Water Quality

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Submission 2010

- Since my original submission in 2010 there are some major changes.
- We not only have a higher responsibility toward the environment, but the general public is more aware that the existing resource consent levels for discharging wastewater to any receiving waterways is not strict enough and we continue to pollute our rivers, lakes and the sea with Ammonium, Nitrate, Phosphate and faecal bacteria.
  Most of the evidence provided today by the FNDC representatives and their experts will tell us that, even with the existing discharge figures we are not polluting the environment. There are no risks to the environment etc.
- We would like to show you in this presentation that the discharge of the partially cleaned wastewater from the Taipa Waste Water treatment plant is in fact still polluting the environment.
- There are international levels for the discharge of the water soluble nutrients as well as bacteria from humans into any water way.
  Our mission statement was created to protect the receiving environment and the levels used (once applied) all around the world have shown a significant improvement of all the water ways in question.

Algae in treatment ponds

Flow chart waste water treatment

Oxidation pond 1

Nitrification & Algae

- Oxidation pond 2 nitrification? Possible denitrification

Oxidation pond 3 (denitrification)

- Complete covered with algae

Settlement pond Algae

Wetland ponds Algae bloom

Algae in receiving water ways

- In December 2017 we used a Helicopter to provide more evidence that a major contributor towards the excessive growth of algae is caused by the semi treated discharged human wastewater into the receiving waterways.
  Here we concentrate on the discharge from the Taipa WWTP wetland only. However we took over 300 photos from most of the Waste Water treatment plants in Northland. The algae growth after the human waste water addition to any waterways is just shocking and disgusting. It is completely obvious.
  Once again you will hear from the expert witnesses that it is not a problem for the environment, but we have proof that it is.

Algae in the sea just by the Aurere river mouth

Algae sample

- On a few places we sampled the seawater to make sure, that what we see are in fact saltwater algae.
- The microscope sample did confirm that billions of algae are in the seawater.
- Also in some rivers we took sample and pictures from above and below the discharge of the wastewater to make sure that the excessive water soluble nutrients are in fact from the wastewater discharge and not leaching from farmland.
- In my experience of testing non waste water river enrty to sea water no algae was found.

Trial with Electrical coagulation unit

- In May 2017 we started as a joint venture between the 3 Hapū of Ngāti Kahu – Ngāti Tara, Ngāti Whata and Matakairiri, Clean waters to the sea and many concerned local citizens for a trial to test the effectiveness of an EC2 unit as an add on to the existing waste water plant in Taipa.

- The trial has been extremely successful to date and we will continue to test the waste water for a further 6 month with that unit.

- Here are some results

Test results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 2**		
Date	**13/04/2018**	Time	
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**after EC unit 2.5 Amps**	Sample source	**TWWTP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**13/04/2018**	Time	**10:00am**

Laboratory result

Laboratory No	8160
Total Coliforms Colilert 9223B	
Escherichia Coli Colilert 9223B	
Faecal Coliforms CFU/100 ml	<10
Escherichia Coli CFU/100 ml	<10
pH	7.65
Ammonium NH_4 mg/l	37
Nitrate NO_3 mg/l	3.1
Chloride mg/l	
Phosphate mg/l	0.17

Taipa waster water plant EC2 trial sample results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 1**		
Date	**13/04/2018**	Time	**9:30am**
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**Raw Waste settlement Pond**	Sample source	**TWWTP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**13/04/2018**	Time	**3:00pm**

Laboratory result

Laboratory No	**8159**
Total Coliforms Colilert 9223B	
Escherichia Coli Colilert 9223B	
Faecal Coliforms CFU/100 ml	13500
Escherichia Coli CFU/100 ml	13500
pH	7.2
Ammonium NH_4 mg/l	64
Nitrate NO_3 mg/l	28
Chloride mg/l	
Phosphate mg/l	20.6
Total Hardness $CaCO_3$ mg/l	
Iron Fe mg/l	

Test results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 14**		
Date	**25/10/2018**	Time	**17:30pm**
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**Outlet settlement pond raw**	Sample source	**TWWP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**29/10/2018**	Time	**3:30pm**

Laboratory result

Laboratory No	8553
Total Coliforms Colilert 9223B	140
Escherichia Coli Colilert 9223B	90
Faecal Coliforms CFU/100 ml	
Escherichia Coli CFU/100 ml	
pH	8.72
Ammonium NH_4 mg/l	53
Nitrate NO_3 mg/l	2.2
Chloride mg/l	
Phosphate mg/l	20.6

Test results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 15**		
Date	**25/10/2018**	Time	**17:30pm**
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**Outlet settlement pond after EC**	Sample source	**TWWP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**29/10/2019**	Time	**3:30pm**

Laboratory result

Laboratory No	**8554**
Total Coliforms Colilert 9223B	<1
Escherichia Coli Colilert 9223B	<1
Faecal Coliforms CFU/100 ml	
Escherichia Coli CFU/100 ml	
pH	9.91
Ammonium NH_4 mg/l	36
Nitrate NO_3 mg/l	<0.2
Chloride mg/l	
Phosphate mg/l	0.16

Test results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 29**		
Date	**5/2/1019**	Time	**4:00pm**
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**Settlement Pond overflow**	Sample source	**TWWTP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**6/02/2019**	Time	**10:30am**

Laboratory result

Laboratory No	**8715**
Total Coliforms Colilert 9223B	
Escherichia Coli Colilert 9223B	
Faecal Coliforms CFU/100 ml	110000
Escherichia Coli CFU/100 ml	105000
pH	7.76
Ammonium NH_4 mg/l	73
Nitrate NO_3 mg/l	22.2
Chloride mg/l	
Phosphate mg/l	31
Total Hardness $CaCO_3$ mg/l	
Iron Fe mg/l	
Copper Cu mg/l	
Calcium Ca mg/l	
Manganese Mn mg/l	
Chlorine mg/l	
Alkalinity mg/l HCO-3	
Sulphate SO4 mg/l	
Magnesium mg/l	
Sodium mg/l	
Acidity mg/l CO_2	
Conductivity µs	930
Total dissolved Solids mg/l	640

Test results

Customer	**Taipa Waste Water Treatment Plant**		
Ministry of Health ID No			
Sample	**Sample 30**		
Date	**05/02/2019**	Time	**4:00pm**
Customer ID	**2153**	Sampler	**Andreas**
Sample taken from	**After EC treatment 5 amps**	Sample source	**TWWTP**
Sample condition at arrival	**>10°C**	Sample accepted Yes/No	**yes**
Start Date Laboratory	**6/02/2019**	Time	**10:30am**

Laboratory result

Laboratory No	**8716**
Total Coliforms Colilert 9223B	
Escherichia Coli Colilert 9223B	
Faecal Coliforms CFU/100 ml	179
Escherichia Coli CFU/100 ml	160
pH	8.36
Ammonium NH_4 mg/l	37
Nitrate NO_3 mg/l	<1.0
Chloride mg/l	
Phosphate mg/l	1.1
Total Hardness $CaCO_3$ mg/l	
Iron Fe mg/l	
Copper Cu mg/l	
Calcium Ca mg/l	
Manganese Mn mg/l	
Chlorine mg/l	
Alkalinity mg/l HCO-3	
Sulphate SO4 mg/l	
Magnesium mg/l	
Sodium mg/l	
Acidity mg/l CO_2	
Conductivity µs	450
Total dissolved Solids mg/l	310

Results

Average results of the reduction of water soluble nutrients and E. coli bacteria from the discharge water of the Taipa settlement pond after the EC unit (16 samples analysed)

Ammonium reduction	Average of 50 to 60 %
Nitrate reduction	Average of 80 to 85%
Phosphate reduction	Average of over 95%

The **reduction** of **E.coli bacteria** was in every run over 99.9%

FNDC proposal for possible new treatment option

1. System batch reactor (SBR)

2. Membrane bioreactor (MBR)

3. Electrocoagulation (EC)

4. Electrocoagulation (EC) following pond system with algae bioreactor

5. Dissolved Air Flotation

6. Advanced Integrated Wastewater Pond System (AIWPS)

7. Carrousel pond upgrade, followed by maturation pond & tertiary treatment defined by the members of the discussion group

MISSION STATEMENT

FROM NGATI KAHU HAPU, NGATI TARA, NGATI WHATA & MATAKAIRIRI & DOUBTLESS BAY COMMUNITY MEMBERS LIVING IN THE CATCHMENT AREA OF TAIPA, PARAPARA & AURERE

Named: TE MANA O TE WAI HAPU INTEGRATION ROOPU (HIR)

Tihei mauri ora, the 3 Hapū of Ngāti Kahu – Ngāti Tara, Ngāti Whata and Matakairiri as Kai Kaitiaki in our rohe are fulfilling our responsibility to mitigate and protect our waterways from the adverse effects of the discharge overflow of the Taipā Wastewater Plant into the Parapara awa and Aurere moana.

We are making the statement that the mauri of our awa and moana is suffering from the adverse effects from the Taipa Wastewater Plant due to poor maintenance and nil upgrade of the plant and compliance standards that have not addressed population and development growth in our rohe.

For our 3 hapu the health of our awa and moana has for mai rānō been an intricate part of our tikanga (way of life).

We know all waterways in our rohe are the life force that has allowed our whanau to remain on our tribal lands for generations.

Historically the Parapara awa flourished with a variety of tuna, Aurere was plentiful providing a wide variety of kai moana and shellfish. This legacy, our tupuna handed down through tikanga practices from collection and spiritual respect to rejuvenation methodologies that kept our waterway’s healthy.

We need the mauri of our awa and moana returned to its natural state.

RE: Taipa Wastewater Treatment System Resource Consent 4007 Renewal. Overdue since 2008

This is a Statement that we; TE MANA O TE WAI HAPU INTEGRATION ROOPU (HIR) will be accepting, a renewal of the Consent 4007 conditional on, and only if, the following discharge parameters of the upgraded Waste water treatment plant can be met, as per the National Policy Statement for Fresh Water Management 2014 (amended 2017) Ministry for the Environment.

We have an obligation to protect our Environment and stop the pollution of our water ways. A point source discharge of Waste water is an ideal example for implementing very tight parameters to stop future pollution and reduction of marine life.

TO THE FAR NORTH DISTRICT COUNCIL,

To carry out the following activities associated with the operation and use of a sewage treatment and disposal system at Ryder and Parapara Roads, Taipa on, Pt Allot 57, Pt Sec 33, & Pt Allot 24, Blk IV Mangonui SD:

01

To discharge treated municipal wastewater to land after the following discharge parameters are met.

a) **Zero discharge over the property of IJ & GM Muir Trust, Parapara Road, as is the current situation.**

a) **Zero discharge into Parapara Stream, or any stream in our rohe.**

02

To discharge contaminants to air from activities associated with the treatment and disposal of wastewater at two points, at or about Map References O04:514-882 & O04:524-889;
subject to the following conditions:

DISCHARGE TO FARM LAND

1 The quantity of treated wastewater discharged shall not exceed 350 cubic metres per day (based on dry weather flows).

2 The discharge shall not cause the soil quality in the unnamed designated area, to fall below the following standards:

a) The natural pH of the soil shall be within the range 6.0 to 6.5

b) The median concentration of the faecal coliform bacteria in the water shall not exceed 100 per 100 millilitres, and the 80percentile concentration shall not exceed 350 per 100 millilitres, based on not fewer than 5 samples taken over any 30day period.

c) The dissolved oxygen concentration shall not be reduced below 90% of saturation.

d) The concentration of total N in the discharged treated water shall not exceed the following:

at pH 6.5; **20°C**; 1.0 mg/l total Nitrogen

e) The concentration of total P in the discharged treated water shall not exceed 0.25 ppm

SCHEDULE 1

The Consent Holder or its agent shall carry out the following monitoring programme.

1. MONITORING OF THE DISCHARGE

At not less than weekly intervals the Consent Holder or its agent shall undertake the following sampling and analyses.

Composite samples of the discharge made up of not less than three consecutive grab samples of equal volume taken at least 5 minutes apart and be analysed for the following:

Determinand
pH
Total Phosphorus
Total Ammonia
Total Nitrite
Total Nitrate
Total Nitrogen
Biochemical Oxygen Demand BOD 5 or DOD 5
Suspended Solids

Determinand
Total Coliforms (membrane filtration technique)
E. coli

2. REVIEW

This monitoring programme may be reviewed two years after the commencement of the consent, where a need arises. The Northland Regional Council in conjunction with the Consent Holder shall undertake the review. The Consent Holder shall meet the reasonable costs of any such review.

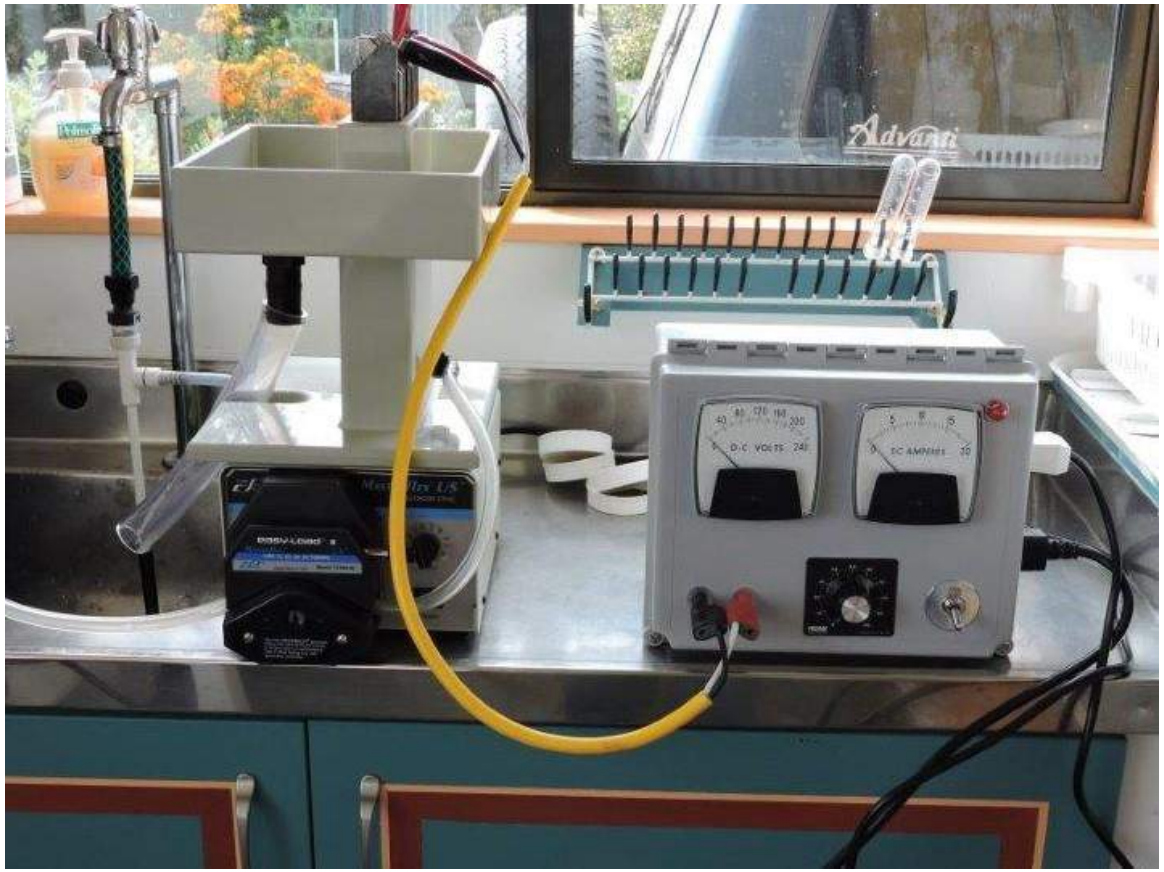
Breakthrough water cleaning technology

After 6 years of trialling this new technology on cow manure and human waste water in Northland we have achieved excellent results for cleaning a variety of waste water.

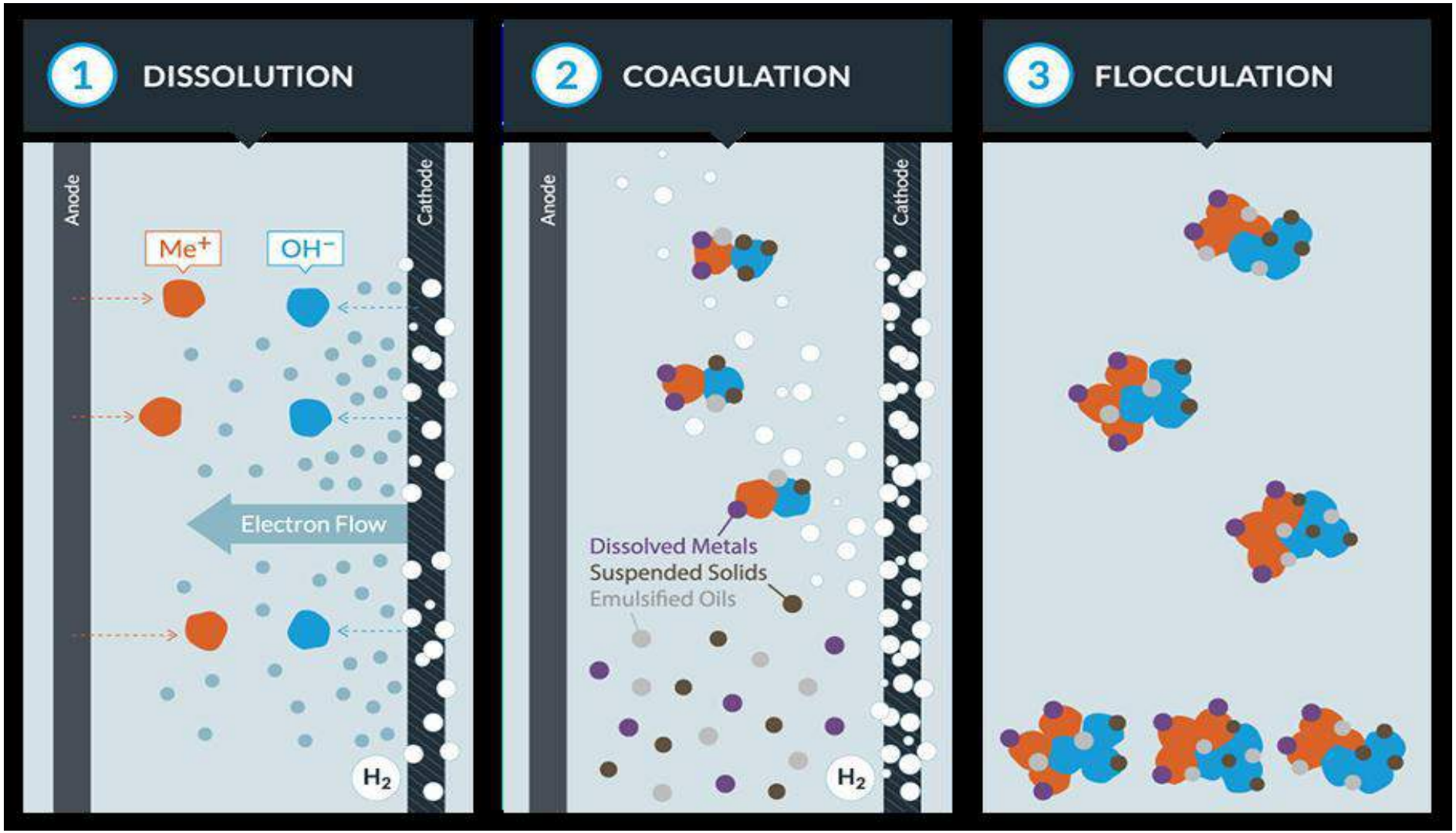
With the scientific data we are now confident to implement the first commercial units and run a larger scale trial on a communal waste water plant.

Truck wash Pond Mangonui Haulage

Electro-coagulation Unit



Principle EC



Waste water sample

Five Minutes Settling

Sample

Four Hours Settling

Information on Phosphorus Amounts International levels

Fresh water	Limit for P
Streams and rivers	0.1 ppm
Streams entering lakes	0.05 ppm
Lakes / reservoirs	0.025 ppm (NZ 0.033)

Examples of P levels in some North island rivers
Mangere River at Knights Road
Total phosphorus (µg/L) average 181 : range 58 – 296
Awanui River at Waihue Channel
Total phosphorus (µg/L) average 109 : range 68 - 434
Manganui River
Total phosphorus (µg/L) average 70 : range 45 - 131
Mangahahuru Stream at Apotu Road
Total phosphorus (µg/L) average 123 : range 54 - 279
Waiotu River at SH1
Total phosphorus µg/L) average 63 : range 30 – 112

Guideline trigger values in New Zealand Lowland Rivers for total phosphorus are 33 µg/l.

Example of a commercial EC unit

A Positive Future for Our Waterways

- Once the treated waste water has passed the E.C unit and the two solids separation stages it will no longer create a pollution problem to the receiving environment. In fact, the water quality will meet the recreational standards for creeks and rivers making it safe for swimming.
- To majorly reduce the pollution of our waterways we strongly recommend a change to the current resource consent legislation. This would be to lower the allowable levels of the above pollutants into the environment.

Application for the EC units

The EC units are available in a large range of sizes to treat various waste water volumes

Capacity is from 100 litres/hour to over 1,000,000 litres/hr

The systems can be used applications that can include the following-

Summary

The technology has been run successfully in the U.S and Europe for a number of years

The system has the potential to vastly improve our discharges into our environment including the recycling of treated wastewater.
Water conservation is critical in many locations in N.Z

It has a smaller footprint than traditional systems, less odour, visual impact and will create ponds and waterways that will allow fish and bird-life to flourish
The first commercial EC system in Northland will be installed by the end of August 2019.

Cost of an add on EC2 system to the WWTP in Taipa

- Most probably you will hear from FNDC staff the treatment of the wastewater according to our mission statement would be extremely expensive.
- They have estimated $20 million plus for any treatment system capable to treat the wastewater to that standard.
- We can prove that an EC system including a two way dewatering centrifuge for a waste water volume of 1500 m3/ day would cost far less than $2 million.
- With the backing as demonstrated at these submission hearings of our local community and Iwi the installation of an EC2 unit would be a break through moment for our water quality and environmental guardianship in this country.
- We invisage a possiblility of an FNDC joint venture with and or interested engineering companies. The EC2 units could be manufactured locally.