# Mangawhai Community Wastewater Scheme

*Wastewater Strategy Workshop*

*22 May 2020*

150 YEARS IN AOTEAROA

**Mangawhai Community Wastewater Scheme**

*Introductions*

**Presentation** – Who you are and role

- Louise Miller – CEO
- Jim Septhon - General Manager
- Donnick Mugutso - Waters and Waste Manager
- Matthew Smith - Planning and Design Engineer
- Brian Armstrong - Operations Engineer Water Services
  Mark Bell - Senior Infrastructure Projects Engineer
- Terry Roche – Plant Operator
- Andrew Springer Technical Principal Wastewater Treatment Engineer
- Larey-Marie Mulder - Senior Water and Wastewater Engineer
- Eros Foschieri - Work Group Manager – 3 Waters

**Objective**

1. Engage on the future of the Scheme.
2. Enable all to be aware of the history, the impact of growth and the timescales.
3. Raise awareness
4. Identify the key steps for delivery
5. Agree an outline strategy (roadmap)

# Mangawhai Community Wastewater Scheme

*Long Term Vision*

## The Mangawhai Community Plan Vision

***Mangawhai will grow well. While we grow, we shall care for nature, encourage a slow pace and active lifestyle, and retain the coastal character and history.***

## Strategic Response

| | | |
|---|---|---|
| 1 | nature | **protect and enhance** biodiversity links, waterways, and the coastal area. |
| 2 | iwi and heritage | **celebrate** Māori culture and make local history **visible.** |
| 3 | three waters | **provide** efficient, clean infrastructure that will serve the community well into the future. |
| 4 | living | **direct** growth outcomes which support community needs and housing choices. |
| 5 | community | **strengthen**, enable and connect the local community through facilities and programmes. |
| 6 | employment | **support** the local economy, and attract more visitors, entrepreneurs, and employment uses. |
| 7 | transport | **improve** safe walking and cycling options, and **manage** vehicular traffic. |

Growth Estimate of 15,222 people by 2043
(approx. 6000 connections)

# Mangawhai Community Wastewater Scheme

*Long Term Vision*

## Three waters

### Existing situation

- A 10-20 year upgrade for additional 7-10,000 population is under investigation
- Wastewater capacity for 1,000 more properties (6-7 years).
- The current zoning already provides for more than 1,000 properties
- There is a shortfall even without the provision of additional growth land.
- Water supply is limited and mainly via rain tanks.


- Current Permanent Population about 5000
- Increased 60% between 2013 and 2018
- Medium projection increase of 10,191 by 2043

= Current Mangawhai X 3 + Commercial

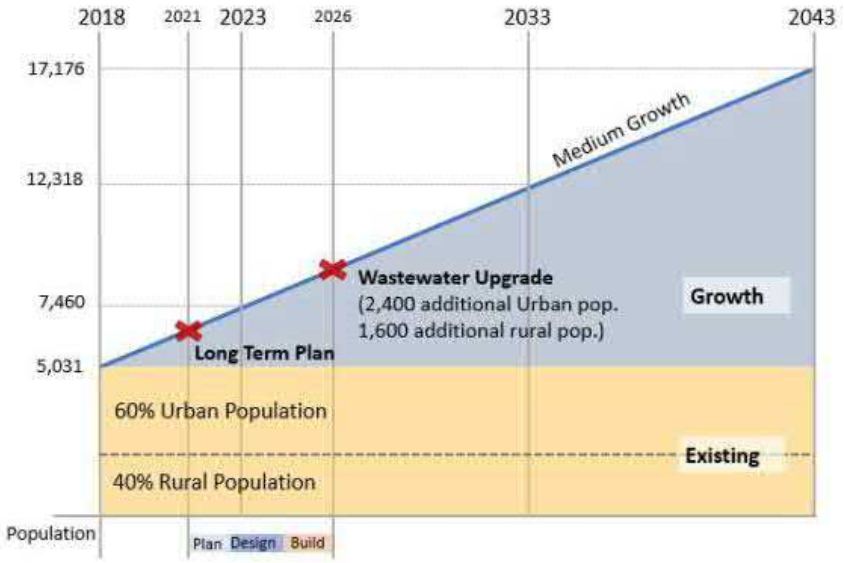
# Mangawhai Community Wastewater Scheme

*Long Term Vision*

## Wastewater
### Recommendations

Progress waste water strategy, including considering options for:

- Disposal.
- Alternative funding.
- Re-use of treated waste water (irrigation of parks, firefighting etc.)
- Latest technological advances.



# Mangawhai Community Wastewater Scheme

*Long Term Vision*

## Water supply

### Recommendation

- Undertake an ongoing review of ground water conditions as population and household numbers increase in Mangawhai.

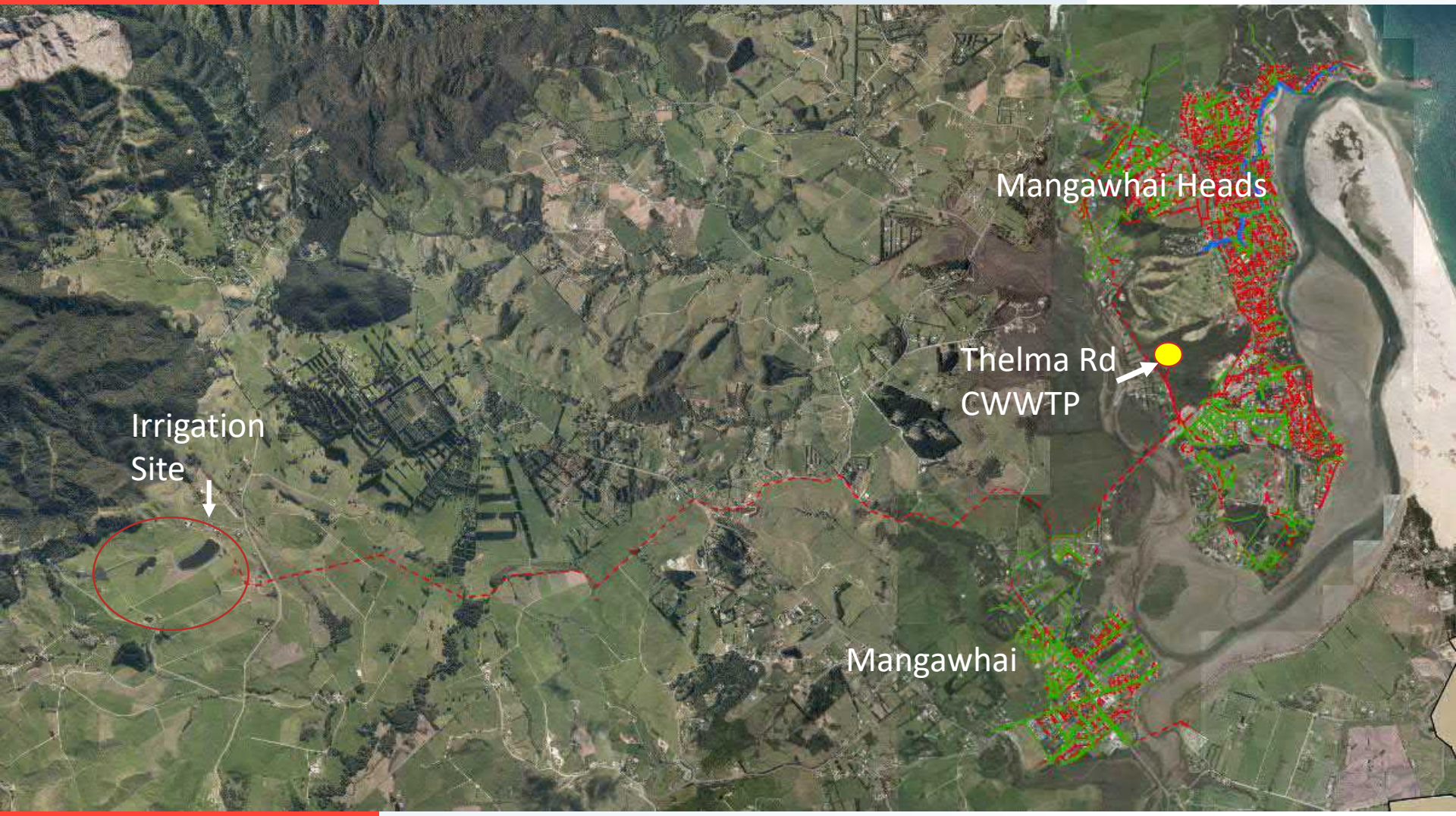
Examples of water tanks

NOTE:

- Wastewater currently 300 l/house/d - Tank Water (including infiltration)
- Future Wastewater, 450 l/house/d- Network Supply (including infiltration)

# Mangawhai Community Wastewater Scheme

*History of the CWWTP*


Mangawhai Heads
Thelma Rd
CWWTP
Irrigation
Site
Mangawhai

**Mangawhai Community Wastewater Scheme**

*History of the CWWTP*

Built by Water Infrastructure Group Operational in 2009.

- Sized for Max 70 l/s
- Aeration sized for 5 years only.
- Tank expected big enough for 20 years

Budget Exceeded Community Expectations.

## Actual Plant

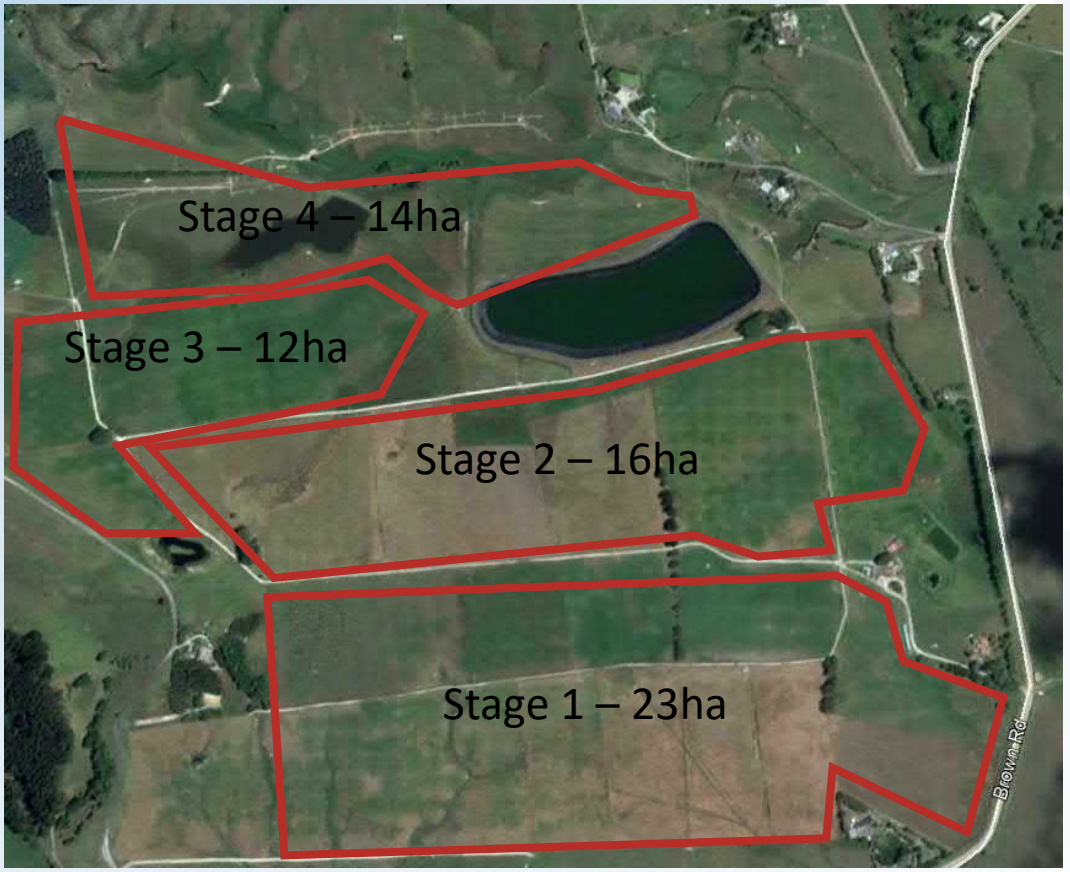
| | |
|---|---|
| Sewage is stronger | Population<br>Water Source |
| Low Water usage | 300 l/connection per day off peak<br>600 l/connection per day peak |
| Expected | 200 l/person/day, so about 500 l/connection off peak. |
| Storm Peak | > 70 l/s at Pump Station. |

## Upgrades

| | |
|---|---|
| 2018 | Capacity Assessment + Farm Studies |
| 2019 | Upgrade Aeration to meet 2028 population<br>Irrigation extended to 65 ha.<br>Max usable land now in use. |

# Mangawhai Community Wastewater Scheme

*History of the CWWTP*




## Disposal Field

- 135 ha land
- 170,000 $m^3$ Storage Pond
- 65.5 ha of irrigation

## Issues

- No more usable land – all in use that can be
- Odour
- Rising Main capacity
- Soil Condition

**Mangawhai Community Wastewater Scheme**

*History of the CWWTP*

# Irrigation Upgrades

| | |
|---|---|
| 2009 | 25 ha original at 350 mm/yr |
| 2012 | 32 ha |
| 2013 | Consent to deficit irrigation 500 mm/yr |
| 2016? | 47 ha |
| 2019 | 65.5 ha |

Full Capacity reached before 3000 connections

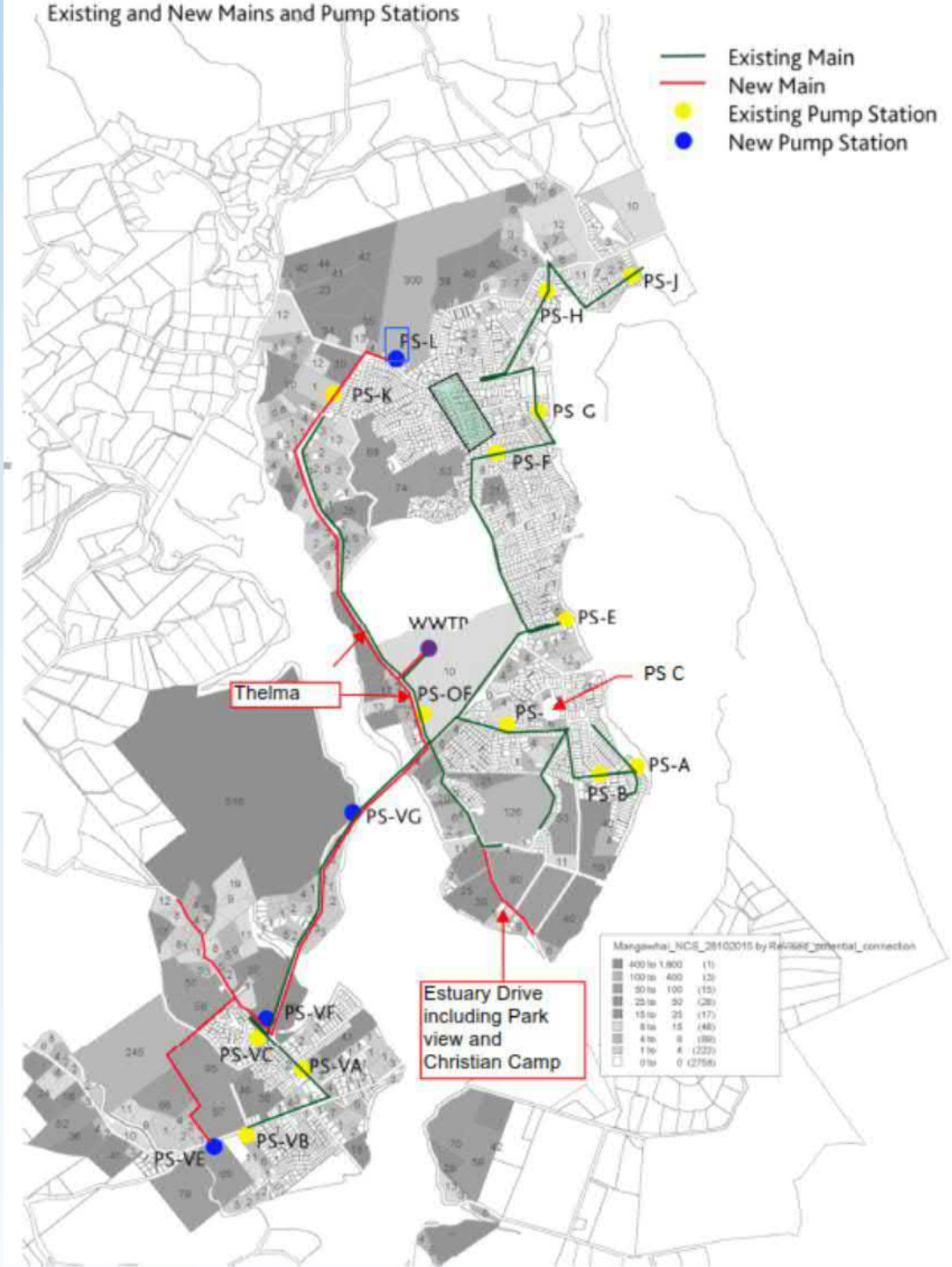
Wet years may exceed capacity before this point.

# Mangawhai Community Wastewater Scheme

*Wastewater Network*

# Mangawhai Community Wastewater Scheme

*Wastewater Network*

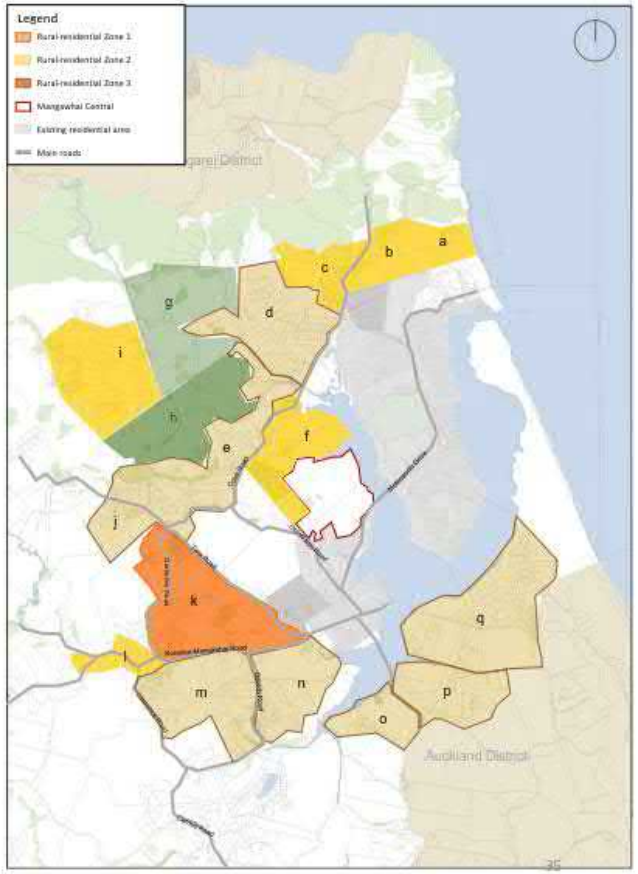


# Mangawhai Community Wastewater Scheme

*Network Growth*

## Residential growth areas

| Zone reference | Min lot size (ha) |
|---|---|
| Large residential lots | 0.4 - 0.8 |
| Lifestyle lot | 0.8 - 2.0 |
| Lifestyle lot with opportunity for equestrian | 2.0 - 4.0 |
| Moderate rural character | Avoid |
| High rural character | Avoid |



# Mangawhai Community Wastewater Scheme

*Wastewater Network*

Currently serves 2000 connections
Including Campgrounds, Shops, light industry, museums, cafes, bars, houses and public toilets.

Mixture of gravity and pumps systems.

Has grinder pumps and low pressure system to reuse some areas of gravity line (not best practice) for 426 connections

| Pump station name | Pump station ID | Design flow rate (l/s) | Design head (m) |
|---|---|---|---|
| Lincoln | A | 8 | 19.8 |
| Cheviot | B | 9.5 | 18.6 |
| Sea Breeze | C | 11.9 | 3.1 |
| Heather | E | 9.5 | 8.9 |
| Fagan | F | 43.9 | 34.4 |
| Alamar | G | 39.2 | 18.5 |
| Pearl | H | 9.5 | 27.6 |
| Wintle | J | 9.5 | 10.5 |
| Molesworth | VA | 21.4 | 24.0 |
| Thelma | Outfall | 70 | 10.4 |
| Jack Boyd | K | 27 | 39.0 |

*Main Pump Stations from Trility 2016*

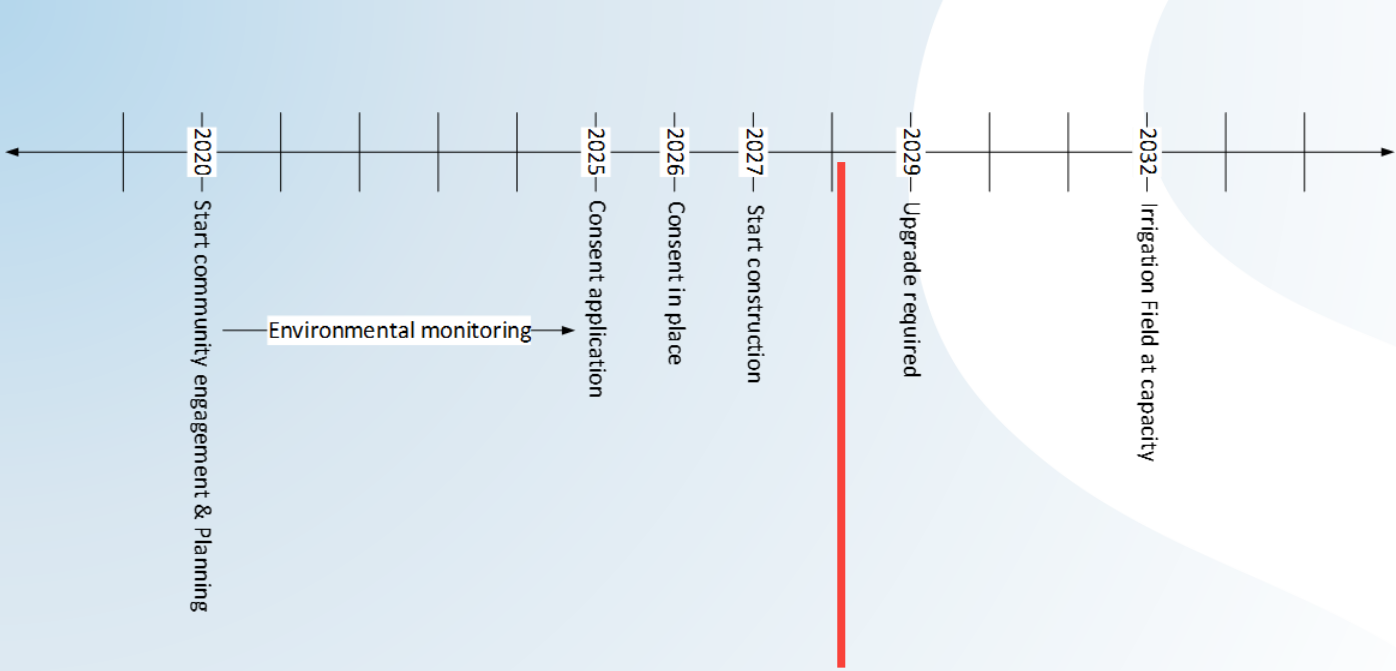
**Mangawhai Community Wastewater Scheme**

*Growth*

- Current System suitable for max 3000 connections.
- Upgrade is essential if Growth to occur with increase in
  - Network
  - Treatment Capacity
  - Disposal Route

# Mangawhai Community Wastewater Scheme

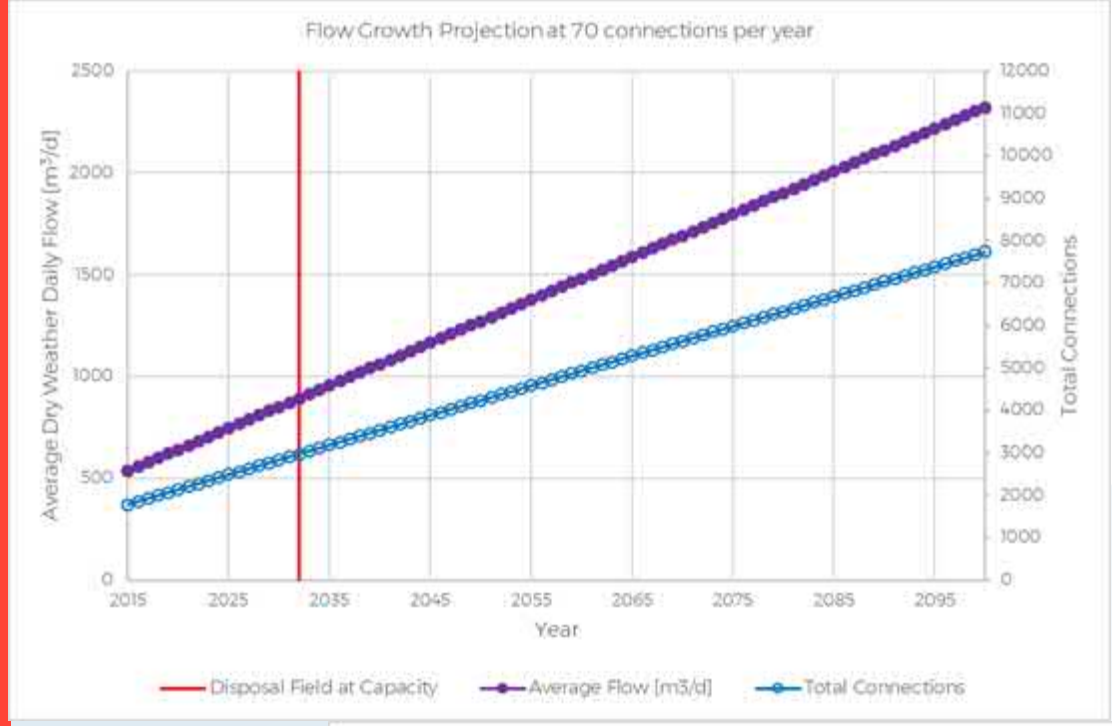
*Growth Timeline* ***at 70 connections*** *per year*

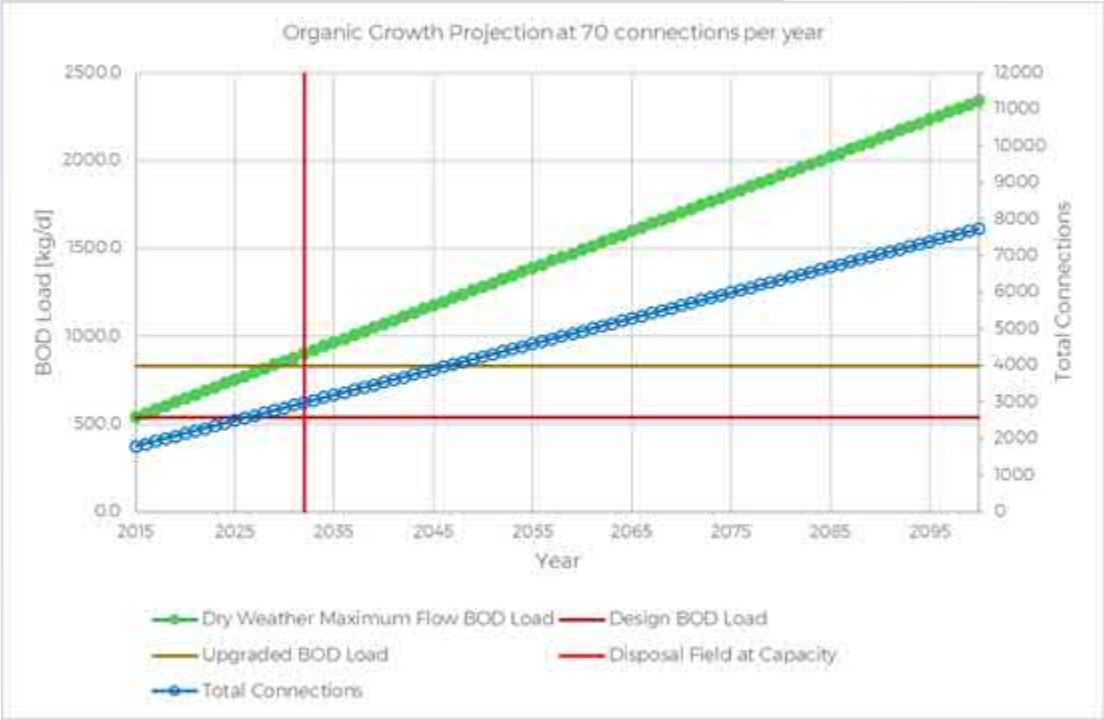



- CWWTP will Reach Current Capacity in 2028/29
- 3000 connections  by 2032
- Disposal Field Capacity exceeded by 2032

# Mangawhai Community Wastewater Scheme

*Growth Timeline at 70 connections per year*



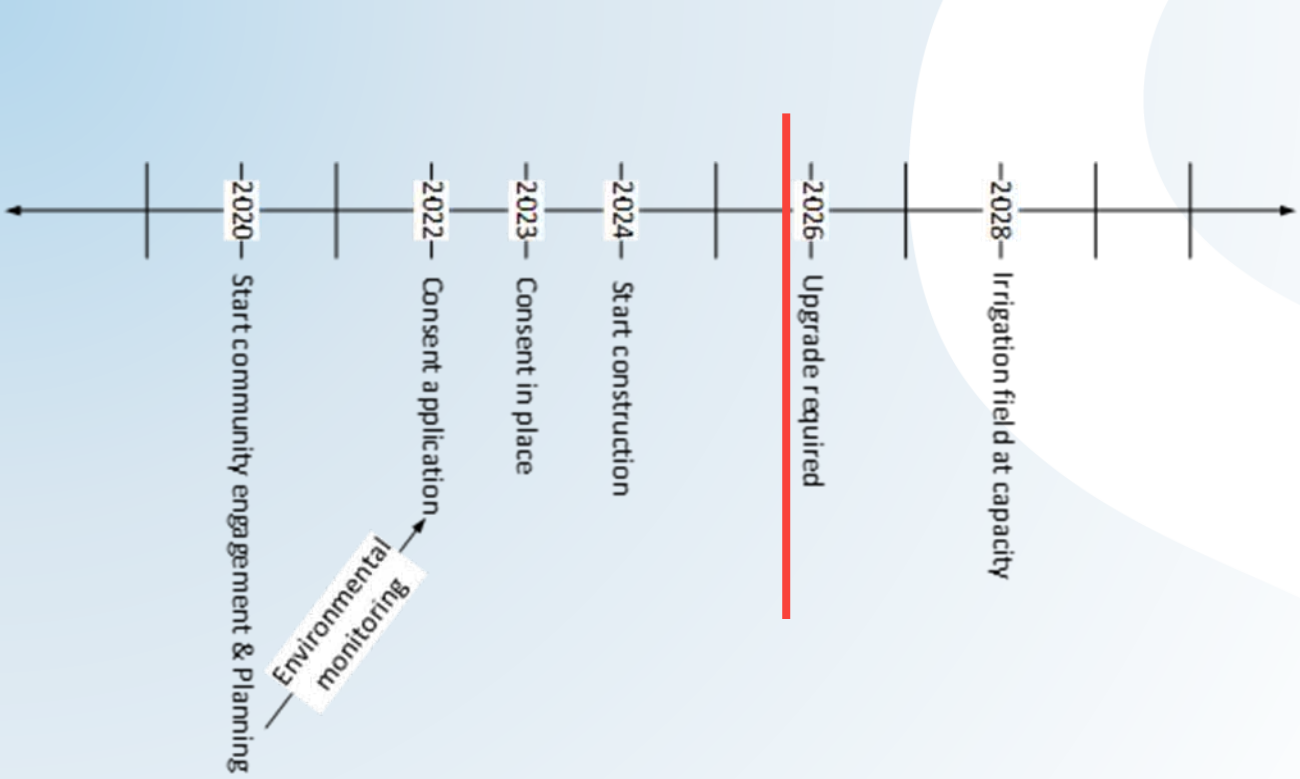
# Mangawhai Community Wastewater Scheme

*Growth Timeline at **70 connections** per year*

- By 2028/2029 the CWWTP will struggle to meet the consent limits, specifically Nitrogen Removal as the plant becomes overloaded in Summer.
- By 2032 additional treatment capacity will be required as the plant will be hydraulically limited at about 3,000 connections.
  - Treated water pumps and rising main to Farm will be at hydraulic capacity
- By 2032 the disposal field will have reached capacity, additional disposal option will be required.

# Mangawhai Community Wastewater Scheme

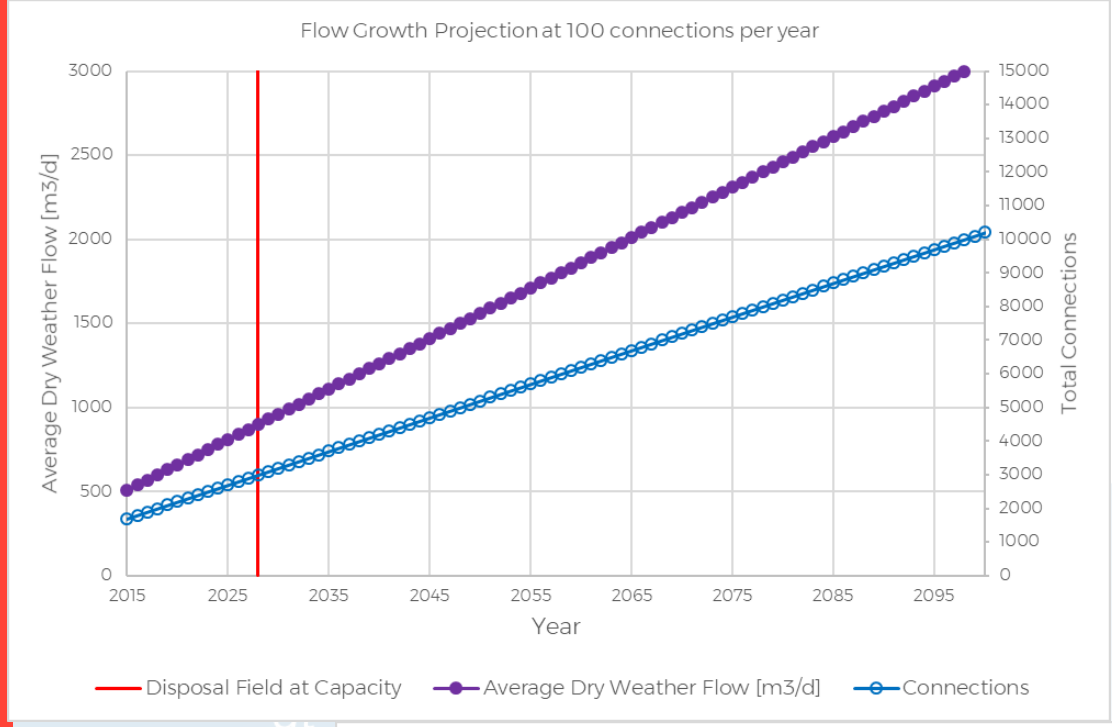
*Growth Timeline at* ***100 connections*** *per year*

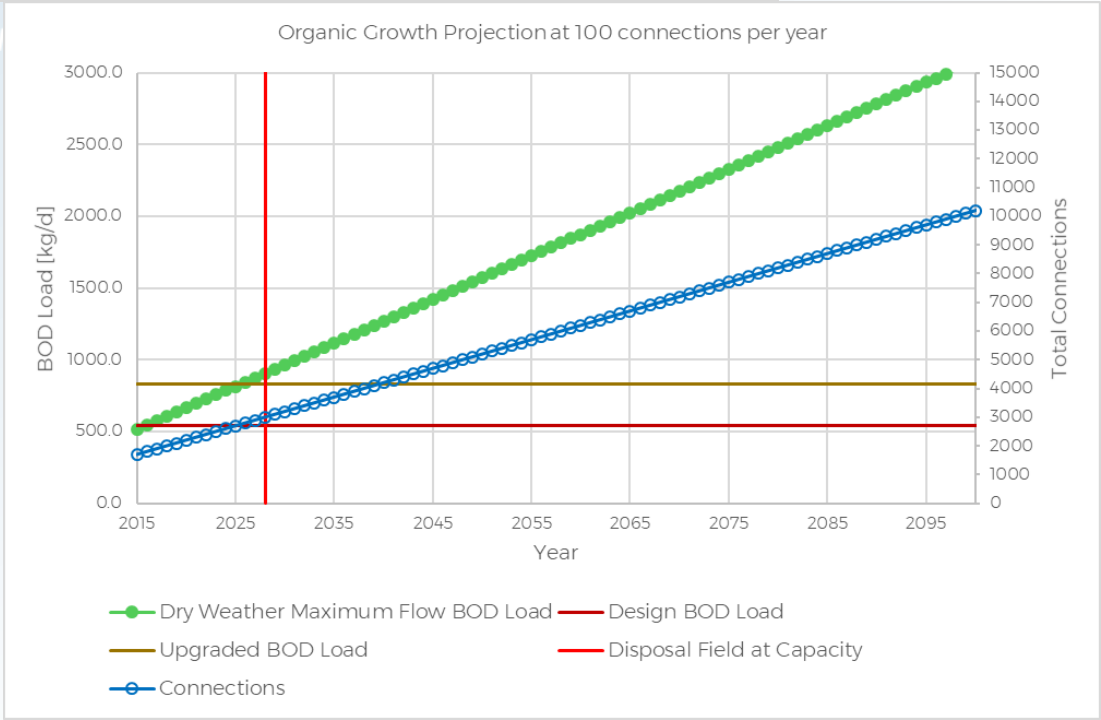



- CWWTP will reach its current capacity in 2026
- 3000 connections by 2028
- Disposal Field Capacity Exceeded by 2032

# Mangawhai Community Wastewater Scheme

*Growth Timeline at 100 connections per year*



**Mangawhai Community Wastewater Scheme**

*Growth Timeline at 100 connections per year*

- By 2026 the CWWTP will struggle to meet the consent limits, specifically on Nitrogen Removal as the plant becomes overloaded in Summer.

- By 2028 additional treatment capacity will be required as the plant will be hydraulically limited at about 3,000 connections.
  - Treated water pumps and rising mains will be at hydraulic capacity

- By 2028 the disposal field will have reached capacity,  additional disposal option will be required.

# Questions so far ?

**Mangawhai Community Wastewater Scheme**

*Questions ?*

**Mangawhai Community Wastewater Scheme**

*KDC Feedback*

# Areas To Consider

- Feedback from Consultation
- Community Expectations
- Vision on Community Engagement

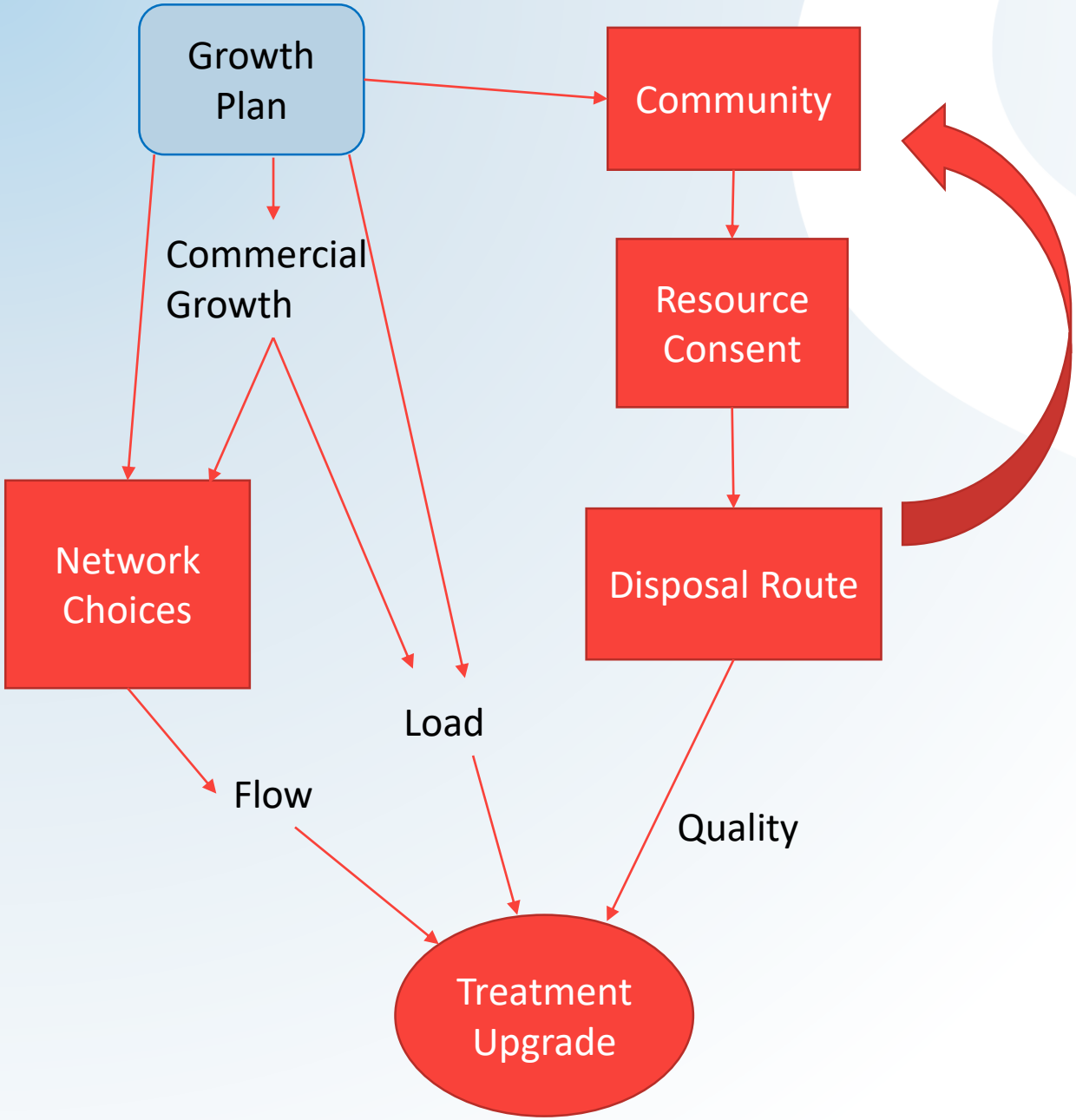
- Social, Cultural Iwi and Environmental Values
- Planning context - LTP, Annual Plan, Expected delivery timescale

- Where and when Will growth Occur
- What level of commercial Growth

- Reuse for irrigation
- Environmental Sustainability, Carbon Footprint and renewables
- Climate Change – Sea level and Climate
- Tsunami and Seismic risks
- Latest Technology

# Mangawhai Community Wastewater Scheme

*What is Required to Meet Growth*



**Mangawhai Community Wastewater Scheme**

*Wastewater Treatment*

## Option Considerations

Disposal to

- Land Estuary
- Ocean
- Reuse

Irrigation

Firefighting

Technology

Technology options available will largely be driven by the disposal and/or reuse option.

**Mangawhai Community Wastewater Scheme**

*Land Disposal*

# Land Treatment

- Additional land (Farm) will be required as current disposal field will reach capacity
- At irrigation rate 5,000 $m^3$/hectare/year:
  - 62 hectares required for 5,000 connections
  - 123 hectares required for 7,000 connections
  - 215 hectares required for 10,000 connections
- Above assumes only 60% of farm suitable for irrigation
- New Consent Required.

- Plus upgrade to Treatment Works
- New Rising Main and Pumps

**Mangawhai Community Wastewater Scheme**

*Land Disposal*

# Treatment Technology

- Same technology as current CWWTP
- Cyclical Activated Sludge System (CASS)
- Meets consented water quality requirements
- Suited to seasonal variation
- Modular approach to increase the capacity
- Upgrade can be future proofed for 7,000 connections
- Upgrade always requires equal amount of reactors (2, 4 then 6)

# Mangawhai Community Wastewater Scheme

*Land DIsposal*

- Limitations
  - Area Required about 1.3 – 1.5 x Application Area
  - Land Purchase
  - Neighbours
  - New Rising Main
  - Capital Cost
- Benefits
  - Iwi Acceptable

# Mangawhai Community Wastewater Scheme

*Land Disposal Treatment Upgrade*

5000
Connections

7000
Connections

**Mangawhai Community Wastewater Scheme**

*Sea Outfall Discharge*

# Sea Outfall

- Existing disposal field remains available and run at capacity
- New consent required for discharge
- Assumed that current level of treatment suitable for ocean outfall
- Rising main of ~4 km required
- Ocean outfall of ~ 3 km required

- Plus upgrade of Treatment Works

# Nominal Sea Outfall Route

**Mangawhai Community Wastewater Scheme**

*Sea Outfall*

**Mangawhai Community Wastewater Scheme**

*Sea Outfall*

- Limitations
  - Marine Conditions
  - Construction location (access to beach)
  - Capital Cost
  - Cost Uncertainty
  - Public Perception
  - Maintenance
  - Write off of Farm assets
  - May need to directional drill pipelines

- Benefits

  Future Proof (if sized for future)

  Option to retain land disposal

**Mangawhai Community Wastewater Scheme**

*Estuary Discharge*

# Estuary Discharge

- Existing disposal field remains available and run at capacity.
- New consent required for discharge
- Short rising main required (~1 km)
- Potentially gravity main
- Due to sensitive nature a high level of treatment required
- Total flow can be diverted to estuary

- Plus upgrade to Treatment Works

**Mangawhai Community Wastewater Scheme**

*Estuary Discharge*

# Estuary Discharge Technology

- Higher degree of treatment required
  - Nutrient removal (nitrogen and phosphorus)
  - Suspended solids removal
  - Stringent E.coli limits
- Membrane bioreactor (MBR)
- Small footprint
- Membranes can be selected to achieve low bacterial limits
- Similar to other New Zealand examples
  - Clarks Beach
  - Snells Beach
  - Rotorua WWTP
- Quality as high as BOD < 1, TSS, < 1, NH3, < 1, TN, <3*, TP
- < 1,  E coli < 1, Viruses  2 log removal

* TN 3 mg/l is limit of technology.

**Mangawhai Community Wastewater Scheme**

*Estuary Discharge*

# Technology

- Retrofit existing bioreactor tanks
- Similar Energy requirements
- Require chemicals for periodic cleaning (hypochlorite)
- Pre-packaged plants are available
- Modular membranes– allows for quick expansion
- Due to high mixed liquor suspended solids, existing bioreactor tanks can be used for longer before additional reactor tanks are required.
- Upgrade can be future proofed
- Removal of hypochlorite dosing to effluent
- Considered Best Available Technology

# Mangawhai Community Wastewater Scheme

*MBR Layout*

5000
Connections

7000
Connections

**Mangawhai Community Wastewater Scheme**

*Estuary Discharge*

- Limitations
  - Public Perception of discharge
  - Highest Standard Effluent – manageable

- Benefits
  - Most Affordable
  - Retains land disposal
  - Best Quality to minimise eco-impact
  - Allows Next Upgrade on existing Site

**Mangawhai Community Wastewater Scheme**

*Disposal To Harbour and Culture*

# Culturally,

- Water should return to the land
- To restore the Mauri of the water
- Water is of Papatuanuku and Ranginui and is intrinsic to life and must be able to sustain life and be life sustaining.
- Kaitiakitanga

Proposed Land Contact in Rotorua

**Mangawhai Community Wastewater Scheme**

*Wastewater Treatment Assumptions*

# Assumptions

All Wastewater is domestic

Off Peak Water contribution 300 l/connection/d
Peak Water contribution 600 l/connection/d

Usage includes Infiltration as data is measured

Quality standards are based on experience around NZ for similar applications

# Cost Estimates

| Discharge Options | 5000 connections | 7000 connections |
|---|---|---|
| Disposal Field | $38m | $47m |
| Sea Outfall | $47m | $56m |
| Estuary | $26m | $38m |

All Cost Estimates Exclude cost of Network upgrades

Sea outfall costs are indicative only and subject to pipe route and sea bed conditions, natural dispersion and construction methods.

**Mangawhai Community Wastewater Scheme**

*Discharge Options*

**Mangawhai Community Wastewater Scheme**

*Wastewater Reuse*

# Wastewater Reuse

- Irrigation:
  - Parks
  - Council owned land
  - Resource Consent Required (as WDC)
- Firefighting  < 200 $m^3$/yr estimated

- Volume is intermittent due to demand.
- Quality suitable for all areas, if solids are low (class A)

- Note:  We recommend use of the Australian Standards for wastewater reuse as no NZ standard.

# What needs to be done before the upgrade ?

Excess Flow Management at Jack Boyd Drive and Outfall PS

Sand Filter Capacity

**Mangawhai Community Wastewater Scheme**

*Current Issues*

# Mangawhai Community Wastewater Scheme

*Funding*

Provincial Growth Fund

Shovel Ready

Tourism Infrastructure fund

Other ?

# Break

*15 minutes – call on hold*

**Mangawhai Community Wastewater Scheme**

*Project Timeline*

# Preliminary Timeline

| | |
|---|---|
| Network Studies and Model | 6 mths |
| Community Engagement | 12 mths |
| AEE | 18 mths |
| Consent Application | 6 mths |
| Consent review/hearing | 12 mths |
| Design | 9 mths |
| Tender Period and Award | 6 mths |
| Construction | 15 mths |
| Total | 84 mths |
| | 7 Years |

Times may vary depending on solution
Some elements may run in parallel

**Mangawhai Community Wastewater Scheme**

*Community Engagement*

# Engagement Plan

Is there a Plan ?

How does this relate to other engagement ?

Programme ?

# Agree Next Actions

**Mangawhai Community Wastewater Scheme**

*Next Steps*

# Mangawhai Community Wastewater Scheme

*Close*

# Thank you

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