day capacity will be installed after the ponds. Conveyance to the three public land areas requires 6.8 km of pipelines. Public land area available is between 38 - 59 ha. A new 85m outfall would be located near the existing.
Comment	The tertiary membrane unit will remove suspended solids and pathogens from the discharge. The new discharge structure combined with optimised discharge timing will improve distribution of the treated wastewater on the outgoing tide. Discharge to water is expected to occur throughout the year (from 12% to land in August to 73% in December – 2025 flows). This system would be complex to manage.

KEY COMPONENTS	
New tertiary membrane	• Polish pond treated wastewater to target a reduction in TSS and pathogen levels
Modifications to Ponds A - D	• Removal of aquamats • New surface aeration system • Reinstating anaerobic ponds to reduce BOD loading in aerobic ponds
Irrigation pipeline	• Three irrigation pipelines and pumping for conveyance required • Raglan Airstrip: 75 mm pipe diameter and 2 km pipe length • Golf Course: 110 mm pipe diameter and 2.2 km pipe length • Wainui Reserve: 110 mm pipe diameter and 2.5 km pipe length
Irrigation to public land	• Maximum area is 59 ha, minimum area is 38 ha (incorporates 50 m buffer inside property boundaries) • Drip line irrigation with storage pond (1000 m^3) at Wainui Reserve to buffer irrigation volumes • Maximum irrigation application rate is 8 mm/day • Assumed that irrigation to Wainui Reserve and Raglan Airstrip can occur year round, while irrigation to Raglan Golf Course would only occur in summer months from Dec – Mar
New harbour outfall	• Contingency discharge required for when land discharge sites are unable to accept treated wastewater and WWTP storage facilities are full • Discharge outlet at least 2.5m below chart datum to provide for meaningful improvement in dilution performance

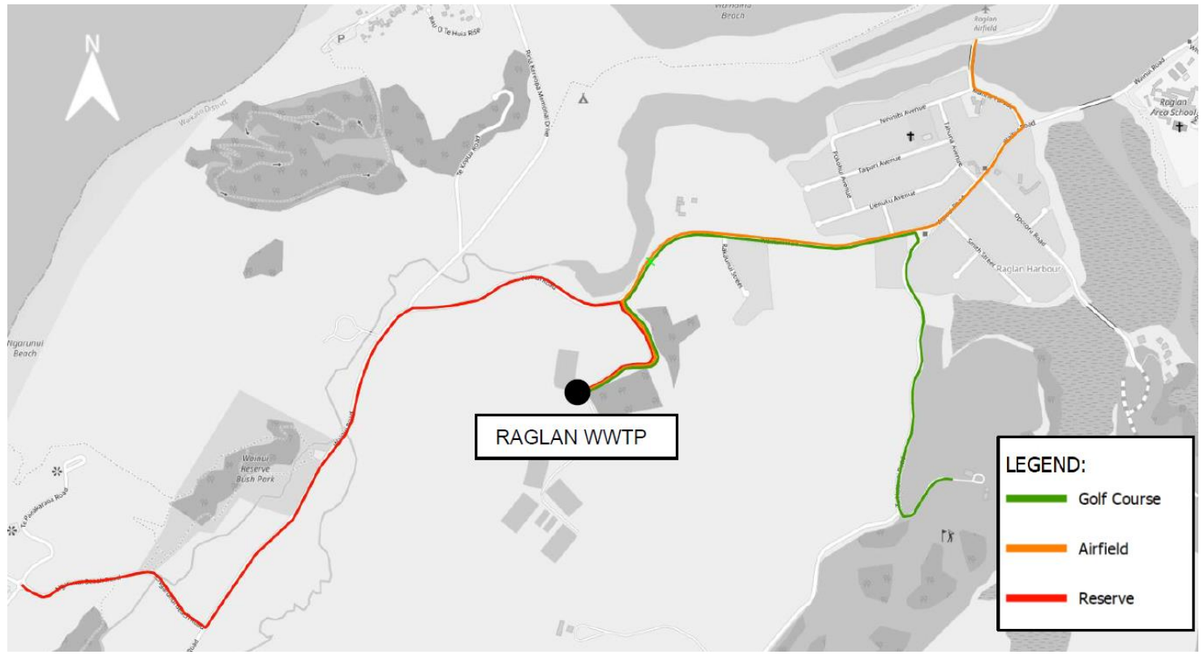
EXPECTED TREATED WASTEWATER QUALITY – TERTIARY MEMBRANE AND UV DISINFECTION						
Parameter	**TSS**	**Biochemical oxygen demand**	**Ammoniacal Nitrogen**	**Total Nitrogen**	**Total Phosphorus***	***E.coli***
90th percentile	< 5 mg/L	< 5 mg/L	14 mg/L	< 20 mg/L	7 mg/L	< 10 cfu/100mL

*Potentially some total phosphorus removal with membranes and without alum dosing. With alum dosing could reduce this to < 1 mg/L.

PROCESS FLOW DIAGRAM:



MAP – INDICATIVE PIPELINE ROUTES TO PUBLIC LAND DISCHARGE SITES:



Note that the new harbour outfall would be located as per Option M1.

MCA Scoring Sheet – Option L1

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	7	7	All sites safe for swimming, however some risk remains (albeit below the NOEL). Although discharge to land will occur year round, discharge to land during dry summer periods particularly reduces marine discharge volume compared to option M1.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		7		All sites safe for secondary contact recreation, however some risk remains (albeit below the NOEL). Although discharge to land will occur year round, discharge to land during dry summer periods particularly reduces marine discharge volume compared to option M1.
		Consumption of raw shellfish		6		All sites safe for shellfish collection, however some risk remains (albeit below the NOEL). Although discharge to land will occur year round, discharge to land during dry summer periods particularly reduces marine discharge volume compared to option M1.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment for discharge to air risk	6		Buffer distances will apply to reduce wind migration risk. Added tertiary treatment will reduce bacterial exposure risk. Consideration need to be given to human exposure within public land areas, with exclusion areas potentially applying.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour. For land discharge options – PDP expert assessment of nutrient leaching/runoff using Overseer modelling, based on land use and loading rate.	8	7	As per option M1, treated wastewater will be improved when compared to the existing discharge particularly in terms of TSS, pathogens and TN. The discharge timing will be optimised to ensure no flows occur eastwards up the harbour at the beginning of the discharge period. Nitrogen modelling shows the discharge plume is rapidly discharged from the Harbour. Discharge to land will occur throughout the year, but some residual discharge to the marine environment (ranging between 8-50% of discharge to land at 2055). Irrigation to land may result in greater loss of nitrogen and phosphorus than the existing land use, but landuse could be changed to minimise nutrient loss. Limited opportunity of amend public land landuse.
	Aquatic ecology	Potential effects on aquatic ecosystems		9		There is no evidence for any adverse effects from the existing discharge on marine aquatic ecosystems. Given the improved treated wastewater quality compared to the existing discharge and optimised discharge timing, including the additional reduction in marine discharge, the potential for adverse environmental effects is likely to be very low.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		6		Physical works are limited to a very small extent for the tertiary membrane unit within the existing designated site. There is potential for adverse effects on terrestrial ecosystems on land discharge areas that will need to be mitigated through mitigation such as applying buffers around sensitive sites.
	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.		6		The new outfall will be constructed over the inter-tidal area to a depth of 2.5m CD, however the new outfall will be designed to not be visible at low tide. The original outfall will be removed which is currently visible as it crosses the foreshore and at the low tide mark.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū	4	4	Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option). .
	Kai moana	Potential effects on kai moana and the kaitiaki management of customary fishing		4		
	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		4		
	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		4		

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
						Option L1 discharges a higher quality treated wastewater than existing and partially to land. An outfall is still required to discharge part flows.
Social and community	Amenity value and aesthetics	Potential effects on the natural and built environment (e.g. visual, odour, noise)	For all options – Beca RMA planner with inputs from project team and community engagement.	7	8	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that. There is some potential for odour and visual effects from the land treatment site, however these could be managed through the use of appropriate buffers.
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe		8		This option is designed to meet projected flows throughout the proposed 35 year consent duration. Additional aeration capacity is proposed to cater for additional flows throughout the consent term.
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities		8		The current outfall pipe will be removed and replaced with an outfall that will be out of sight. The treated wastewater plume will be much less visible due to the higher degree of treatment and the discharge 'boil' will not be visible due to the installation of a duck-bill on the outfall, resulting in much greater initial mixing. However, the discharge will be still be present and will need to be signposted, which could result in negative community perception effects. Land discharge to Wainui Reserve will need to be managed appropriately, although the proposal is to irrigate via subsurface irrigation. Irrigation to the golf course will have beneficial effects during summer.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		8		The QMRA has shown that all sites will be safe for shellfish collection.
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		There will be some temporary effects during construction, however the outfall will be visible on the landward side (only the duck-bill and small length of pipe will protrude from the sea bed).
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	8	8	Low power use, TM small footprint, limited use of concrete low embodied carbon. Biosolids retained in pond so well stabilised when removed periodically. Additional pipes to public land areas.
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	7	8	Small footprint TM, storage pond rebuilding will be limited by groundwater level. Further investigations into Geotech/soil conditions in land disposal areas and outfall.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		8		Access to public owned land required
	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.		8		Most existing assets being retained (aquamats replaced with alternative aeration)
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)	Beca and PDP engineering expert.	9	8	Reliable performance from membranes in NZ. Limited redundancy unless multiple trains are installed. Small land disposal blocks proven in NZ.
	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.		8		Pond systems robust to fluctuations in flow and load, TM fixed capacity managed via storage, Limited ability to achieve further improvements to treated wastewater quality.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		10		Addition of extra aeration to pond or additional membrane modules reasonable simple.

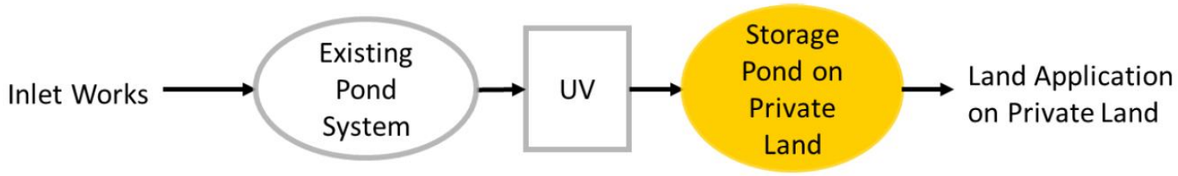
Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		8		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure? Low potential for pond failure given minimal trade waste activities in Raglan. TM mechanical process with low failure potential. Moderate level of operator skill required. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	7	7	Treated wastewater will be beneficially used on public land. Add comment why reduced to 7
Statutory Policy 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	Beca RMA planner	9	8	High-quality discharge of treated wastewater, with low adverse environmental effects. This option also aligns with hapū and community expectations, however does entirely remove wastewater from the marine environment.
	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		7		Discharge of treated wastewater to the Wainui Reserve will likely result in the need to change the purpose of the Wainui Reserve Management Plan and subsequent approval process through the Reserves Act.

Option L2

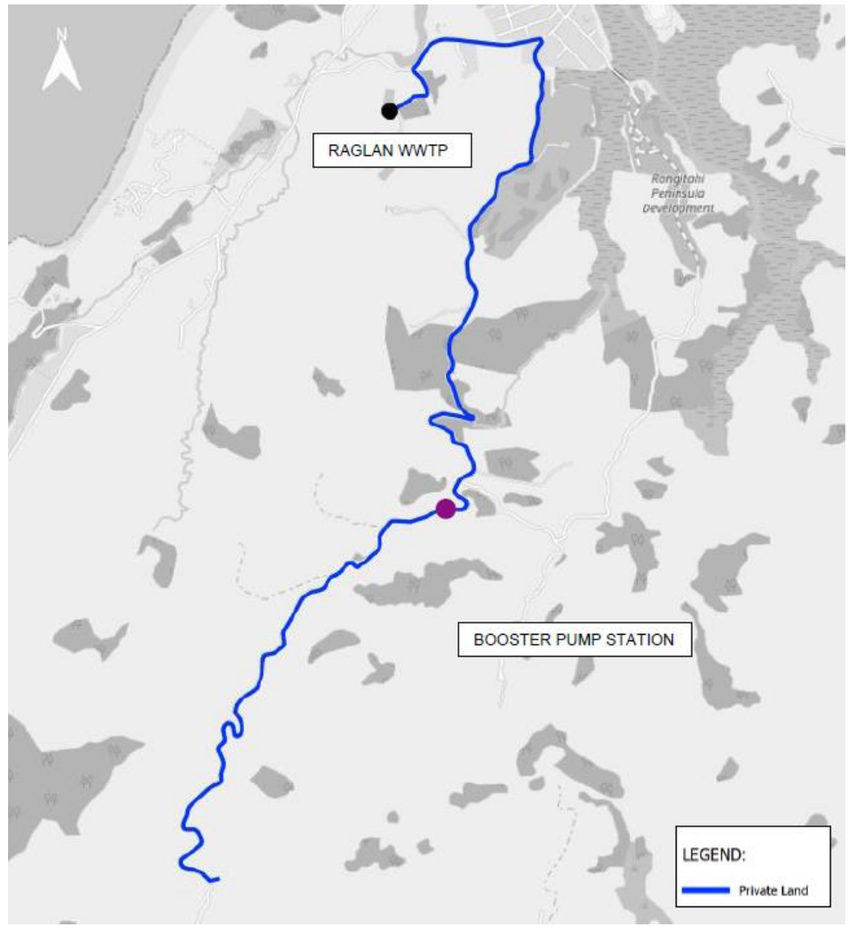
Existing treatment process with private land discharge and storage

OPTION L2 SUMMARY	
Description	The existing ponds would need to be upgraded to treat the increasing flows. Conveyance to the private land area requires 8.8km of pipeline and two pump stations. Land area required for this option is 145 ha plus extra for buffer areas. Storage of 150,000m^3 would be required at the private land.
Comment	There is no discharge to water with this option. The conveyance to the private land has a very high head so a booster pump is required part way along the pipeline route.

PROCESS FLOW DIAGRAM:



MAP – INDICATIVE PIPELINE ROUTE TO PRIVATE LAND DISCHARGE SITE:



KEY COMPONENTS	
Modifications to existing ponds	• Existing ponds upgraded to maintain current treatment performance • Removal of aquamats • New surface aeration system • Reinstating anaerobic ponds to reduce BOD loading in aerobic ponds
Irrigation pipeline and booster pump station	• 250mm pipe diameter and 8.8 km pipe length • Two stages of pumping required to convey treated wastewater, including a booster pump station about halfway
Irrigation to private land	• Land discharge to private land off Te Hutewai Road • Approximately 213 ha of irrigable area is required (accounting for lower irrigation rates on steeper slopes and a 30% buffer zone factor) • Assumed that adjacent parcels will be required to be purchased for a total land purchase area of 550 ha
Storage on private land	• Additional storage to buffer flows (150,000 m^3 storage dam) • Main elements of storage dam likely to include: dam embankment, liner, stormwater diversion • Final dam site selection process needs to be undertaken

EXPECTED TREATED WASTEWATER QUALITY – CURRENT AQUAMATS AND UV DISINFECTION						
Parameter	**TSS**	**Biochemical oxygen demand**	**Ammoniacal Nitrogen**	**Total Nitrogen**	**Total Phosphorus***	***E.coli***
90th percentile	84 mg/L	12 mg/L	14 mg/L	26 mg/L	7 mg/L	< 100 cfu/100mL

MCA Scoring Sheet – Option L2

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	10	10	No marine discharge proposed – public health risks arising from direct marine discharge are removed.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		10		No marine discharge proposed – public health risks arising from direct marine discharge are removed.
		Consumption of raw shellfish		10		No marine discharge proposed – public health risks arising from direct marine discharge are removed.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment for discharge to air risk	8		Buffer distances will apply to reduce wind migration risk. Greater ability to control public exposure on private land
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour.	7	9	The discharge will be 100% to land and any direct discharge to the marine environment will be avoided. The land discharge site will be managed in such a way to reduce nutrient and sediment losses compared to the existing land use, thus leading to beneficial effects on the water quality of the Whāingaroa Harbour compared to the existing situation. Irrigation to land may result in greater loss of nitrogen and phosphorus than the existing land use, but landuse could be changed to minimise nutrient loss. Greater loss expected due to need to maximise irrigation during winter but greater ability to amend landuse on private land to minimise nutrient loss.
	Aquatic ecology	Potential effects on aquatic ecosystems	For land discharge options – PDP expert assessment of nutrient leaching/runoff using Overseer modelling, based on land use and loading rate.	9		Given the avoidance of any direct discharge to surface waters, ecological effects are likely to be negligible.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		6		There is potential for adverse effects on terrestrial ecosystems on land discharge areas that will need to be mitigated through mitigation such as applying buffers around sensitive sites.
	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.		10		The existing outfall will be removed and no new coastal structures are proposed.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option). Option L2 avoids a discharge to marine or freshwaters and does not require an outfall structure.
	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)	For all options – Beca RMA planner with inputs from project team	7	9	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that. There is some potential for odour and visual effects from the land treatment site, however these could be managed through the use of appropriate buffers.

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe	and community engagement.	8		This option is designed to meet projected flows throughout the proposed 35 year consent duration. Additional aeration capacity is proposed to cater for additional flows throughout the consent term.
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities		7		Irrigation to private land will have benefits in terms of additional water and nutrients to assist plant growth, however these are unlikely to significantly affect recreation opportunities.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		10		The QMRA has shown that all sites will be safe for shellfish collection. Any direct discharge of treated wastewater to surface waters will be removed.
	Access to the coast	Extent to which an option effects access to the coastal marine area		10		The existing outfall will be removed and no new marine structures are proposed.
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	8	8	Moderate power use due to need to pump to land disposal site.. Biosolids retained in pond so well stabilised when removed periodically. Claire to add comment on carbon credits – trees on private land
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	5	6	Further investigations required for land disposal area and storage pond.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		4		Large area of additional land required
	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.		8		Most existing assets being retained aquamats replaced with alternative aeration)
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)	Beca and PDP engineering expert.	7	7	Reliable performance from land disposal systems in NZ. No redundancy for pipeline to irrigation area.
	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.		8		Pond systems robust to fluctuations in flow and load, Limited ability to achieve further improvements to treated wastewater quality.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		7		Addition of extra aeration to pond reasonably simple. Irrigation areas can be staged.
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		8		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure? Low potential for pond process failure given minimal trade waste activities in Raglan. Moderate level of operator skill required. Pipelines likely to be robust to earthquake risks - PE material. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A

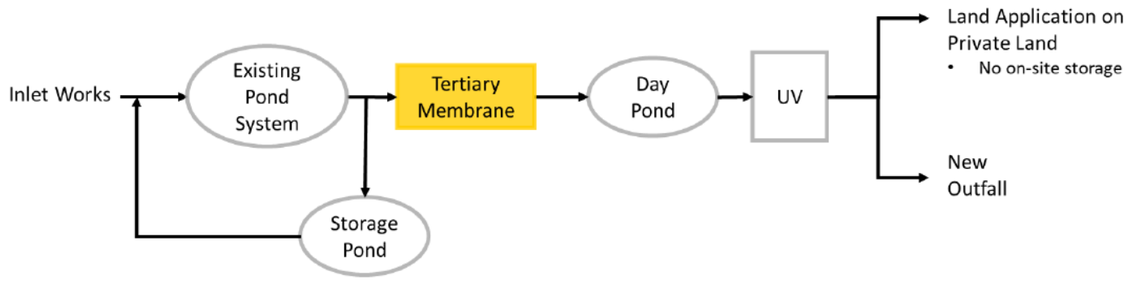
Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	10	10	100% of treated wastewater will be beneficially used on private land.
Statutory Policy 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	Beca RMA planner	9	9	High-quality discharge of treated wastewater, with very low adverse environmental effects. Likely to be highly aligned with hapū and community expectations in terms of reducing effects, beneficial reuse and avoiding new structures in the marine environment.
	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		N/A		N/A

Option L3

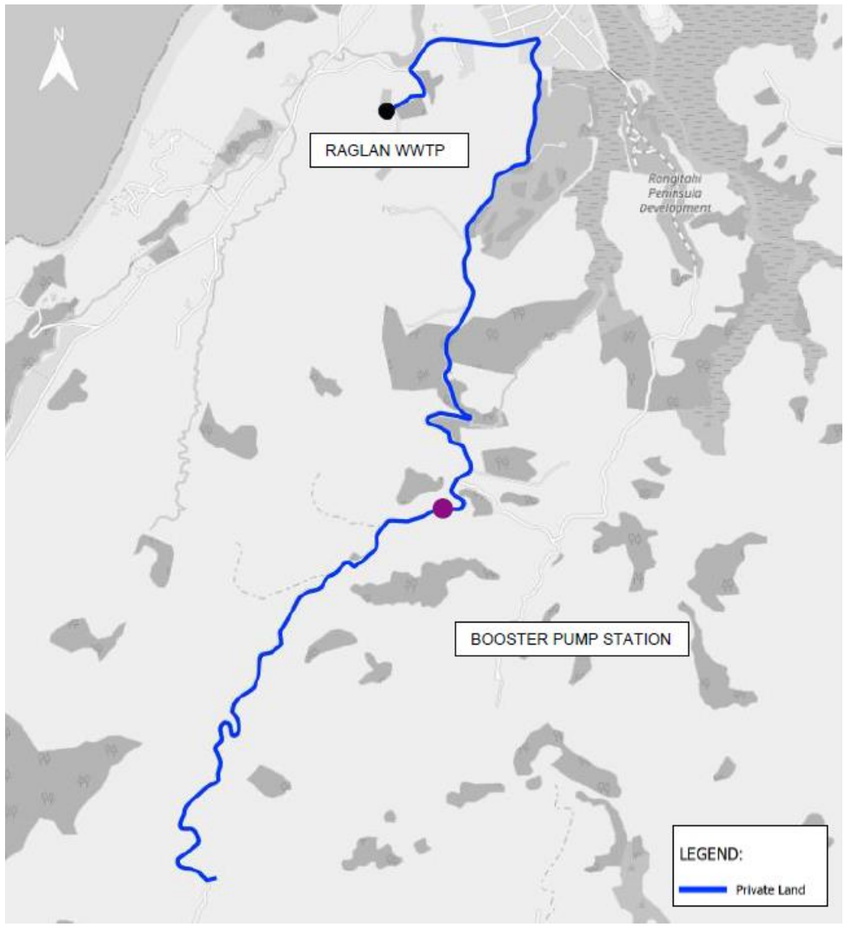
Existing treatment process + tertiary membrane, with combined private land discharge and new harbour outfall

OPTION L3 SUMMARY	
Description	The existing ponds would need to be upgraded to treat the increasing flows. A tertiary membrane unit with 3,000m^3 per day capacity will be installed after the ponds. Conveyance to the private land area requires 8.8km of pipeline and two pump stations. Land area required for this option is 213 ha plus extra for buffer areas. A new 85m outfall would be located near the existing.
Comment	The tertiary membrane unit will remove suspended solids and pathogens from the discharge. The conveyance to the private land has a very high head so a booster pump is required part way along the pipeline route. Discharge to water is expected to only occur through part of the year (from June-September in 2025 to April-October in 2055). The new discharge structure combined with optimised discharge timing will improve distribution of the treated wastewater on the outgoing tide. This system would be complex to manage.

PROCESS FLOW DIAGRAM:



MAP – INDICATIVE PIPELINE ROUTE TO PRIVATE LAND DISCHARGE SITE:



KEY COMPONENTS	
Modifications to existing ponds	• Existing ponds upgraded to maintain current treatment performance • Removal of aquamats • New surface aeration system • Reinstating anaerobic ponds to reduce BOD loading in aerobic ponds
New tertiary membrane	• Polish pond treated wastewater to target a reduction in TSS and pathogen levels
Irrigation pipeline and booster pump station	• 250mm pipe diameter and 8.8 km pipe length • Two stages of pumping required to convey treated wastewater, including a booster pump station about halfway
Irrigation to private land	• Land discharge to private land off Te Hutewai Road • Approximately 213 ha of irrigable area is required (accounting for lower irrigation rates on steeper slopes and a 30% buffer zone factor) • Assumed that adjacent parcels will be required to be purchased for a total land purchase area of 320 ha • A storage pond of 20,000 m^3 capacity located within the irrigation area is required to help buffer flows and allow for short-term periods where soils exceed saturation or run-off is a risk
New harbour outfall	• Discharge outlet at least 2.5m below chart datum to provide for meaningful improvement in dilution performance • Based on expected average discharges to private land, it is anticipated that ~6% of the average annual inflow will discharge via the outfall by 2025 and ~24% by 2055.

EXPECTED TREATED WASTEWATER QUALITY – TERTIARY MEMBRANE AND UV DISINFECTION

Parameter	TSS	Biochemical oxygen demand	Ammoniacal Nitrogen	Total Nitrogen	Total Phosphorus*	*E.coli*
90th percentile	< 5 mg/L	< 5 mg/L	14 mg/L	< 20 mg/L	7 mg/L	< 10 cfu/100mL

*Potentially some total phosphorus removal with membranes and without alum dosing. With alum dosing could reduce this to < 1 mg/L.

MCA Scoring Sheet – Option L3

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	9	9	All sites safe for swimming, however some risk remains (albeit below the NOEL). For this option there is predicted to be no discharge to marine for seven months in 2025 and five months in 2055.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		9		All sites safe for secondary contact recreation, however some risk remains (albeit below the NOEL). For this option there is predicted to be no discharge to marine for seven months in 2025 and five months in 2055.
		Consumption of raw shellfish		9		All sites safe for shellfish collection, however some risk remains (albeit below the NOEL). For this option there is predicted to be no discharge to marine for seven months in 2025 and five months in 2055.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment for discharge to air risk	9		Buffer distances will apply to reduce wind migration risk. Added tertiary treatment will reduce bacterial exposure risk. Greater ability to control public exposure on private land
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour. For land discharge options – PDP expert assessment of nutrient leaching/runoff using Overseer modelling, based on land use and loading rate.	8	8	As per option M1, treated wastewater will be improved when compared to the existing discharge particularly in terms of TSS, pathogens and TN. The discharge timing will be optimised to ensure no flows occur eastwards up the harbour at the beginning of the discharge period. Nitrogen modelling shows the discharge plume is rapidly discharged from the Harbour. Discharge to land will occur will only occur for part of the year (typically between April-October in 2055). Irrigation to land may result in greater loss of nitrogen and phosphorus than the existing land use, but landuse could be changed to minimise nutrient loss. Ability to control land use and ability for winter time alternative discharge provides for maximum ability to minimise nutrient loss.
	Aquatic ecology	Potential effects on aquatic ecosystems		9		There is no evidence for any adverse effects from the existing discharge on marine aquatic ecosystems. Given the improved treated wastewater quality compared to the existing discharge and optimised discharge timing, including the additional reduction in marine discharge, the potential for adverse environmental effects is likely to be very low.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		6		Physical works are limited to a very small extent for the tertiary membrane unit within the existing designated site. There is potential for adverse effects on terrestrial ecosystems on land discharge areas that will need to be mitigated through mitigation such as applying buffers around sensitive sites.
	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.		6		The new outfall will be constructed over the inter-tidal area to a depth of 2.5m CD, however the new outfall will be designed to not be visible at low tide. The original outfall will be removed which is currently visible as it crosses the foreshore and at the low tide mark.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option).
	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				

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
						Option L3 discharges a higher quality treated wastewater than existing and partially to land. An outfall is still required to discharge part flows.
Social and community	Amenity value and aesthetics	Potential effects on the natural and built environment (e.g. visual, odour, noise)	For all options – Beca RMA planner with inputs from project team and community engagement.	7		The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that. There is some potential for odour and visual effects from the land treatment site, however these could be managed through the use of appropriate buffers.
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe		8		This option is designed to meet projected flows throughout the proposed 35 year consent duration. Additional aeration capacity is proposed to cater for additional flows throughout the consent term.
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities		8		The current outfall pipe will be removed and replaced with an outfall that will be out of sight. The treated wastewater plume will be much less visible due to the higher degree of treatment and the discharge 'boil' will not be visible due to the installation of a duck-bill on the outfall, resulting in much greater initial mixing. However, the discharge will be still be present and will need to be signposted, which could result in negative community perception effects. Irrigation to private land will have benefits in terms of additional water and nutrients to assist plant growth, however these are unlikely to significantly affect recreation opportunities.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		8		The QMRA has shown that all sites will be safe for shellfish collection.
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		There will be some temporary effects during construction, however the outfall will be visible on the landward side (only the duck-bill and small length of pipe will protrude from the sea bed).
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	8	8	Moderate power use due to need to pump to land disposal site. Biosolids retained in pond so well stabilised when removed periodically. Claire to add comment on carbon credits – trees on private land
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	5	6	Further investigations required for land disposal area and outfall.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		4		Large area of additional land required
	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.		8		Most existing assets being retained (aquamats replaced with alternative aeration)
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)	Beca and PDP engineering expert.	8	8	Reliable performance from land disposal systems in NZ. No redundancy for pipeline to irrigation area but could discharge to outfall.
	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.		8		Pond systems robust to fluctuations in flow and load, Limited ability to achieve further improvements to treated wastewater quality.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		7		Addition of extra aeration to pond reasonably simple. Irrigation areas can be staged.
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		8		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure? Low potential for pond process failure given minimal trade waste activities in Raglan. High level of operator skill

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
						required for land disposal. Pipelines likely to be robust to earthquake risks - PE material. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	9	9	Treated wastewater will be beneficially used on private land.
Statutory Policy 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	Beca RMA planner	8	8	High-quality discharge of treated wastewater, with very low adverse environmental effects. Likely to be highly aligned with hapū and community expectations in terms of reducing effects and beneficial reuse. A new outfall is still required under this option.
	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		N/A		N/A

Option L4

MBR and UV disinfection, with combined public land discharge and new harbour outfall

OPTION L4 SUMMARY	
Description	The MBR system consists of new screens, flow balancing pond (utilising existing pond) reactor basin, membranes, sludge handling and UV treatment. Conveyance to the three public land areas requires 6.8 km of pipelines. Public land area available is between 38-59 ha. A new 85m outfall would be located near the existing.
Comment	High quality treated wastewater will be produced by the MBR system. The new discharge structure combined with optimised discharge timing will improve distribution of the treated wastewater on the outgoing tide. Discharge to water is expected to occur throughout the year (from 12% to land in August to 73% in December – 2025 flows). This system would be complex to manage.

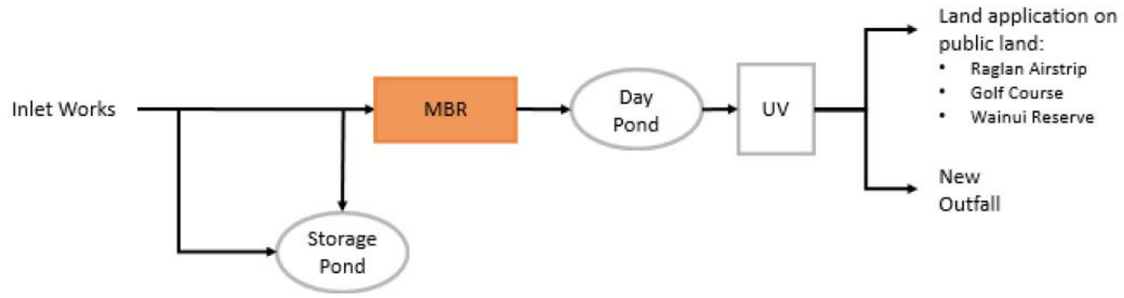
KEY COMPONENTS	
Inlet works facility	• Influent collection chamber, coarse and fine band screens, grit separator, scum collection tank
Reactor and membrane system	• Activated sludge reactors for nitrogen and phosphorus removal • Ultrafiltration membrane separation and alum dosing for additional phosphorus removal where necessary
Tertiary UV disinfection system	• In-channel lamp bank or in-pipe UV disinfection system
Dewatering system	• Screw press, dewatering day tanks etc
Irrigation pipeline	• Three irrigation pipelines and pumping for conveyance required • Raglan Airstrip: 75 mm pipe diameter and 2 km pipe length • Golf Course: 110 mm pipe diameter and 2.2 km pipe length • Wainui Reserve: 110 mm pipe diameter and 2.5 km pipe length
Irrigation to public land	• Maximum area is 59 ha, minimum area is 38 ha (incorporates 50 m buffer inside property boundaries) • Drip line irrigation with storage pond (1000 m^3) at Wainui Reserve to buffer irrigation volumes • Maximum irrigation application rate is 8 mm/day • Assumed that irrigation to Wainui Reserve and Raglan Airstrip can occur year round, while irrigation to Raglan Golf Course would only occur in summer months from Dec – Mar
New harbour outfall	• Contingency discharge required for when land discharge sites are unable to accept treated wastewater and WWTP storage facilities are full • Discharge outlet at least 2.5m below chart datum to provide for meaningful improvement in dilution performance

EXPECTED TREATED WASTEWATER QUALITY – MBR AND UV DISINFECTION

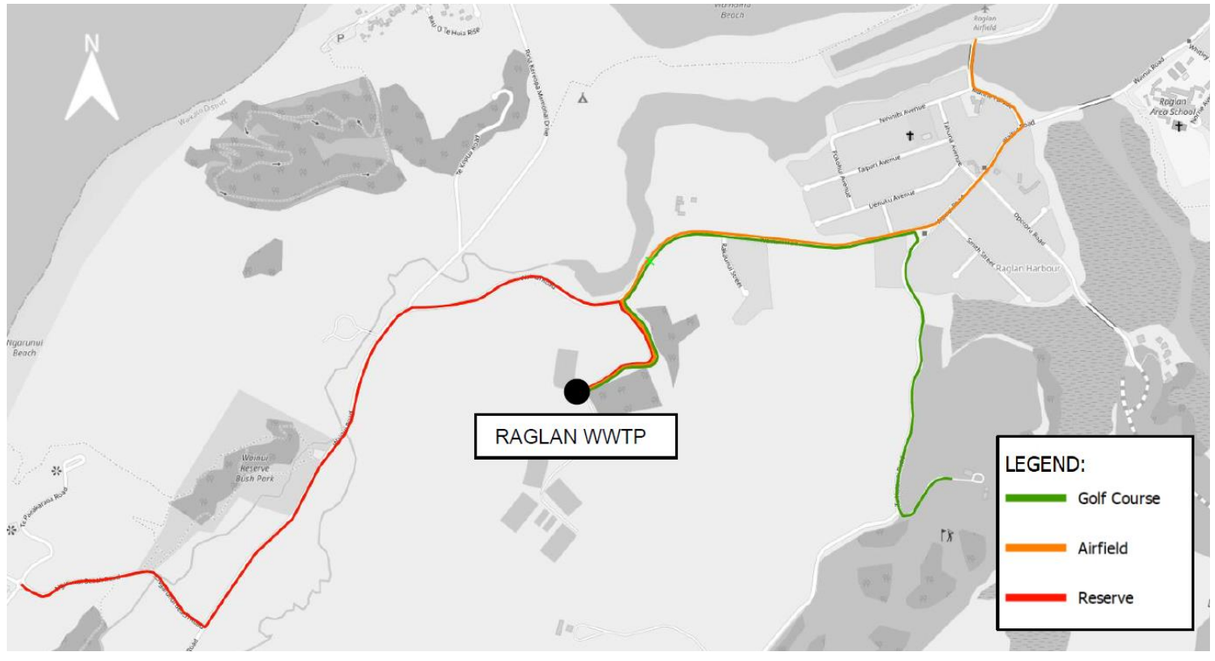
Parameter	TSS	Biochemical oxygen demand	Ammoniacal Nitrogen	Total Nitrogen	Total Phosphorus*	*E.coli*
90th percentile	< 5 mg/L	< 5 mg/L	<1 mg/L	< 8 mg/L	< 1 mg/L	< 10 cfu/100mL

*assumes alum dosing or Bio P configuration

PROCESS FLOW DIAGRAM:



MAP – INDICATIVE PIPELINE ROUTES TO PUBLIC LAND DISCHARGE SITES:



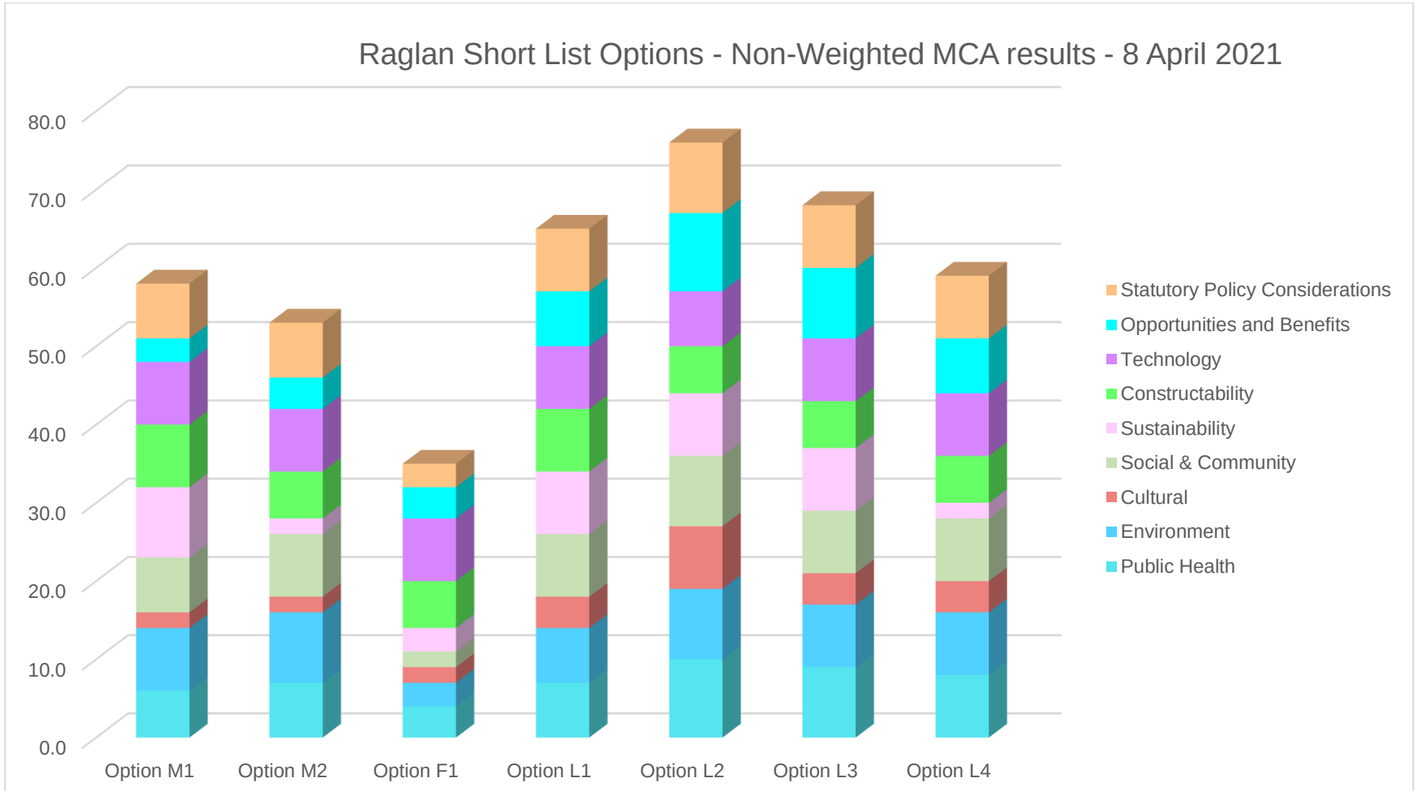
Note that the new harbour outfall would be located as per Option M1 and the MBR layout would be located as per Option M2.

MCA Scoring Sheet – Option L4

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
Public Health	Public health risk of treated wastewater discharge	Primary contact recreation e.g. swimming	Outputs from Quantitative Microbial Risk Assessment (QMRA) of options with water discharge component – this will assess public health risks to contact recreation and shellfish gathering	8	8	All sites safe for swimming, however some risk remains (albeit below the NOEL). Discharge to land will occur year round, with greater volumes discharged to land during dry summer periods. Slightly better treatment process pathogen removal than option L1.
		Secondary contact recreation (e.g. shoreline walking, jogging, boating)		8		All sites safe for secondary contact recreation, however some risk remains (albeit below the NOEL). Discharge to land will occur year round, with greater volumes discharged to land during dry summer periods. Slightly better treatment process pathogen removal than option L1.
		Consumption of raw shellfish		8		All sites safe for shellfish collection, however some risk remains (albeit below the NOEL). Discharge to land will occur year round, with greater volumes discharged to land during dry summer periods. Slightly better treatment process pathogen removal than option L1.
	Health effects from irrigation	Risk of public exposure to pathogens from irrigation.	For land discharge options – PDP expert assessment for discharge to air risk	5		Buffer distances will apply to reduce wind migration risk. Added treatment will reduce bacterial exposure risk. Consideration need to be given to human exposure within public land areas, with exclusion areas potentially applying.
Environment	Water quality	Potential effects on freshwater (surface and ground) and coastal/marine receiving environments	For water discharge options – Beca expert assessment. Informed by outputs from DHI modelling of nitrogen in the Whāingaroa Harbour. For land discharge options – PDP expert assessment of nutrient leaching/runoff using Overseer modelling, based on land use and loading rate.	9	8	As per option F1, treated wastewater will be improved when compared to the existing discharge and to a TM particularly in terms of TSS, pathogens, TN and TP. The discharge timing will be optimised to ensure no flows occur eastwards up the harbour at the beginning of the discharge period. Nitrogen modelling shows the discharge plume is rapidly discharged from the Harbour. Discharge to land will occur throughout the year, but some residual discharge to the marine environment (ranging between 8-50% of discharge to land at 2055). Irrigation to land may result in greater loss of nitrogen and phosphorus than the existing land use, but landuse could be changed to minimise nutrient loss. Limited opportunity of amend public land landuse but lower overall nitrogen load will result in less nutrient loss than Option L1.
	Aquatic ecology	Potential effects on aquatic ecosystems		9		There is no evidence for any adverse effects from the existing discharge on marine aquatic ecosystems. Given the improved treated wastewater quality compared to the existing discharge and optimised discharge timing, including the additional reduction in marine discharge, the potential for adverse environmental effects is likely to be very low.
	Terrestrial ecology	Potential effects on terrestrial ecosystems and soils		6		Physical works are limited to the new reactor and membrane units within the existing designated site. There is potential for adverse effects on terrestrial ecosystems on land discharge areas that will need to be mitigated through mitigation such as applying buffers around sensitive sites.
	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.		6		The new outfall will be constructed over the inter-tidal area to a depth of 2.5m CD, however the new outfall will be designed to not be visible at low tide. The original outfall will be removed which is currently visible as it crosses the foreshore and at the low tide mark.
Cultural	Mauri	Potential effects on mauri of land, water and air	Ongoing engagement with hapū			Tainui o Tainui express their guardianship as supporting re-use and implementing policies that effectively reduce overall quantity of black water. Their cultural bottom line is to allow kai to be collected which is a Maori world view of land/root contact to allow for any co-mingling. - Very clear messaging that a solution must (i) remove their area from being the town toilet location; and (ii) the wider community must recognise and own effects rather than 'out of sight, out of mind'. Based on cultural engagement to date Watercare consider there is an equal position weighting on (a) demonstrating re-use or discharge to land. (b) treating winter flow with a design that unquestionably offers neutrality through earth contact (not satisfied with examples shown of flow over stone) and (c) providing opportunity for full future re-use (ensuring ability for this isn't discounted by any final treatment or discharge option).
	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				

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
						Option L4 discharges a higher quality treated wastewater than existing and partially to land. An outfall is still required to discharge part flows.
Social and community	Amenity value and aesthetics	Potential effects on the natural and built environment (e.g. visual, odour, noise)	For all options – Beca RMA planner with inputs from project team and community engagement.	7	8	The existing treatment plant has been determined to manage odour and noise appropriately within the existing WWTP site; this option will not change that. There is some potential for odour and visual effects from the land treatment site, however these could be managed through the use of appropriate buffers.
	Urban development	Extent to which the option enables residential and commercial development within the projected timeframe		8		This option is designed to meet projected flows throughout the proposed 35 year consent duration. Additional aeration capacity is proposed to cater for additional flows throughout the consent term.
	Recreation	Extent to which the project enhances or detracts from local recreational activities and opportunities		8		The current outfall pipe will be removed and replaced with an outfall that will be out of sight. The treated wastewater plume will be much less visible due to the higher degree of treatment and the discharge 'boil' will not be visible due to the installation of a duck-bill on the outfall, resulting in much greater initial mixing. However, the discharge will be still be present and will need to be signposted, which could result in negative community perception effects. Land discharge to Wainui Reserve will need to be managed appropriately, although the proposal is to irrigate via subsurface irrigation. Irrigation to the golf course will have beneficial effects during summer.
	Food gathering	Extent to which the project enhances or detracts from people's ability to collect food within the area		8		The QMRA has shown that all sites will be safe for shellfish collection (higher degree of treatment than TM).
	Access to the coast	Extent to which an option effects access to the coastal marine area		8		There will be some temporary effects during construction, however the outfall will be visible on the landward side (only the duck-bill and small length of pipe will protrude from the sea bed).
Sustainability	Carbon footprint	Potential embodied and operational carbon footprint	Beca and PDP engineering expert. Qualitative assessment at this stage.	2	2	Highest power use, medium footprint, extensive use of concrete, steel and PE pipelines
Constructability	Geology, soil, groundwater conditions	Option suited to local environmental conditions	Beca and PDP engineering expert.	4	6	Moderate footprint MBR reactor with relatively high load, extensive ground improvements expected to be required, Proposed site elevated so unlikely to be impacted by groundwater. Land disposal site soil conditions require further investigation.
	Land availability, accessibility	Adequate and secure land must be available for the required infrastructure, timescales that fit within project timing		10		No additional land required
	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.		5		Limited existing assets being retained (1 pond for buffer storage, storage pond, UV and outfall pipe)
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)	Beca and PDP engineering expert.	10	8	Reliable performance from MBRs in NZ. Redundancy typically provided as part of design. Performance of small WW land disposal systems in NZ reliable.
	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.		9		MBR fixed hydraulic capacity managed via raw WW storage, Copes with varying loads up to design capacity. MBR technology has ability to achieve further improvements to treated wastewater quality through carbon dosing or tertiary processes.
	Able to be staged	The extent to which an option could be staged (e.g. through modularised components).		6		Mechanical equipment and membrane modules can be staged. Reactors more difficult to stage. Some of the components need to be sized for ultimate flows.

Criteria	Issue/Topic	Description/Explanation	MCA specialist/ source of information	MCA Score (10=Best to 1=Worst)	Overall MCA score	Justification for MCA score (bullet points)
	Operational and engineering resilience	The option must be sufficiently resilient to natural hazards and operational failure.		6		Unlikely to be significantly impacted by floods and earthquakes. Potential for pond failure?. High degree of operator skill required. Spikes in load (seasonal) can be managed. Outfall has risk of failure from severe storms, earthquakes.
Financial Implications	Capital cost	Is the cost of the project appropriate for the project area and the population served?	Not assessed as part of MCA. The financial implications of each option will be assessed once the MCA has been completed for non-cost criteria	N/A	N/A	N/A
	Operating and maintenance cost	Can the capital infrastructure be maintained and operated in a cost-effective manner?		N/A		N/A
	Whole of life cost	How do the whole of life costs pf the various options compare?		N/A		N/A
	Financial risk	Is the option affordable even if growth does not occur as predicted?		N/A		N/A
Opportunities and Benefits	Opportunity for resource recovery	The potential for beneficial reuse of treated wastewater	Beca and PDP engineering expert	7	7	Treated wastewater will be beneficially used on public land. Add comment why reduced to 7
Statutory Policy 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	Beca RMA planner	9	8	High-quality discharge of treated wastewater, with low adverse environmental effects. This option also aligns with hapū and community expectations, however does entirely remove wastewater from the marine environment.
	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		7		Discharge of treated wastewater to the Wainui Reserve will likely result in the need to change the purpose of the Wainui Reserve Management Plan and subsequent approval process through the Reserves Act.



Raglan Short List MCA - non-weighted results - maximum score is 90							
	Option M1	Option M2	Option F1	Option L1	Option L2	Option L3	Option L4
Criteria	Existing process + tertiary membrane; New harbour outfall	MBR and UV disinfection; New harbour outfall	MBR and UV disinfection; freshwater diffuse discharge	Existing process + tertiary membrane; combined public land discharge and harbour outfall	Existing process; private land discharge and storage	Existing process + tertiary membrane; combined private land discharge and harbour outfall	MBR and UV disinfection; combined public land discharge and harbour outfall
Public Health	6.0	7.0	4.0	7.0	10.0	9.0	8.0
Environment	8.0	9.0	3.0	7.0	9.0	8.0	8.0
Cultural							
Social & Community	7.0	8.0	2.0	8.0	9.0	8.0	8.0
Sustainability	9.0	2.0	3.0	8.0	8.0	8.0	2.0
Constructability	8.0	6.0	6.0	8.0	6.0	6.0	6.0
Technology	8.0	8.0	8.0	8.0	7.0	8.0	8.0
Opportunities and Benefits	3.0	4.0	4.0	7.0	10.0	9.0	7.0
Statutory Policy Considerations	7.0	7.0	3.0	8.0	9.0	8.0	8.0
Total	58.0	53.0	35.0	65.0	76.0	68.0	59.0
Rank	5	6	7	3	1	2	4

Images: Collective Scoring Summary (for discussion)