CHBDC Wastewater Upgrades

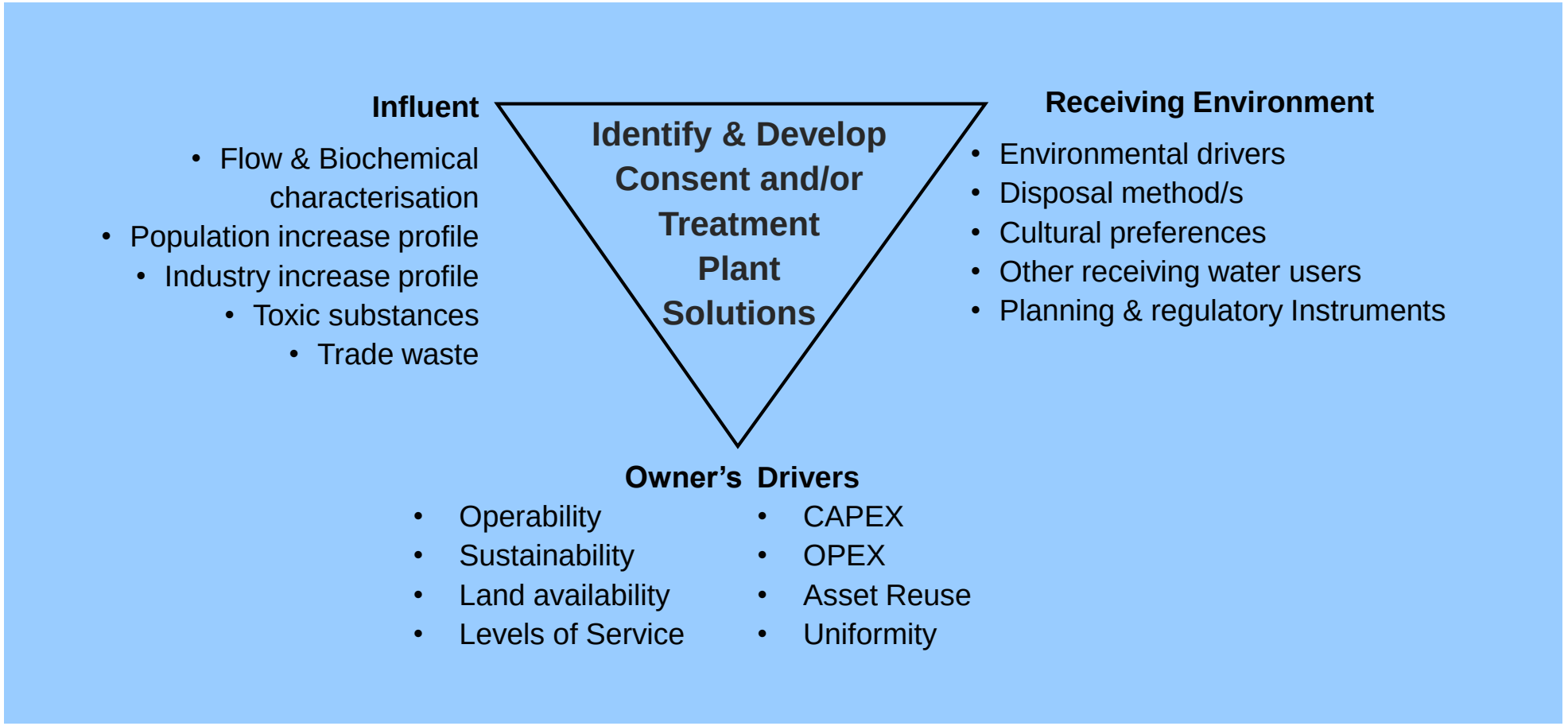
WW Reference Group Meeting – 15 October 2018

Development of Success Criteria

Setting

- Common
  - Oxidation Ponds
  - With Add-Ons
  - Rivers nutrient sensitive
  - Soils low permeability
  - 6km separation
- Waipawa
  - Discharge to Waipawa Rv
- Waipukurau
  - Discharge to Tukituki Rv
- Otane
  - Discharge to Farm Drain

Our Job in Setting Success Criteria



Wastewater 101

Pollutant	What it is	Harm it Causes
	Wastewater itself – Human & industrial by-products	Loss of mana & mauri of the water – metaphysical. Distress at loss of purity and amenity.
BOD	Biochemical oxygen demand. A measure of carbon based wastes	Oxygen depletion - suffocates aquatic life. Causes odour and grey looking water. Leads to growth of aquatic sewage fungus.
TSS	Suspended solids.	Poor aesthetics. Build up of organic sludge in receiving environment
NH_3-N	Ammonia-N	Acute aquatic toxicity. Contributes to eutrifying nitrogen load
NO_3-N	Nitrate-N	Contributes to eutrifying nitrogen load to receiving water.
TP	Total Phosphorus	Contributes to eutrifying phosphorus load to receiving water.
E.Coli	Escherichia coli	Human health. Indicator organism for pathogenic bacteria.
Virus	Various pathogenic viruses	Human health. Acute respiratory and gastrointestinal illness.
POPs	Persistent Organic Pollutants.	Chronic disease, cancers and or genetic deformity in water using organisms such as fish and mammals.
Odour	Odorous volatile compounds	Unpleasant smell

What Do We Need to Achieve ?

- The following slides are ideas from experience
- They will vary from community to community
- They are there to be debated, poked, prodded, adjusted, added to and or deleted

What Do We Need to Achieve

- Environment
  - The People
  - Nutrients
  - Human Health
  - Aquatic Health
  - Sustainable management
- Functioning Community
  - Cater for growing community
  - Cater for industry
- Operational Council
  - Manage ‘Rates’ burden
  - Safe operational facilities
  - Compliance with regulatory instruments
  - Adhere to adopted Policies
  - Reliable systems
  - Wise use of assets

Environment Outcomes

- Nutrients
  - Eutrifying potential
  - Attached growth slimes
  - Suspended algae
  - Emergent aquatic plant growth
- Pathogens
  - Safe for swimming
  - Safe for gathering food
  - Safe for extraction for drinking
- People
  - Proud of their environment
  - Happy with management of it
  - Able to use it
  - Involved in management of it
  - Connected to it

Community Outcomes

- Domestic
  - Existing population served
  - Capacity to grow
  - Sewage removed 24 / 7 / 365
  - Treated effluent doesn’t recreate health hazard
  - Attractive and safe place to live
  - Affordable place to live
- Business
  - Trade waste managed
  - Ability to expand
  - Pays its fair share

Council Outcomes

- Governance
  - Safety of Staff & Public
  - Compliant corporate entity
  - Practice what it preaches
  - Appropriate balance of community, environmental, regulatory and fiscal outcomes
  - Facilitate opportunities for business and growth
- Fiscal
  - Prudent use of existing assets
  - Manage rates to reasonably affordable levels
  - Balance OPEX and CAPEX
  - Appropriate use & reuse of resources
- Employer
  - Safe workplace
  - Job provider
  - Employees tasks readily achievable

What did Raukawa & SWDC Decide ?

Issue	Criteria	Means of Assessment
Health and wellbeing of the waterbodies is restored and protected for current and future generations.	Waterbodies are accessible and safe to swim in, and take kai from, all year round.	Measured improvements in effluent bacteriological quality.
	Reduction in nitrogen levels.	Alignment to Healthy River Wai Ora Plan change. Decrease in annual loads of nitrogen discharged into waterbodies.
	Reduction in phosphorus levels.	Alignment to Healthy River Wai Ora Plan change. Reduction in phosphorus levels.
Acknowledgement and protection of **cultural values**.	Mauri and mana is safeguarded for present and future generations. Raukawa kaitiaki relationship with their waters is respected, enhanced and supported.	Method of discharge used.
A wastewater solution that meets the **long-term needs of the community** in a flexible way	Meets future needs (including cultural needs). Continuous improvement.	• Ability of the solution to be scaled for growth over an agreed period of time. • Recognition that resource consents can be granted for up to a maximum of 35 years. • Ability of final solution to be staged to match both growth and funding ability.
Economically viable for the community	Cost to ratepayers.	Total cost to the residential ratepayers from the upgrades. This includes any potential revenue generation from the options, as this will offset operating costs.

Success Criteria

Discussion

Wastewater Treatment 101

	Raw Sewage (mg/l)	Poor (mg/l)	Average (mg/l)	Good (mg/l)	Very Good (mg/l)	Excellent (mg/l)	Drinking Water MAV
BOD	230	120	35	15	5	<1	
Achieved using		Septic Tank	Oxidation Pond Trickling Filter	AS SAF	MLE	MLE + tertiary filtration	
TSS	250	150	40	15	3	1	
Achieved using			Oxidation Pond Trickling Filter with Humus tank		AS + tertiary filtration	AS + tertiary filtration Membrane	
Ammonia	35	35	10	1	0.5	0.1	
Achieved using		Septic Tank Oxidation Pond	Oxidation pond with add-ons Poor AS Nitrifying TF	Nitrifying AS	Nitrifying AS	Nitrifying AS, Probably over sized	
Total Nitrogen	50	45	20	8	5	3	11
Achieved using		Septic Tank Oxidation Pond	Oxidation pond with add-ons		BNR AS, MLE 7x Recycle 4 Stage Bardenpho	BNR AS + Post DeNi	
Total Phosphorus	9	7		1	0.5	0.03	
Achieved using		Septic Tank Oxidation Pond		EBPR or Metal Salt	EBPR + Metal Salt	EBPR + Metal Salt	
E.coli	10,000,000	100,000	4,000	<235	<14	<1	0
Achieved using		Septic Tank Poor Oxidation Pond AS no Disinfection	Good Oxidation Pond	AS with UV	AS with UV + Tertiary filtration	UF MF + UV	

- AS – Activated Sludge
- BNR – Biological nutrient removal
- EBPR – Enhanced biological phosphorus removal
- MBR – Membrane bioreactor
- MLE – Modified Ludzack Ettinger AS process.
- SAF – Submerged aerated filter
- TF – Trickling filter

What Improvement does What Job ?

- Removes nitrogen from river
  - Nitrification (aerobic) and denitrification (anoxic) processes in WWTP or soil
  - Taken away bound up in sludge
  - Uptake by irrigated plants
  - Adsorption processes – e.g zeolite filters (but need frequent regen.)
- Removes phosphorus from river
  - Biological phosphorus removal processes (EBPR)
  - Alum (or other metal salts) dosing. Forms a precipitate. Adds to sludge
  - Taken away bound up in sludge
  - Uptake by plants
  - Adsorption onto allophanic volcanic soils

What Improvement does What Job ?

- Removes pathogens from river
  - In plant disinfection
  - Application to land
  - Exposure to sunlight
- Improves visual aesthetic of discharge
  - Improved clarifiers
  - Tertiary filtration
  - Wetland
  - Discharge away from river
- Removes oxygen demand from discharge.
  - As for nitrogen. If treatment plant is optimised for N removal, then BOD will already have been dealt with sufficiently

Broad Options to be Considered

- New Treatment plants – discharges to water
- New Treatment plants – single discharge to water
- Existing Treatment Plants - Disposal to Land
- Combined Treatment Plant – Disposal to Water
- Combined treatment plant – Higher quality discharge to land
- Seasonal disposal combinations
- Biosolids Management – Neglect the solids stream at your peril !