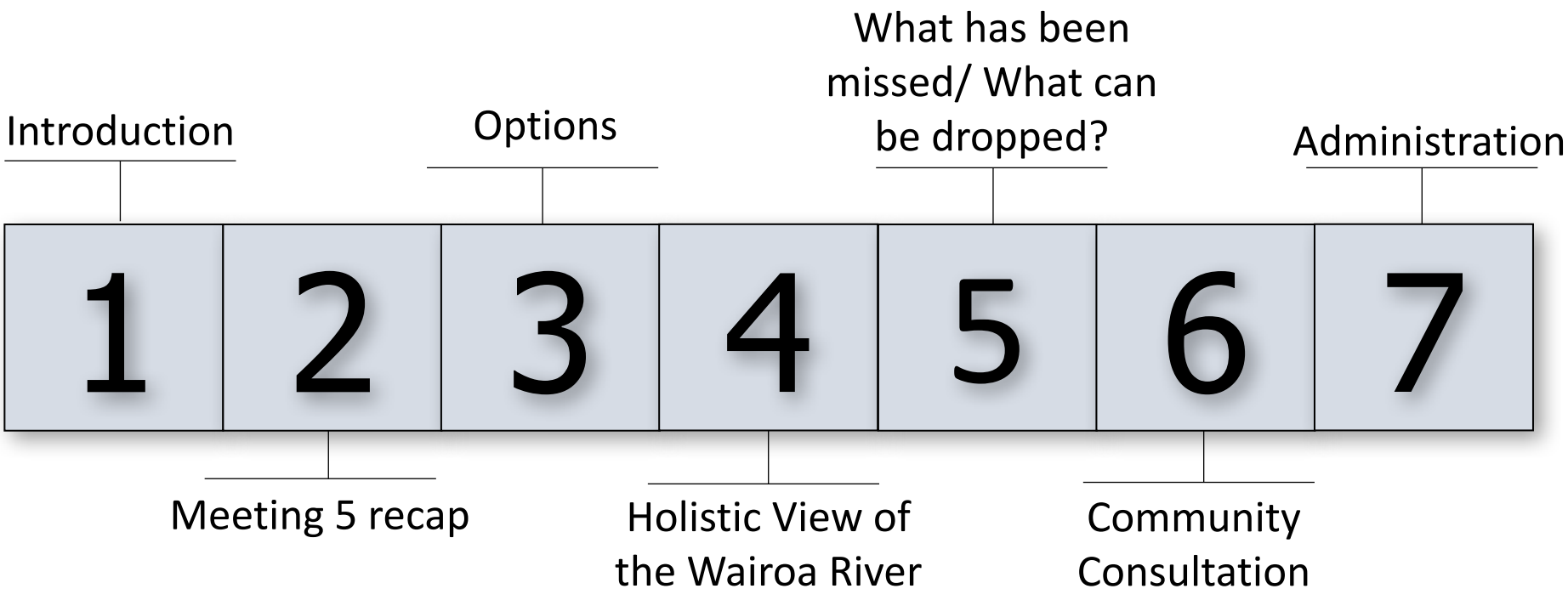
Wairoa Wastewater Scheme Stakeholder Group Meeting

Meeting 6 – 31 July 2017

INTRODUCTION

Outline



RECAP - MEETING 5

Recap from Meeting 5

- Any points from technical reports?
  - Existing Wastewater System (treatment, reticulation)
  - Receiving Environment (in river summary)
  - Land Options (cost, areas to use)
- Forward Reporting
  - Cultural Impact Assessment
  - Land & Water Assessment of Environmental Effects (AEE)

RECAP - MEETING 5

Councillors Forum

- Journey to date
  - Reporting
  - Values workshop
  - Four pillars (Cultural, Financial, Recreational, Environmental)
  - Options – wastewater system & discharge
- Consider Wairoa River Catchment not just wastewater
  - Opportunity to look at bigger picture

RECAP - MEETING 5

Cultural Direction

- Summary of background knowledge is underway
- Will identify areas of significance
- Will lead into CIA once we identify options

OPTIONS

Wastewater System	Discharge Options	Values to Consider

• Reticulation
  • Issues with I&I
  • Overflows
• Treatment & Storage
  • Treatment level good
  • Issues with sludge levels
  • Limited storage
• Discharge
  • Discharge into river
  • Issues with blockages at diffuser
  • Minimal effects on environment from discharge		

OPTIONS

Wastewater System	Discharge Options	Values to Consider

• **Reticulation**
  ○ Issues with I&I
  ○ Overflows
• **Treatment & Storage**
  ○ Treatment level good
  ○ Issues with sludge levels
  ○ Limited storage
• **Discharge**
  ○ Discharge into river
  ○ Issues with blockages at diffuser
  ○ Minimal effects on environment from discharge		

OPTIONS

Wastewater System

- **Reticulation**
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- **Discharge**
  - Discharge into river
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  - Minimal effects on environment from discharge

Discharge Options

- Current Discharge into River
- Ocean discharge
- Land passage to water
- Wetland to water
- Land via irrigation
- Land via rapid infiltration
- Combination of both land and water

Values to Consider

OPTIONS

Wastewater System

- **Reticulation**
  - Issues with I&I
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- **Treatment & Storage**
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Discharge Options

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- Ocean discharge
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- Wetland to water
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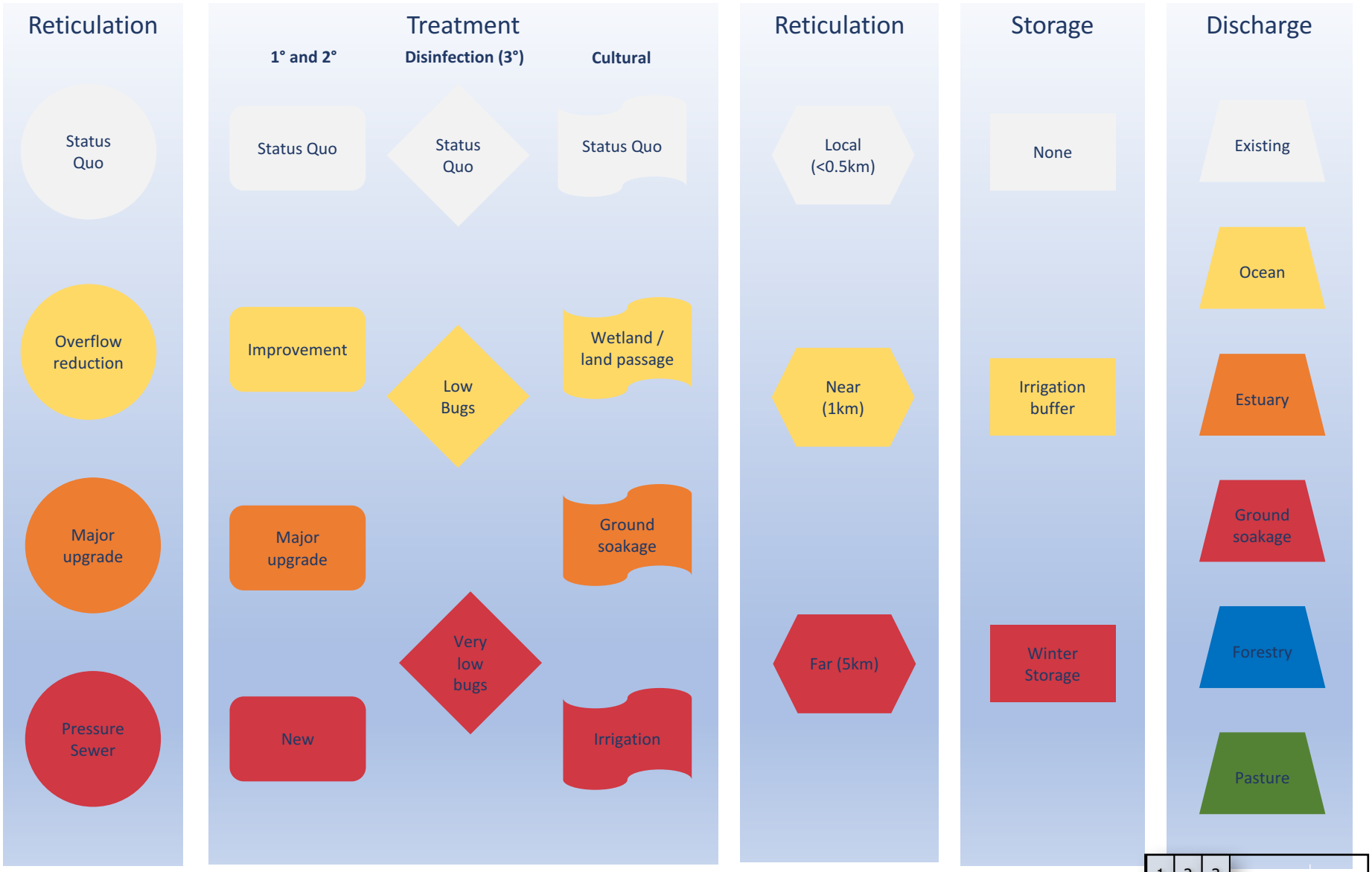
- Land via rapid infiltration
- Combination of both land and water

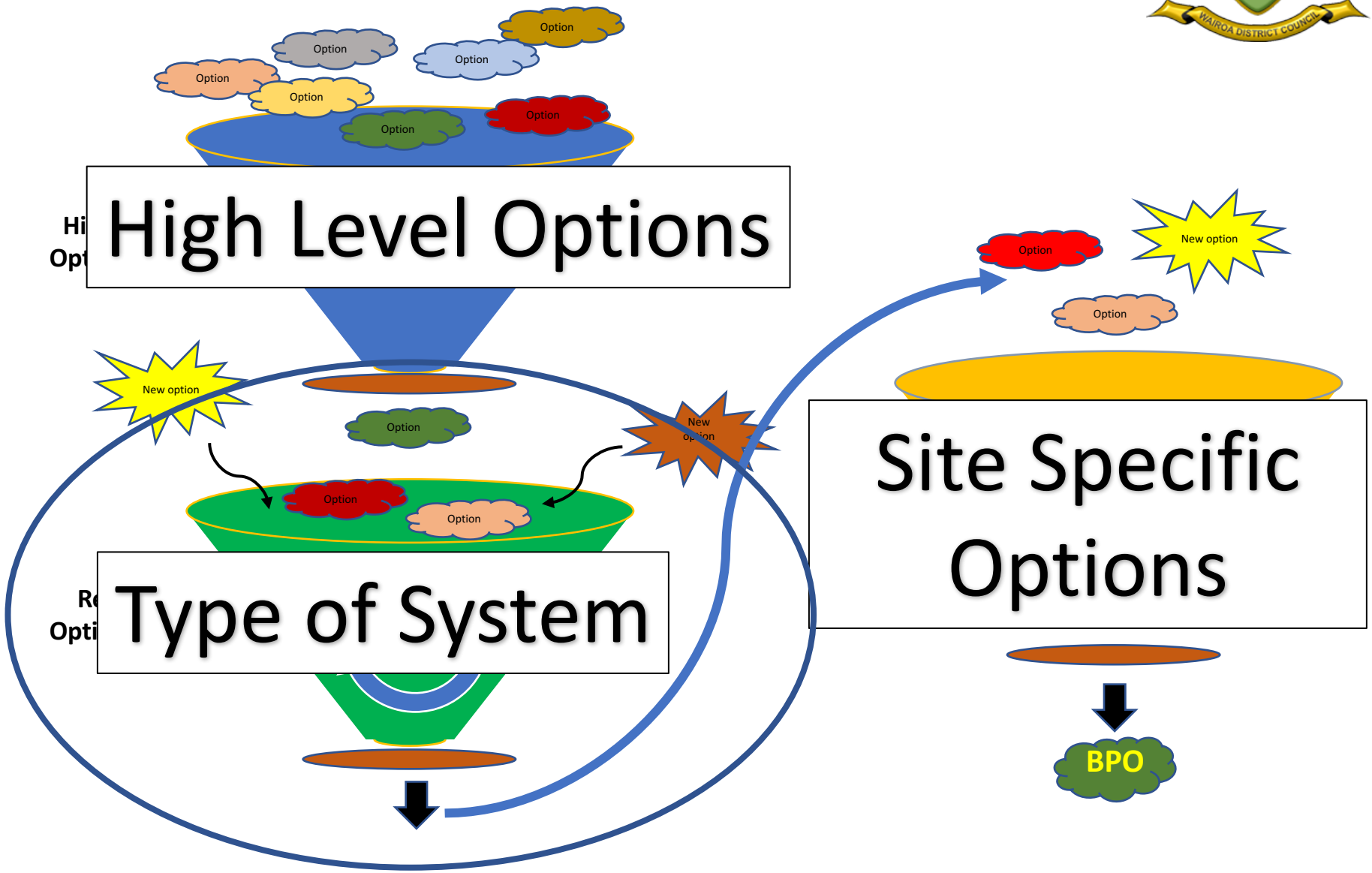
Values to Consider

- **Cultural** – Waahi tapu, papatuanuku
- **Financial** – what can we afford?
- **Recreational** – will the discharge location affect recreational activities?
- **Environmental** – what effect if any will this have on the receiving environment?

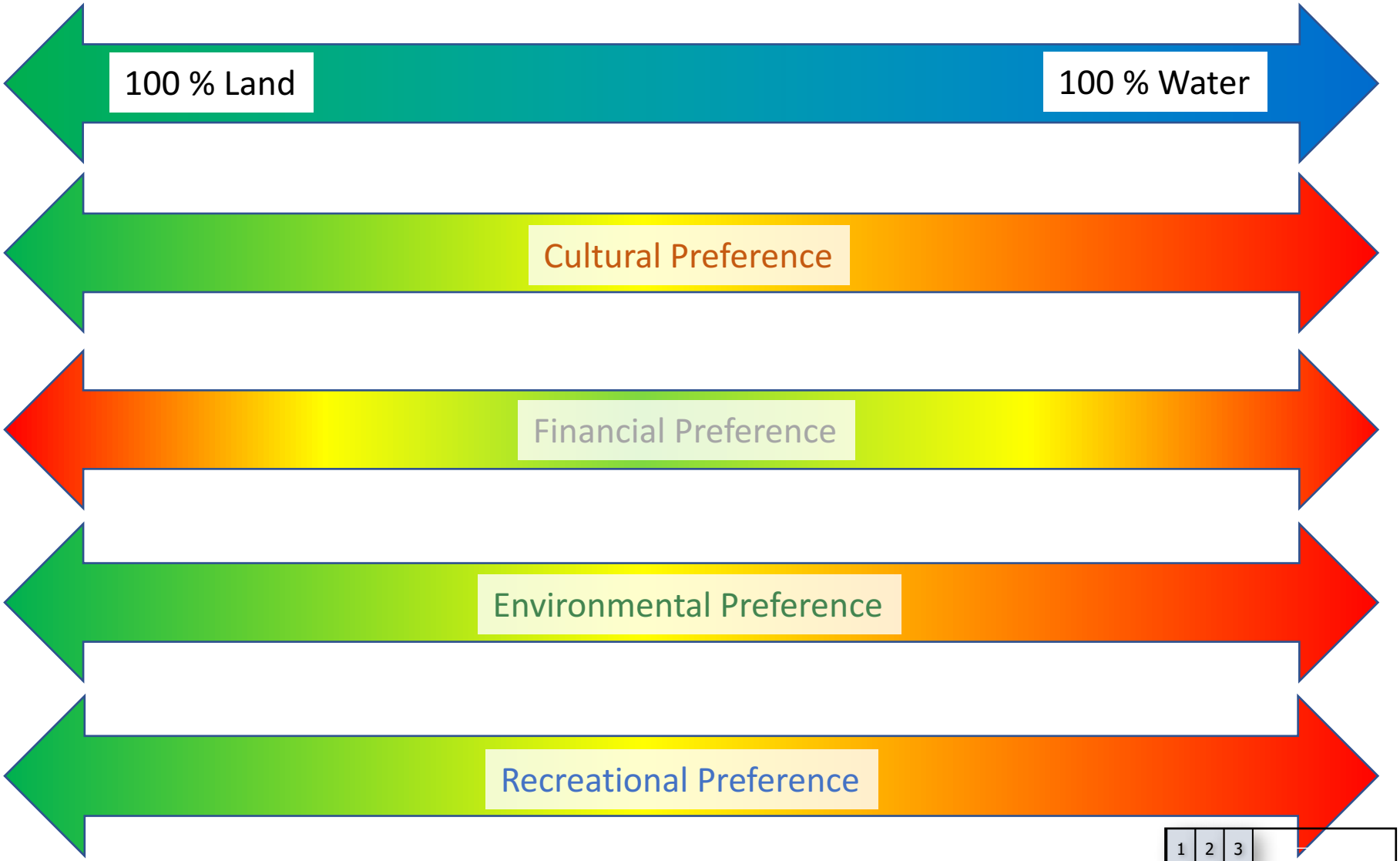
OPTIONS – RECAP



DECISION CRITERIA – FILTERING



OPTIONS – HOW DO WE USE - CRITERIA



OPTIONS – FINANCIAL BOTTOM LINE

OPTIONS

Selection Process

- We have come up with 22 options
- Ideally work through each of the 22 options as a group
- Consider all values: cultural, financial, recreational, environmental

Options were selected from a multitude of combinations that are relevant for Wairoa

Still need to consider those options that are not suitable so they can be removed from the process

OPTIONS - PARAMETERS

Reticulation

- current flow
  - (6,500m³/d peak, 4,000 m³/d winter average, and 2,700 m³/d mean flow)
- improved reticulation 50% reduction in flow
  - (3,250 m³/d peak, 2,000 m³/d winter average, and 1,800 m³/d mean flow)

Treatment

- Status quo
- Filtration + UV
- Filtration
- HRLP-OLF
- Irrigation filtration + UV

Storage

- current storage for 2-3 days (5,400 m³)
- 14 day storage
- 90 day storage
- 120 day storage

Discharge

- River Existing Outfall
- River New Outfall
- Ocean
- Irrigation rate 1 (5 mm/d deficit irrigation)
- Irrigation rate 2 (0.8 mm/d deficit irrigation)
- Rapid Infiltration (200 mm/d rapid infiltr

OPTIONS – WHAT ARE THEY

Status Quo

- 1.1 Status Quo
- 1.2 River-low bugs/24-hour continuous discharge

River

- 2.1 River-low bugs
- 2.2 River-low bugs/HRLP-OLF
- 2.3 River-HRLP-OLF
- 2.4 River-50% flow/low bugs/HRLP-OLF
- 2.5 River(new)-low bugs -HRLP-OLF

Ocean

- 3.1 Ocean
- 3.2 Ocean-HRLP-OLF

Land

- 4.1 Land-90 day storage buffer/irrigation rate 1
- 4.2 Land-120 day storage buffer/irrigation rate 1
- 4.3 Land-50% flow/90 day storage buffer/irrigation rate 1
- 4.4 Land-50% flow/120 day storage buffer/irrigation rate 1
- 4.5 Land-90 day storage buffer/irrigation rate 2
- 4.6 Land-120 day storage buffer/irrigation rate 2
- 4.7 Land-50% flow/90 day storage buffer/irrigation rate 2
- 4.8 Land-50% flow/120 day storage buffer/irrigation rate 2
- 4.9 Land-rapid infiltration

Combo

- 5.1 Combo-River/land-HRLP-OLF/14 day storage buffer
- 5.2 Combo-River/land-HRLP-OLF/90 day storage buffer
- 5.3 Combo-50% flow/River/land-HRLP-OLF/14 day storage buffer
- 5.4 Combo-50% flow/River/land-HRLP-OLF/90 day storage buffer

OPTIONS – WHAT ARE THEY

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OPTIONS – WHAT ARE THEY

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OPTIONS – WHAT ARE THEY

Ocean

- 3.1 Ocean
- 3.2 Ocean-HRLP-OLF

OPTIONS – WHAT ARE THEY

Land

- 4.1 Land-90 day storage buffer/irrigation rate 1
- 4.2 Land-120 day storage buffer/irrigation rate 1
- 4.3 Land-50% flow/90 day storage buffer/irrigation rate 1
- 4.4 Land-50% flow/120 day storage buffer/irrigation rate 1
- 4.5 Land-90 day storage buffer/irrigation rate 2
- 4.6 Land-120 day storage buffer/irrigation rate 2
- 4.7 Land-50% flow/90 day storage buffer/irrigation rate 2
- 4.8 Land-50% flow/120 day storage buffer/irrigation rate 2
- 4.9 Land-rapid infiltration

OPTIONS – WHAT ARE THEY

Combo

- 5.1 Combo-River/land-HRLP-OLF/14 day storage buffer
- 5.2 Combo-River/land-HRLP-OLF/90 day storage buffer
- 5.3 Combo-50% flow/River/land-HRLP-OLF/14 day storage buffer
- 5.4 Combo-50% flow/River/land-HRLP-OLF/90 day storage buffer

OPTIONS – ASSUMPTIONS

Notes Explaining Option Details and Excluded Options

All costings are rough preliminary estimates, and costs generated from detailed design assessments could be less or perhaps significantly more expensive than the ranges indicated in this preliminary option assessment process.

Storage:

Storage pond sizing has been based on average daily winter flows of 4,000 m^3/d currently and 2,000 m^3/d for major reticulation improvements. These flows were used because elevated winter flows will generally drive storage volumes while summer flows will be discharged.

Discharge to river options 1.2 and 2.1-2.5 did not include any increased storage volume options because there is no benefit gained from larger storage. It is noted that, regardless of river flows being high or low, the tides and river flows provide good dilution and flushing volumes in the estuary.

All combo options 5.1-5.4 have assumed that storage of 120 days is not necessary, as the river should be able to receive wastewater more frequently during winter and the land can receive wastewater frequently during summer.

Disinfection:

UV treatment to reduce pathogen concentrations requires filtration as a pre-treatment, so this is included in all discharge to river options except 2.3 and in all discharge to land or combo options.

All combo options 5.1-5.4 include filtration and UV only for the irrigated wastewater component. It is not necessary for the river discharge and also reduces the size of the filtration/UV units and consequently reduces costs.

Land Passage:

HRLP works best for stable flow rates. Multiple HLRP beds could be used to expand the system to cope with storm flows. OLF could be a wetland or a vegetated swale - there are many potential design options.

The residual wastewater from HRLP-OLF will need to be collected and then pumped through the pipeline to the river or ocean discharge location, as pressure will be needed to force it out into the river or ocean environment.

All combo options 5.1-5.4 have assumed that the river discharge will require HRLP-OLF in order to address cultural values prior to the wastewater entering the river.

Potential New River Discharge:

A new river discharge location could be further up the main river stem, within the estuary, or within the lagoons east and west of the estuary. For cultural and environmental reasons (poor dispersion and flushing), the lagoons must be discounted as a viable option. Other river and estuary locations are unlikely to be assessed as any better than the existing location.

Discharge to Ocean Considerations:

Discharge to ocean options 3.1 and 3.2 did not include any increased storage volume or reticulation improvement options because there is no benefit gained from larger storage or reduced flows. It is noted that the ocean provides very high dilution regardless of wastewater flows and quality.

Discharge to ocean options do not require filtration or UV for pathogens because the ocean will rapidly disperse the discharge without adverse effects and is unlikely to form a visible plume. The only reason for any treatment improvement (land passage) is to address cultural values.

Discharge to ocean could remain restricted to overnight, but without out-going tide time restrictions. However, there is no environmental or recreational reason why it couldn't occur continuously on a 24 hour basis.

Discharge to ocean location could be near shore (500 m from the Hawke Bay side of the spit) or further off-shore (1 km or more off-shore). The advantages and disadvantages of near shore should be considered before considering the more expensive far shore option.

Discharge to Land Considerations:

Discharges to land options 4.1-4.8 require 90-120 days of storage due to the reasonably wet climate, poor soil drainage, and low soil water holding capacities. Only the rapid infiltration option can cope with smaller storage, but this is dependent upon the drainage from the rapid infiltration basin entering surface water in an environmentally sustainable manner and rate.

Land uses for options 4.1-4.8 could be pasture or forestry, but the actual type of land use is not critical to the assessments of values. The key factor is the daily application rate, as this determines the area of land required which affects the cost of purchasing or leasing land and the extent and cost of irrigation infrastructure.

Irrigation requires filtration to prevent nozzle blockages. Irrigation of pasture may require UV treatment, so this has been included in all land discharge options. It is a minor additional cost.

Discharges to land are very unlikely to be able to cope with the largest emergency storm flows, so a relief valve of discharging to the river or ocean must be included for such rare events.

Rapid infiltration option 4.9 requires dunes for highly porous and free-draining soils. There is a narrow strip of dune soils along the coast, but the availability of suitable sites close to the WWTP is limited. The coast and ocean processes are highly active/dynamic, so any site will need to be protected from coastal erosion. Rapid infiltration can also destabilise the dunes and be lost in storm erosion.

OPTIONS – DETAIL

Code	Option Description	Reticulation	Treatment		Storage	Discharge	
1.1	Status Quo	x. current flow	a. Status quo		i. 2-3 days (current)	A1. River Existing Outfall	
1.2	River-low bugs/24-hour continuous discharge	x. current flow	b. Filtration + UV		i. 2-3 days (current)	A1. River Existing Outfall	
2.1	River-low bugs	x. current flow	b. Filtration + UV		i. 2-3 days (current)	A1. River Existing Outfall	
2.2	River-low bugs/HRLP-OLF	x. current flow	b. Filtration + UV	d. HRLP-OLF	i. 2-3 days (current)	A1. River Existing Outfall	
2.3	River-HRLP-OLF	x. current flow	d. HRLP-OLF		i. 2-3 days (current)	A1. River Existing Outfall	
2.4	River-50% flow/low bugs/HRLP-OLF	y. 50% flow	b. Filtration + UV	d. HRLP-OLF	i. 2-3 days (current)	A1. River Existing Outfall	
2.5	River(new)-low bugs -HRLP-OLF	x. current flow	b. Filtration + UV	d. HRLP-OLF	i. 2-3 days (current)	A2. River New Outfall	
3.1	Ocean	x. current flow	a. Status quo		i. 2-3 days (current)	B1. Ocean	
3.2	Ocean-HRLP-OLF	x. current flow	d. HRLP-OLF		i. 2-3 days (current)	B1. Ocean	
4.1	Land-90 day storage buffer/irrigation rate 1	x. current flow	e. Irrigation filtration + UV		iii. 90 days	C1. Irrigation rate 1	
4.2	Land-120 day storage buffer/irrigation rate 1	x. current flow	e. Irrigation filtration + UV		iv. 120 days	C1. Irrigation rate 1	
4.3	Land-50% flow/90 day storage buffer/irrigation rate 1	y. 50% flow	e. Irrigation filtration + UV		iii. 90 days	C1. Irrigation rate 1	
4.4	Land-50% flow/120 day storage buffer/irrigation rate 1	y. 50% flow	e. Irrigation filtration + UV		iv. 120 days	C1. Irrigation rate 1	
4.5	Land-90 day storage buffer/irrigation rate 2	x. current flow	e. Irrigation filtration + UV		iii. 90 days	C2. Irrigation rate 2	
4.6	Land-120 day storage buffer/irrigation rate 2	x. current flow	e. Irrigation filtration + UV		iv. 120 days	C2. Irrigation rate 2	
4.7	Land-50% flow/90 day storage buffer/irrigation rate 2	y. 50% flow	e. Irrigation filtration + UV		iii. 90 days	C2. Irrigation rate 2	
4.8	Land-50% flow/120 day storage buffer/irrigation rate 2	y. 50% flow	e. Irrigation filtration + UV		iv. 120 days	C2. Irrigation rate 2	
4.9	Land-rapid infiltration	x. current flow	a. Status quo		i. 2-3 days (current)	C3. Rapid Infiltration	
5.1	Combo-River/land-HRLP-OLF/14 day storage buffer	x. current flow	e. Irrigation filtration + UV	d. HRLP-OLF	ii. 14 days	A1. River Existing Outfall	C1. Irrigation rate 1
5.2	Combo-River/land-HRLP-OLF/90 day storage buffer	x. current flow	e. Irrigation filtration + UV	d. HRLP-OLF	iii. 90 days	A1. River Existing Outfall	C1. Irrigation rate 1
5.3	Combo-50% flow/River/land-HRLP-OLF/14 day storage buffer	y. 50% flow	e. Irrigation filtration + UV	d. HRLP-OLF	ii. 14 days	A1. River Existing Outfall	C1. Irrigation rate 1
5.4	Combo-50% flow/River/land-HRLP-OLF/90 day storage buffer	y. 50% flow	e. Irrigation filtration + UV	d. HRLP-OLF	iii. 90 days	A1. River Existing Outfall	C1. Irrigation rate 1

OPTIONS – DETAIL

Code	Option Description	Detailed Description	Reasons for Inclusion	Key Benefits	Key Disadvantages
1.1	Status Quo	Existing reticulation renewal programme. No changes to treatment, storage, discharge location or discharge regime.	Baseline against which other options need to be assessed. Current environmental effects and treatment performance are acceptable, but it is culturally unacceptable.	Minimal costs due to a lack of any upgrades or changes to any aspects of the wastewater system.	No environmental, cultural, or recreational improvements for the river. May be unacceptable for consenting.
1.2	River-low bugs/24-hour continuous discharge	Existing reticulation renewal programme. Filtration & UV to reduce pathogens. No additional storage. Continuous discharge to river. If necessary, summer discharges could be restricted to overnight out-going tides.	Simpler discharge regime, but still addresses public health concerns.	Simplified discharge regime that helps keep the river discharge outlet clear of silt and needs no storage. UV treatment ensures that public health and recreational values are addressed.	No cultural improvements for the river, and minimal environmental improvement. May be unacceptable for consenting due to 24-hour direct river discharge without any cultural mitigation.
2.1	River-low bugs	Existing reticulation renewal programme. Filtration & UV to reduce pathogens. No additional storage. Current discharge regime & location.	Additional treatment solely to address pathogen numbers discharged to the river, which is the only environmental and public health concern, while maintaining current river discharge to minimise costs.	Addresses the public health risk of pathogens in the river. Minimal cost to construct and operate additional treatment.	No cultural improvements for the river and may be unacceptable for consenting. Treatment of current flows will require the largest capacity UV system of all options.
2.2	River-low bugs/HRLP-OLF	Existing reticulation renewal programme. HRLP/OLF to address cultural and environmental values. Filtration & UV to reduce pathogens (probably after HRLP/OLF). No additional storage. Current discharge regime & location.	Additional treatment to address pathogens and cultural and environmental values while maintaining current river discharge to minimise costs.	Additional treatments address public health and cultural values while also improving the river environment.	Large modular HRLP and UV systems will be needed to handle the highly variable and large daily flows. May be unacceptable for consenting due to reliance on river receiving environment.
2.3	River-HRLP-OLF	Existing reticulation renewal programme. HRLP/OLF to address cultural and environmental values. No filtration & UV to reduce pathogens. No additional storage. Current discharge regime & location.	Additional treatment to address cultural and environmental values while maintaining current river discharge to minimise costs.	HRLP treatment addresses cultural values and contributes to improving the river environment.	Does not address the public health risk of pathogens in the river. A large modular HRLP will be needed to handle the highly variable and large daily flows. May be unacceptable for consenting due to reliance on river receiving environment.
2.4	River-50% flow/low bugs/HRLP-OLF	Intensive reticulation renewal programme to reduce flows. HRLP/OLF to address cultural and environmental values. Filtration & UV to reduce pathogens (probably after HRLP/OLF). No additional storage. Current discharge regime & location.	Intensive reticulation to improve flow management, which will reduce the sizes and improve the stability of UV and HRLP systems. Additional treatment to address public health, cultural and environmental values.	Filtration and UV units can be smaller than would be needed for current flows. HRLP will receive more consistent gentle flows and can be smaller than would be needed for current flows. Additional treatments address public health and cultural values while	Significant reticulation upgrade costs may be unaffordable for the community or less efficient expenditure than treating and dischargingthe current flows. May be unacceptable for consenting due to reliance on river receiving environment.
2.5	River(new)-low bugs -HRLP-OLF	Existing reticulation renewal programme. HRLP/OLF to address cultural and environmental values. Filtration & UV to reduce pathogens (probably after HRLP/OLF). No additional storage. Current discharge regime but at a new location within the river.	A new river discharge location has been discussed previously and needs to be considered as a potential option.	A different river discharge location might be more acceptable to the community, ensure faster dispersion and flushing out to sea, and less prone to siltation problems than the current river discharge location. Additional treatments address public health	A changed location within the river may be seen as providing no benefit to the river while adding unnecessary costs. Large modular HRLP and UV systems will be needed to handle the highly variable and large daily flows. May be unacceptable for
3.1	Ocean	Existing reticulation renewal programme. No changes to treatment or additional storage. New ocean outfall (either 500 m off-shore or 1 km off-shore). Current overnight out-going tide or continuous 24-hour discharge regime.	Discharge uses a nearby receiving environment with the highest capacity to receive and disperse the discharge without adverse effects.	The ocean has the greatest capacity to receive the discharge without timing or volume restrictions. No need to upgrade reticulation, treatment, or storage.	No cultural improvements for effects on water, potentially culturally offensive pipeline route through estuary/lagoon and spit, and installing a pipeline to the ocean outfall will be expensive and technically difficult to achieve.
3.2	Ocean-HRLP-OLF	Existing reticulation renewal programme, and no additional storage. HRLP to address cultural values prior to new ocean outfall (either 500 m off-shore or 1 km off-shore). Current overnight out-going tide or continuous 24-hour discharge regime.	HRLP addresses cultural values and discharges to a nearby receiving environment with the highest capacity to receive and disperse the discharge without adverse effects.	HRLP addresses cultural values while discharging to the ocean has the greatest capacity to receive the discharge without timing or volume restrictions. No need to upgrade reticulation, treatment, or storage.	Large modular HRLP system will be needed to handle the highly variable and large daily flows. Potentially culturally offensive pipeline route through estuary/lagoon and spit, and installing a pipeline to the ocean outfall will be expensive and
4.1	Land-90 day storage buffer/irrigation rate 1	Existing reticulation renewal programme. Irrigation at a daily average of 5 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 90 days of flows.	100 % land discharge at highest daily rate possible with minimal storage and avoiding expensive reticulation upgrade.	River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients. Avoids reticulation upgrade costs.	Large and expensive storage. Large irrigation area. May not be feasible during winter due to high soil moisture and wastewater flows.
4.2	Land-120 day storage buffer/irrigation rate 1	Existing reticulation renewal programme. Irrigation at a daily average of 5 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 120 days of flows.	100 % land discharge at highest daily rate possible with large storage while avoiding expensive reticulation upgrade.	River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients. Avoids reticulation upgrade costs.	Very large and expensive storage. Large irrigation area. May not be feasible during winter due to high soil moisture and wastewater flows.
4.3	Land-50% flow/90 day storage buffer/irrigation rate 1	Intensive reticulation renewal programme to reduce flows. Irrigation at a daily average of 5 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 90 days of flows.	100 % land discharge at highest daily rate possible with minimal storage and reduced flows.	Storage size and irrigated land area have been minimised by upgrading reticulation. River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients.	Moderately large storage. Moderate irrigation area. May not be feasible during winter due to high soil moisture and wastewater flows.
4.4	Land-50% flow/120 day storage buffer/irrigation rate 1	Intensive reticulation renewal programme to reduce flows. Irrigation at a daily average of 5 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 120 days of flows.	100 % land discharge at highest daily rate possible with large storage and reduced flows.	Storage size and irrigated land area have been minimised by upgrading reticulation. River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients.	Large and expensive storage. Large irrigation area. May not be feasible during winter due to high soil moisture and wastewater flows.
4.5	Land-90 day storage buffer/irrigation rate 2	Existing reticulation renewal programme. Irrigation at a daily average of 0.8 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 90 days of flows.	100 % land discharge at low daily rate with minimal storage and avoiding expensive reticulation upgrade.	River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients. Avoids reticulation upgrade costs.	Very large land area required for irrigation and large storage pond. Unlikely to be feasible within soil moisture limits for more than a few dry months each year.
4.6	Land-120 day storage buffer/irrigation rate 2	Existing reticulation renewal programme. Irrigation at a daily average of 0.8 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 120 days of flows.	100 % land discharge at low daily rate with large storage and avoiding expensive reticulation upgrade.	River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients. Avoids reticulation upgrade costs.	Very large land area required for irrigation and very large storage pond. Unlikely to be feasible within soil moisture limits for more than a few dry months each year.
4.7	Land-50% flow/90 day storage buffer/irrigation rate 2	Intensive reticulation renewal programme to reduce flows. Irrigation at a daily average of 0.8 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 90 days of flows.	100 % land discharge at low daily rate with minimal storage and reduced flows.	Storage size and irrigated land area have been minimised by upgrading reticulation. River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients.	Very large land area required for irrigation and moderate storage size. Unlikely to be feasible within soil moisture limits for more than a few dry months each year. Expensive reticulation upgrades.
4.8	Land-50% flow/120 day storage buffer/irrigation rate 2	Intensive reticulation renewal programme to reduce flows. Irrigation at a daily average of 0.8 mm/d. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 120 days of flows.	100 % land discharge at low daily rate with large storage and reduced flows.	Storage size and irrigated land area have been minimised by upgrading reticulation. River discharge is avoided if discharges to land exceed soil moisture limits in winter. Pasture benefits from water and nutrients.	Very large land area required for irrigation and moderate to large storage size. Unlikely to be feasible within soil moisture limits for more than a few dry months each year. Expensive reticulation upgrades.
4.9	Land-rapid infiltration	Existing reticulation renewal programme. Rapid infiltration to address cultural and environmental values, and to minimise required land area. No filtration & UV to reduce pathogens. No additional storage.	Rapid infiltration is a very compact 100 % land discharge option that avoids some infrastructure and land costs.	Smallest land area and low to moderate cost if close to WWTP.	Difficult to find a suitable site that will be safe from erosion and away from cultural sites. Discharge contaminates groundwater. May need to install several km of reticulation from WWTP to discharge location.
5.1	Combo-River/land-HRLP-OLF/14 day storage buffer	Combined land and river discharge system. Existing reticulation renewal programme. Irrigation at a daily average of 5 mm/d when soils allow. Filtration and UV to avoid irrigator blockages and public health risks. Small storage for 14 days of flows. Only discharge to river when irrigation is not possible and storage is nearly full. River discharges pass through HRLP-OLF to address cultural values.	Summer irrigation and small storage to reduce river discharge while avoiding expensive reticulation upgrade.	Diverts most wastewater from the river to benefit pasture instead during summer. Addresses cultural values for river discharge. Avoids reticulation upgrade costs and keeps storage costs lower.	Is not capable of discharging all wastewater to land during summer due to limited storage and elevated flows during storms. Moderate land area required for irrigation. Complex discharge management and monitoring could be a burden.
5.2	Combo-River/land-HRLP-OLF/90 day storage buffer	Combined land and river discharge system. Existing reticulation renewal programme. Irrigation at a daily average of 5 mm/d when soils allow. Filtration and UV to avoid irrigator blockages and public health risks. Moderately large storage for 90 days of flows. Only discharge to river when irrigation is not possible and storage is nearly full. River discharges pass through HRLP-OLF to address cultural values.	Summer irrigation and moderate storage to reduce river discharge while avoiding expensive reticulation upgrade.	Diverts almost all wastewater from the river to benefit pasture instead during summer and shoulder seasons. Addresses cultural values for river discharge. Avoids reticulation upgrade costs.	Large storage volume is expensive. Moderate to large land area required for irrigation. Complex discharge management and monitoring could be a burden.
5.3	Combo-50% flow/River/land-HRLP-OLF/14 day storage buffer	Combined land and river discharge system. Intensive reticulation renewal programme. Irrigation at a daily average of 5 mm/d when soils allow. Filtration and UV to avoid irrigator blockages and public health risks. Small storage for 14 days of flows which have been reduced by reticulation upgrade. Only discharge to river when irrigation is not possible and storage is nearly full. River discharges pass through HRLP-OLF to address	Summer irrigation and small storage with reduced flows to reduce river discharge.	Diverts almost all wastewater from the river to benefit pasture instead during summer. Addresses cultural values for river discharge. Reduced flows resulting from reticulation upgrade have reduced storage volume and land area for irrigation and HRLP. Very	Very small storage and moderate irrigation area. Expensive reticulation upgrades. Complex discharge management and monitoring could be a burden.
5.4	Combo-50% flow/River/land-HRLP-OLF/90 day storage buffer	Combined land and river discharge system. Intensive reticulation renewal programme. Irrigation at a daily average of 5 mm/d when soils allow. Filtration and UV to avoid irrigator blockages and public health risks. Storage for 90 days of flows which have been reduced by reticulation upgrade. Only discharge to river when irrigation is not possible and storage is nearly full. River discharges pass through HRLP-OLF to address cultural values.	Summer irrigation and small storage with reduced flows to reduce river discharge.	Best combination to maximise irrigation and minimise river discharges. Diverts all wastewater from the river to benefit pasture during summer and shoulder seasons. Addresses cultural values for river discharge. Reduced flows resulting from reticulation	Moderate storage volume and moderate to large irrigation area. Expensive reticulation upgrades. Complex discharge management and monitoring could be a burden.

OPTIONS – DETAIL

Recreational	Envrionmental	Cultural	Financial
The time of disharge should not impact river users, but could impact on public perception. Potential for public health concern due to limited pathogen treatment.	No more than minor impact on receiving environment from discharge, however in-river biota counts are low due to upstream silt sources. Discharging on out-going tides ensures good flushing and protects estuary	Direct discharge to water without land passage is culturally offensive.	Consenting will be the only cost because nothing else is being changed or upgraded. The consent for this option is likely to be more expensive than all others due to cultural and community opposition.
Will impact on public perception (24-hour discharges may be less acceptable than overnight restrictions), but UV treatment of pathogens ensures there is no risk to public health despite 24 hour discharge	Low pathogens protects the river biota. Could have minor impact on upstream environment during in-coming tides. May have more of a dilution effect if discharging at lower rates over 24 hours.	Direct discharge to water without land passage is culturally offensive. UV treatment of pathogens does not address this cultural value.	Consenting will be more expensive due to cultural and community opposition; 24-hour discharges may be contentious. Incorporation of UV treatment will be higher due to its capacity requirement for current flows.
The time of disharge should not impact river users, but could impact on public perception. UV treatment of pathogens ensures there is no risk to public health.	Low pathogens protects river biota and ensures a less than minor impact on receiving environment from discharge. Discharging on out-going tides ensures good flushing and protects estuary except when river mouth is	Direct discharge to water without land passage is culturally offensive. UV treatment of pathogens does not address this cultural value.	Consenting will be more expensive due to cultural and community opposition. Incorporation of UV treatment will be higher due to its capacity requirement for current flows. Costs of major reticulation
The time of disharge should not impact river users, but could impact on public perception. HRLP design could be visually appealing, but position of HRLP could impact on current land users. Pathogen treatment ensures	HRLP allows for some nutrient recycling and benefit to artificial wetland environment. Low pathogens and HRLP protect river biota and ensures a less than minor impact on receiving environment from discharge.	Favourable. Treated wastewater passes over papatuanuku before discharge to water. Pathogen treatment improves acceptability of kaimoana for consumption.	The costs of HRLP and UV treatment will be higher to cope with current flows, but the costa of major reticulation upgrades and storage have been avoided. Cost of consenting could be lower in recognition of the design
Lack of pathogen treatment after HRLP could increase pathogen counts at outlet to river, but time of disharge should not impact river users, but could impact on public perception. HRLP design could be visually appealing, but	HRLP protects river biota and ensures a less than minor impact on receiving environment from discharge. HRLP allows for some nutrient recycling and could be an attractant for wildlife, but could increase pathogen counts at	Favourable, as treated wastewater passes over papatuanuku before discharge to water, but the lack of pathogen treatment does not improve the acceptability of kaimoana for consumption.	The cost of HRLP will be higher to cope with current flows, but the costs of major reticulation upgrades, storage, and UV have been avoided. Cost of consenting could be lower in recognition of the design addressing cultural
The time of disharge should not impact river users, but could impact on public perception. HRLP design could be visually appealing, but position of HRLP could impact on current land users, however the smaller size for	Lower flow reduces effects on environment. HRLP allows for some nutrient recycling and benefit to artificial wetland environment. Low pathogens and HRLP protect river biota and ensures a less than minor	Favourable, as treated wastewater passes over papatuanuku before discharge to water. Pathogen treatment improves acceptability of kaimoana for consumption.	The costs of HRLP and UV treatment will be lower due to reduced flows, but the cost of major reticulation upgrades has been incurred instead. The cost of storage has been avoided too. Cost of consenting could be lower in
The time of disharge should not impact river users, but could impact on public perception. HRLP design could be visually appealing, but position of HRLP could impact on current land users. Pathogen treatment ensures	HRLP allows for some nutrient recycling and benefit to artificial wetland environment. Low pathogens and HRLP protect river biota and ensures a less than minor impact on receiving environment from discharge.	Favourable, as treated wastewater passes over papatuanuku before discharge to water. Pathogen treatment improves acceptability of kaimoana for consumption.	The costs of HRLP and UV treatment will be higher to cope with current flows, but the costs of major reticulation upgrades and storage have been avoided. Cost of consenting could be lower in recognition of the design
Less than minor impact except close to the discharge structure, may impact on public perception due to lack of pathogen treatment and/or if discharge is visible in the ocean.	Very low impact on receiving environment due to very large and rapid dispersion.	Direct discharge to water without land passage is culturally offensive, but discharge to the ocean seems preferable to using the river.	Construction of an ocean outfall is expensive due to its technical design and installation requirements. Costs of major reticulation upgrades, additional treatment, storage, and land expansion have been avoided.
Less than minor impact except close to the discharge structure, may impact on public perception due to lack of pathogen treatment and/or if discharge is visible; HRLP design could be visually appealing; position of HRLP could	Very low impact on ocean receiving environment due to very large and rapid dispersion; HRLP could be an attractant for wildlife, but could increase pathogen counts prior to discharge to ocean.	Favourable, as treated wastewater passes over papatuanuku before discharge to water, and the ocean seems preferable to using the river.	Construction of an ocean outfall is expensive due to its technical design and installation requirements. The cost of constructing an HRLP is an additional cost, which will be reasonably signficant for managing the
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	Low impact on environment; restricted storage may result in irrigation above soil moisture deficit	Favourable, as all wastewater passes over and through papatuanuku and some nutrients will be used to grow pasture.	Large storage and large irrigation area are costly, but costs of major reticulation upgrades have been avoided. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	Med-low impact on environment, extra storage lowers risk of irrigating above soil moisture deficit	Favourable, as all wastewater passes over and through papatuanuku and some nutrients will be used to grow pasture.	Large storage and large irrigation area are costly, but costs of major reticulation upgrades have been avoided. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	med-Low impact on environment; reduced flow concentrates wastewater but will decrease risk of reduced storage during times of soil saturation	Favourable, as all wastewater passes over and through papatuanuku and some nutrients will be used to grow pasture.	Moderately large storage and large irrigation area are costly, and costs of major reticulation upgrades have also been incurred. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	Very low impact on environment and smallest irrigation land area; reduced flow and large storage ensure irrigation occurs at suitable rates and when most beneficial to soils and pasture; high safety margin with large storage	Favourable, as all wastewater passes over and through papatuanuku and some nutrients will be used to grow pasture.	Large storage and large irrigation area are costly, and costs of major reticulation upgrades have also been incurred. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. This option has one of the largest land area requirements, so potentially elevates the perception of effects on more neighbours and	Low impact on environment but discharges to a larger land area; restricted storage may result in irrigation above soil moisture deficit more frequently than desirable, and this causes adverse effects on soils and pasture.	Favourable, as all wastewater passes over and through papatuanuku and most of the nutrients will be used to grow pasture.	Very large storage and very large irrigation area are costly, but costs of major reticulation upgrades have been avoided. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. This option has one of the largest land area requirements, so potentially elevates the perception of effects on more neighbours and	Med-low impact on environment, extra storage lowers risk of irrigating above soil moisture deficit	Favourable, as all wastewater passes over and through papatuanuku and most of the nutrients will be used to grow pasture.	Very large storage and very large irrigation area are costly, but costs of major reticulation upgrades have been avoided. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	Very low impact on environment; reduced flow concentrates wastewater but will decrease risk of reduced storage during times of soil saturation	Favourable, as all wastewater passes over and through papatuanuku and most of the nutrients will be used to grow pasture.	Large storage and very large irrigation area are costly, and costs of major reticulation upgrades have also been incurred. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied. River discharge is avoided.	Very low impact on environment; reduced flow concentrates wastewater but less to apply; high safety margin with storage buffer	Favourable, as all wastewater passes over and through papatuanuku and most of the nutrients will be used to grow pasture.	Very large storage and very large irrigation area are costly, and costs of major reticulation upgrades have also been incurred. Cost of consenting could be modest.
Any current land use will be affected by when and where irrigation is applied, but this is likely to be small and coastal (it needs sandy soils) and may only concern a couple of neighbours or recreational areas.	There is no beneficial nutrient recycling through plants due to speed and large volumes of drainage. It will cause groundwater contamination adjacent to the shore, but occupies a very small land area and avoids the	Favourable, as all wastewater passes over and through papatuanuku, but its rapid and large drainage close to open water may be less acceptable than irrigation. The site will need to avoid culturally significant areas along the	The cost of rapid infiltration will be higher to cope with current flows, but the costs of major reticulation upgrades, storage, and UV have been avoided. Long reticulation to a distant site could be costly. Cost of
Any current land use will be affected by when and where irrigation is applied, including HRLP. Negative public perception of discharge to water still occurring at times.	Small land area for pond and moderate area for irrigation. Pasture will benefit from nutrients and water during summer. Most wastewater will discharge to land during summer, but the small storage volume and lack of	Favourable, as some wastewater will be discharged to land during summer, while the discharge to the river will pass over and through paptuanuku (HRLP-OLF) first.	Land area for irrigation and HRLP will be costly, but small storage minimises costs. Costs of major reticulation upgrade have been avoided. Complex discharge management and monitoring could be a burden.
Any current land use will be affected by when and where irrigation is applied, including HRLP. River discharges will only occur during large summer storms and winter when recreation is low or nil.	Moderate land area for pond and moderate to large area for irrigation. Pasture will benefit from nutrients and water during summer. Almost all wastewater will discharge to land during summer. However, the lack of	Favourable, as most summer flows of wastewater will be discharged to land, while the discharge to the river at other times will pass over and through paptuanuku (HRLP-OLF) first.	Land area for irrigation and HRLP and large storage increases costs. Costs of major reticulation upgrade have been avoided but have forced the construction of larger storage and irrigation areas. Complex discharge
Any current land use will be affected by when and where irrigation is applied, including HRLP. River discharges will only occur during large summer storms and winter when recreation is low or nil.	Very small land area for pond and moderate area for irrigation. Pasture will benefit from nutrients and water during summer. Almost all wastewater will discharge to land during summer, but the small storage	Favourable, as most wastewater will be discharged to land during summer, while the discharge to the river will pass over and through paptuanuku (HRLP-OLF) first.	Land area for irrigation and HRLP will be more modest and small storage minimises costs. Costs of major reticulation upgrade have been incurred but have reduced the storage and irrigation costs. Complex discharge
Any current land use will be affected by when and where irrigation is applied, including HRLP. River discharges will only occur during very large summer storms and winter when recreation is low or nil.	Small to moderate land area for pond and moderate to large area for irrigation. Pasture will benefit from nutrients and water during summer. The large storage volume and reduced flows will avoid discharges to the	Favourable, as almost all summer flows of wastewater will be discharged to land, while the discharge to the river at other times will pass over and through paptuanuku (HRLP-OLF) first.	Land area for irrigation and HRLP and moderate-large storage increases costs. Costs of major reticulation upgrade have been incurred but have reduced the storage and irrigation costs. Complex discharge management

OPTIONS – SUMMARY

Wairoa Wastewater Option Assessment

Option:	1.1 Status Quo
Reticulation:	No changes (current flows of 2,700 m^3/d average and 6,500 m^3/d peak)
Treatment:	No changes or additional treatment technologies.
Storage:	No changes (5,400 m^3 for 2-3 days of inflows).
Discharge:	No changes (current river discharge location and timing controls - out-going tides during 6 pm- 6 am)

Detailed Description:

Existing reticulation renewal programme. No changes to treatment, storage, discharge location or discharge regime.

Reasons for Inclusion in Option Assessment:

Baseline against which other options need to be assessed. Current environmental effects and treatment performance are acceptable, but it is culturally unacceptable.

Key Benefits:

Minimal costs due to a lack of any upgrades or changes to any aspects of the wastewater system.

Key Disadvantages:

No environmental, cultural, or recreational improvements for the river. May be unacceptable for consenting.

Values Assessments

Recreational Values	Environmental Values
The time of disharge should not impact river users, but could impact on public perception. Potential for public health concern due to limited pathogen treatment.	No more than minor impact on receiving environment from discharge, however in-river biota counts are low due to upstream silt sources. Discharging on out-going tides ensures good flushing and protects estuary except when river mouth is closed.
Cultural Values	**Financial Values**
Direct discharge to water without land passage is culturally offensive.	Consenting will be the only cost because nothing else is being changed or upgraded. The consent for this option is likely to be more expensive than all others due to cultural and community opposition.

Approximate Cost Ranges and Associated Increases in Annual Rates

Total cost range: $1.8M to $2.4M Annual rates range: $ 73.70 to $ 97.80

Overall Values Rating Summary	Viability Assessment
☐ Recreational Values	Viable ☐
☐ Environmental Values	Possible ☐
☐ Cultural Values	Not Possible ☐
☐ Financial Values	

Explanation:

MORNING TEA

OPTIONS - SORTING

Can we exclude based on not meeting values

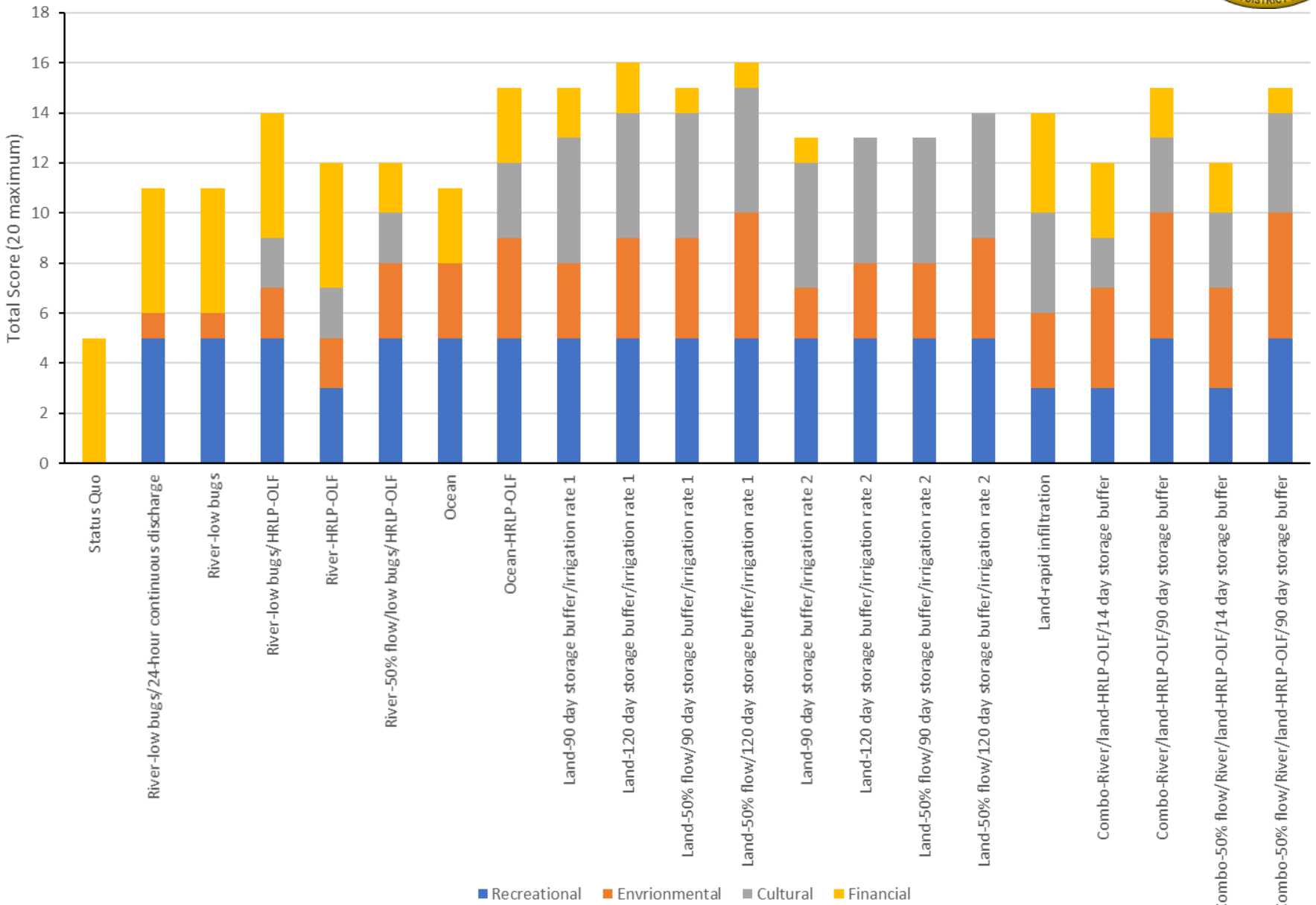
- Recreational
- Environmental
- Cultural
- Financial

How to sort each option

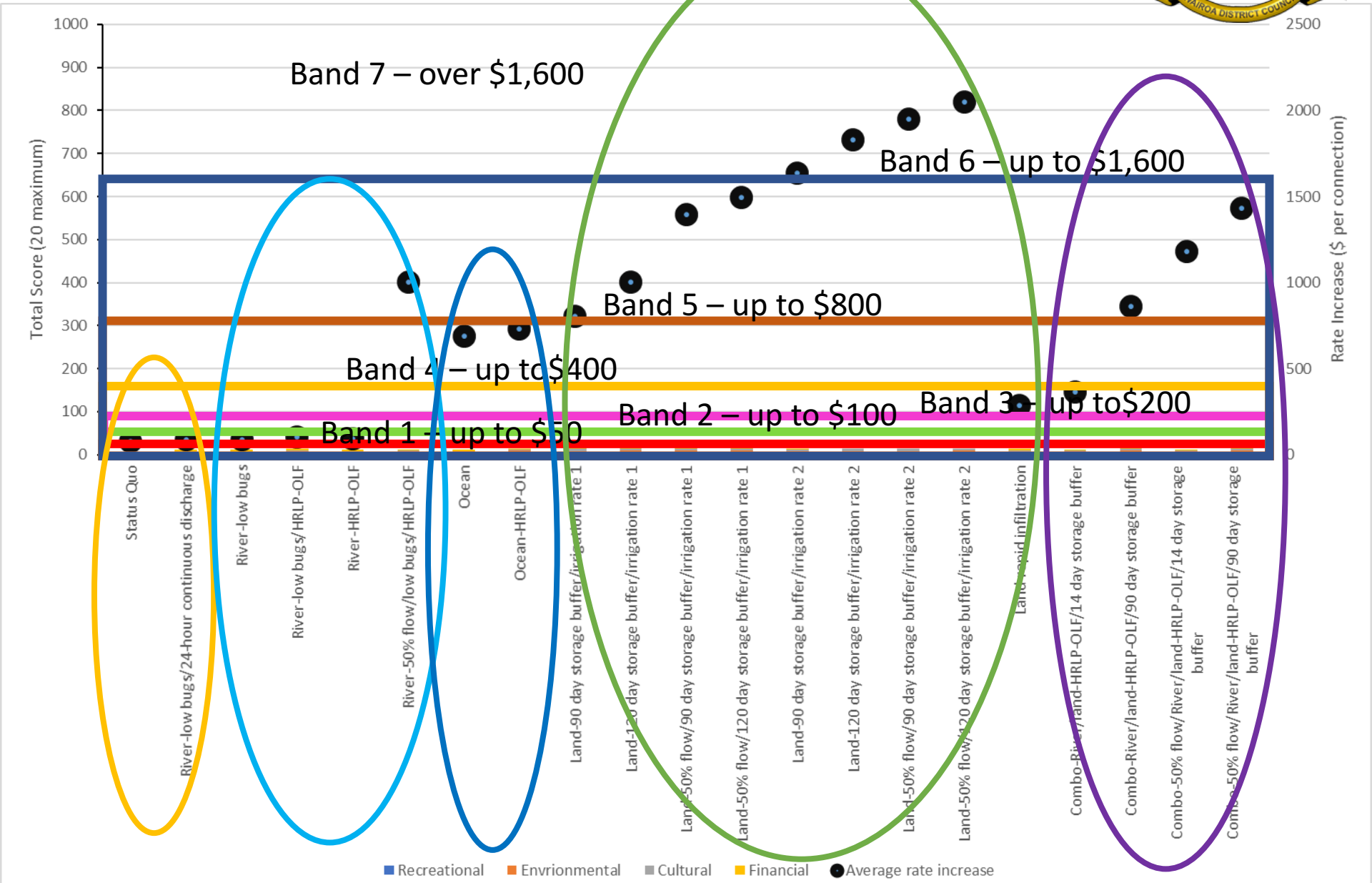
- Yes - this is a definite option to consider – NO DEBATE
- Maybe – this could work, but not sure at this stage – SOME DEBATE
- No – this option will not work for Wairoa – NO DEBATE

Come back to financial

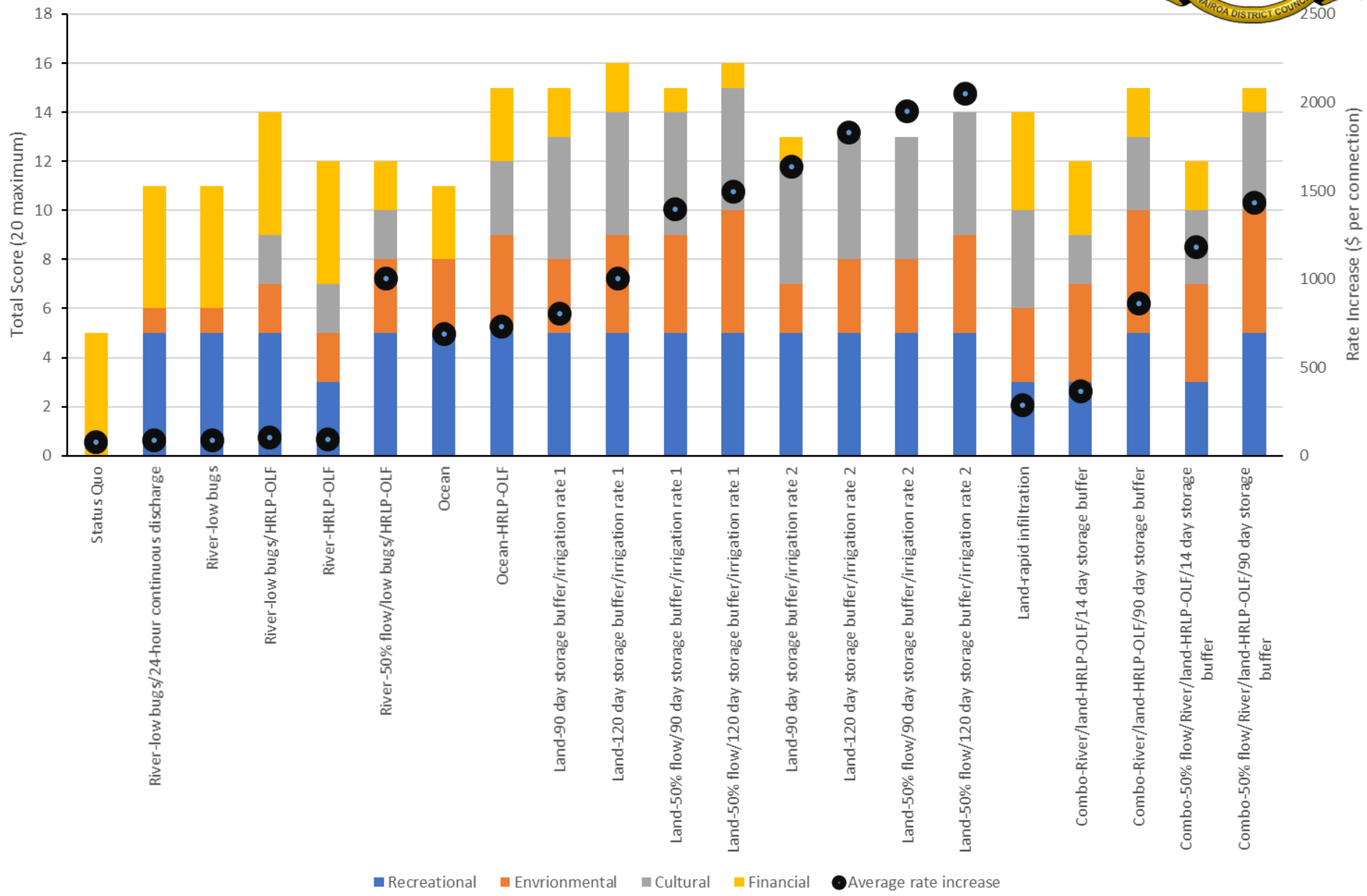
OPTIONS – SORTING - VALUES



OPTIONS – SORTING – RATE INCREASE



OPTIONS – SORTING – RATE INCREASE



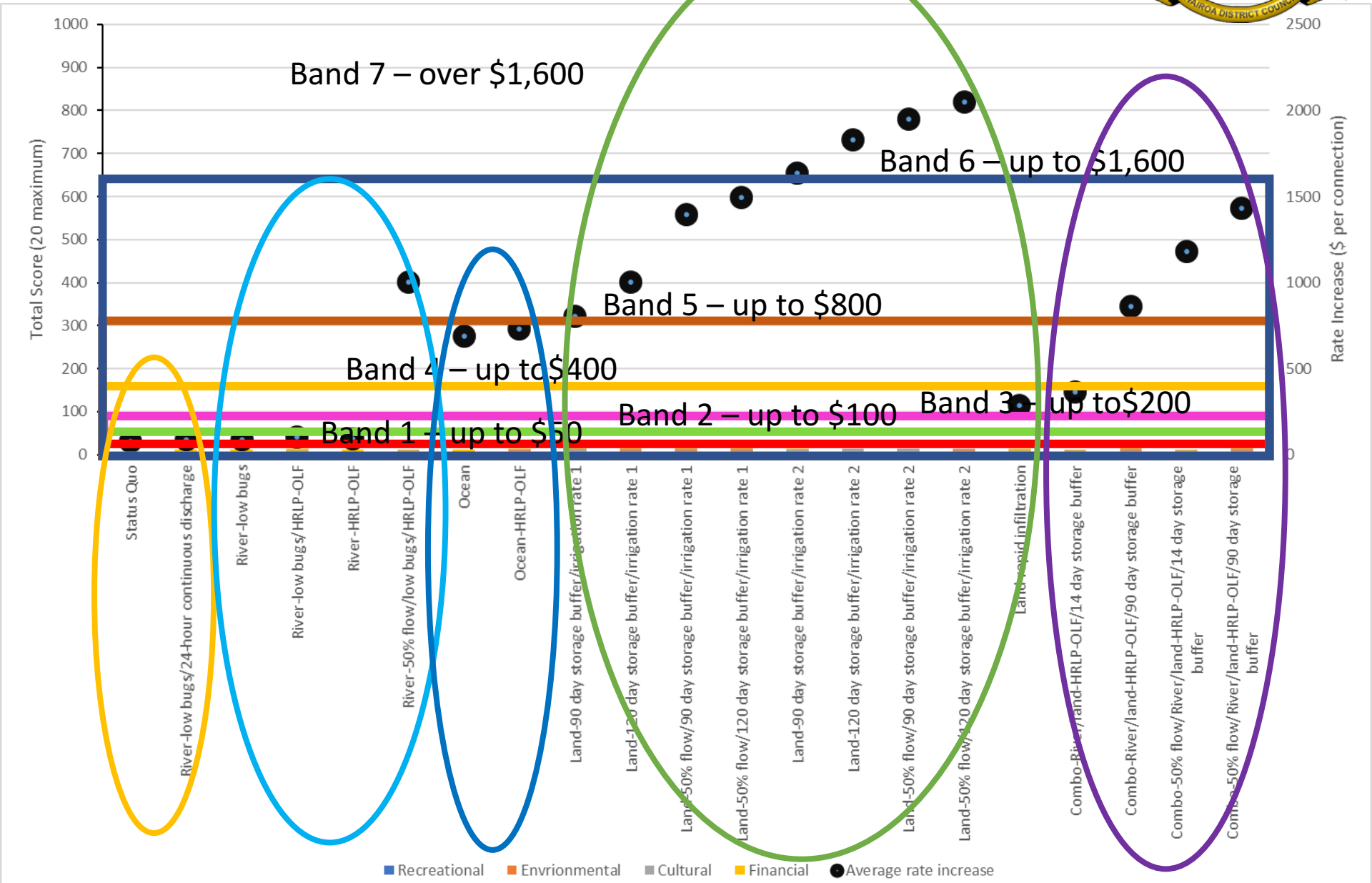
OPTIONS - SORTING

What options are we saying NO to – why?

What options are we saying YES we want – why?

Can any of the may-be's join them? – why?

OPTIONS – SORTING – RATE INCREASE



OPTIONS – KEY MESSAGES

Using current discharge comes at a cost – no zero cost option

An ocean outfall will be expensive

Irrigation is expensive

Rapid infiltration could work

Combinations could work and be developed over time

OPTIONS - NEXT

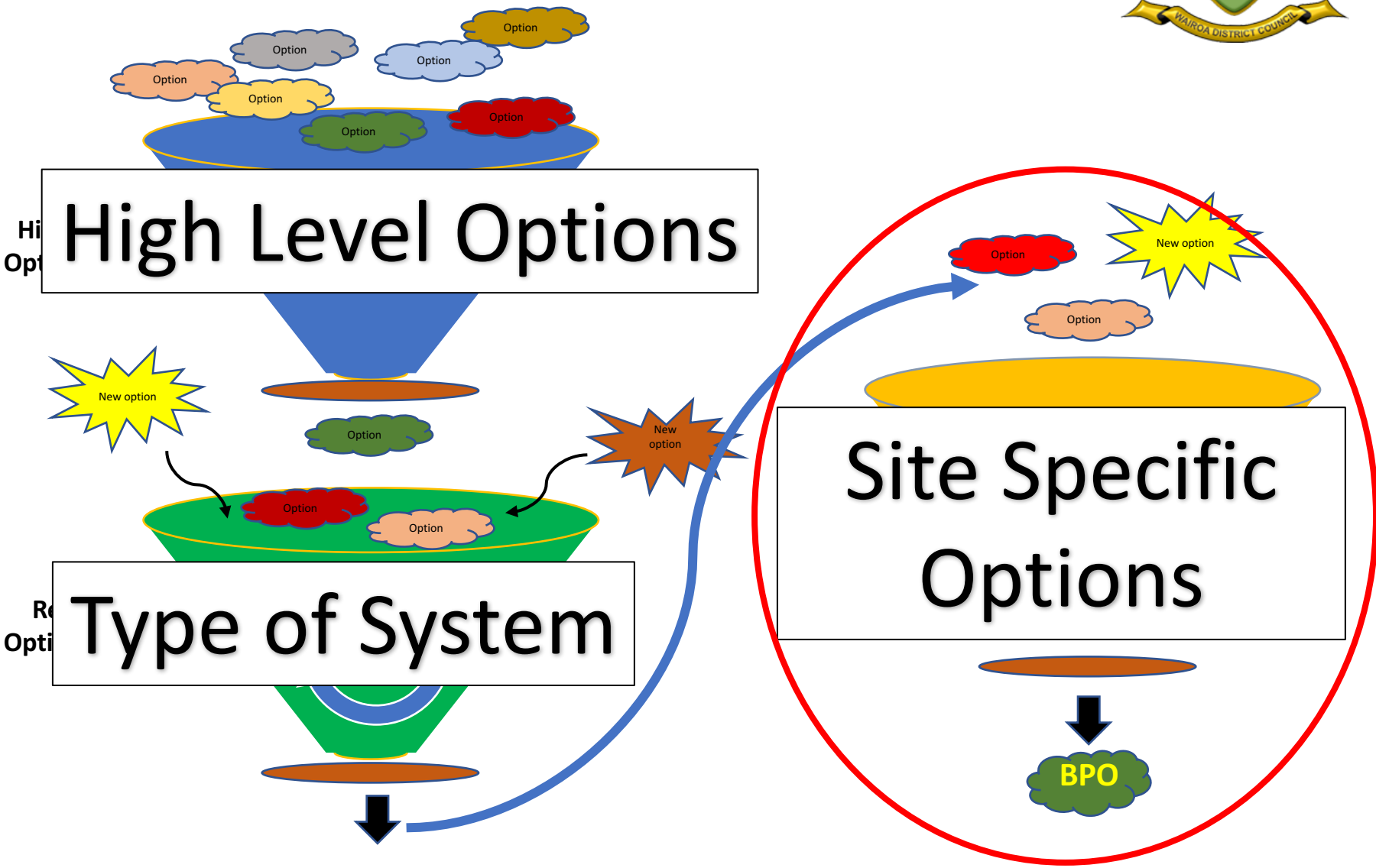
We have gone from 22 options to:

- ? Yes
- ? May-be

How do we get to our best three?

- What home work is needed?
- Who has to do what?

DECISION CRITERIA – FILTERING



HOLISTIC VIEW OF THE WAIROA RIVER

The bigger picture

- What do we want to achieve with the river catchment?
  - Sediment load
  - Nutrient runoff
  - Bacteria & pathogens
  - Flood protection

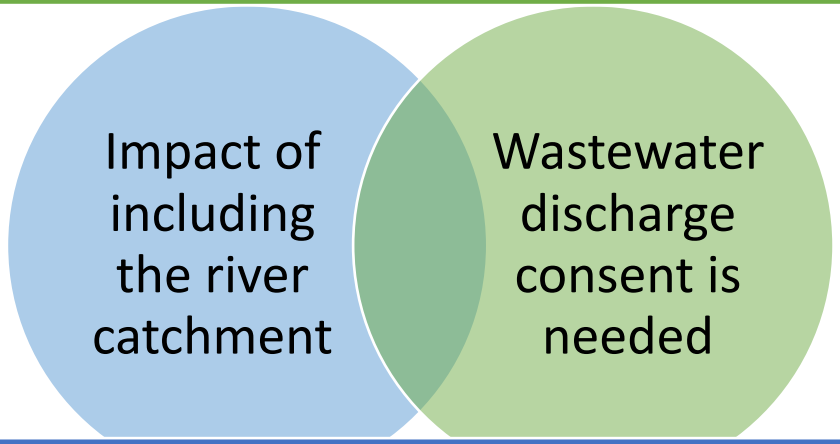
Wastewater & the bigger picture

- What options will fit with the bigger picture?

WHAT HAS BEEN MISSED/WHAT CAN BE DROPPED?

Do we need other options?

Considering the bigger picture, what options can we disregard?



What option best fits with the wider river catchment?

COMMUNITY CONSULTATION

Hui-a-Iwi yesterday

- Most important points?
- What needs attention?
- Other information needed

Public Meeting tonight at 5pm

- Anything to be changed from hui-a-iwi?
- Other thoughts before tonight?

Group Meetings on Tuesday

- AFFCO
- Any others?

ADMINISTRATION

Dropbox updated – can everyone access?

Future topics for discussion

Next meeting Focus – date?

LUNCH