Far North District Council

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Te Kaunihera o Tai Tokerau Ki Te Raki

The top place where talent wants to live, work and invest

17 May 2019

stuarts@nrc.govt.nz

Stuart Savill
Consents Manager
Northland Regional Council

Tena koe

Application to renew consents associated with the Opononi WWTP

FNDC is making an application to renew the resource consents associated with the operation of the Opononi Wastewater Treatment Plant.

These resource consents expire 31 August 2019 and this application is made in accordance with Section 124(2) of the Resource Management Act 1991. FNDC respectfully request that NRC use its discretion to allow FNDC to continue to operate under Section 124(3) of the same.

Enclosed is the application form, assessment of environmental effects and supporting information. The pre-application was circulated to the relevant parties in accordance with Section 62(3) of the Marine and Coastal Area (Takutai Moana) Act 2011 on 4 May 2019 as per the attached e-mail.

Please provide draft conditions in advance of a decision being issued on the application.

Nga mihi

Jessica Crawford

Jessica Crawford
Senior Infrastructure Consents Planner

APPLICATION FORM FOR RESOURCE CONSENT

Northland REGIONAL COUNCIL

Whangārei Office	Phone:	09 470 1200
	Fax:	09 470 1202
Kaitāia Office	Phone:	09 408 6600
Waipapa Office	Phone	09 470 1200
Ōpua Office	Phone:	09 402 7516
Dargaville Office	Phone:	09 439 3300
Free Phone		0800 002 004
E-mail		mailroom@nrc.govt.nz
Website		www.nrc.govt.nz

This application is made under section 88/127 of the Resource Management Act 1991

To: Consents Department
Northland Regional Council
Private Bag 9021
Whangārei Mail Centre
Whangārei 0148

IMPORTANT NOTES TO APPLICANTS

(a) **Please read fully** the notes below and the Information Brochures and Explanatory Notes available from the council, **before** preparing your application and any supporting information.

(b) The Resource Management Act 1991 sets out the information you must provide with your application for a resource consent. If you do not provide adequate information, your application cannot be received nor processed by the council and will be returned to you. If you are unsure of what information should be included with your application, please contact the council before submitting the application.

(c) Applications require notification (public advertising calling for submissions) unless the council is satisfied that the adverse effects on the environment of the activity for which consent is sought will be minor; and written approval has been obtained from every person who the council is satisfied may be adversely affected by the granting of the consent. The council also has available a form "Form 8A – Affected Person's Written Approval", to help you record such approvals for applications that may be processed without public notification.

PART A – GENERAL

APPLICANT	Full Names
(1) **Full Name of Applicant(s):** (in full e.g. Albert William Jones and Mary Anne Jones. For Companies, Trusts and other Organisations, commonly used name)	FAR NORTH DISTRICT COUNCIL
Phone Number – Business:	**Fax:**
Home:	**Mobile:**
E-mail:	

For applications by a company, private trusts or other entity/organisations, the Directors; Trustees and Officers' full names must be supplied and Section (12) completed and signed.

(2) **Postal Address:** (in full)	PRIVATE BAG 752
	KAIKOHE 0440

(3) **Residential Address:** (if different from postal address)	

Application Form continued on next page

(4) Address for Service of Documents: (if different from postal address e.g. Consultant)	C/- JESSICA CRAWFORD
(5) Owner/Occupier of Land/ Water Body: (if different from the Applicant)	

(6) Type(s) of Resource Consent sought from the Regional Council:

You will need to fill in a separate Assessment of Environmental Effects Form for each activity.
These forms can be obtained from the Northland Regional Council.

Coastal Permit

- ☐ Mooring
- ☐ Marine Farm
- ☐ Structure
- ☑ Pipeline/Cable
- ☑ Other (specify) DISCHARGE TO THE CMA

Land Use Consent

- ☐ Vegetation Clearance
- ☐ Quarry
- ☐ Structure in/over Watercourse
- ☐ Earthworks
- ☐ Construct/Alter a Bore
- ☐ Dam Structure
- ☐ Other (specify)

Water Permit

- ☐ Stream/Surface Take
- ☐ Damming
- ☐ Groundwater Take
- ☐ Diverting Water
- ☐ Other (specify) n/a

Discharge Permit

- ☐ Domestic Effluent to Land
- ☑ General Discharge to Land
- ☐ Farm Dairy Effluent to Land/Water
- ☑ Air
- ☑ Water
- ☐ Other (specify)

(7) Other Resource Consents required from the District Council:

Where other resource consents are required for the same activity, they must be applied for at the same time.
Not doing so will delay the processing of this application.

What other Resource Consents are required from the District Council?

- ☑ None
- ☐ Land Use Consent
- ☐ Subdivision Consent

Have the applications been made? ☐ Yes ☐ No

(8) Description of the Activity:

Please briefly describe the activities and duration for which consent(s) are being sought. It is important you fill this out correctly, as the council cannot grant consent for any activity you do not apply for.

APPLICATION TO RENEW RESOURCE CONSENTS ASSOCIATED WITH THE OPONONI WASTEWATER TREATMENT PLANT.

Application Form continued on next page

(9) Location of Property/Waterbody to which Application relates:

Describe the location in a manner which will allow it to be readily identified, e.g. street address, legal description, harbour, bay, map reference etc. Attach appropriate plans and/or diagrams

Property Address: (see rate demand) BAKER ROAD LOT 1 DP 110735 **Locality:** OPONONI

Legal Description: LOT 1 DP 167208 **Blk:** VII **SD:** HOKIANGA

Other Location Information:

PART B – ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

You must include an assessment of the effects of your activity on the environment as part of your application.

The Resource Management Act 1991 requires that each application include an assessment of the actual and potential effects of the activity on the environment in accordance with the Fourth Schedule.

To assist you to supply this assessment of effects, the council has prepared specific forms for various consent activities. For minor activities, all that will be required is for you to complete the specific form. Where the potential effects of the activity are more significant, we recommend you undertake a full assessment of effects, with professional assistance if necessary.

If you are unsure of what information to include with you application and the assessment of effects, please contact the council before submitting your application. A pre-lodgement meeting with relevant consent staff is recommended.

PART C – GENERAL

(10) Renewal of an Existing Resource Consent:

☐ Yes ☐ No ☐ A change in conditions of a current Resource Consent

(11) Fee/Deposit Enclosed with Application(s):

Application to be processed as: ☐ Notified ☐ Limited Notified ☐ Non-notified

☑ Coastal Permit:	$	☐ Land Use Consent:	$
☐ Water Permit	$	☑ Discharge Permit:	$
☐ Bore Permit:	$	☐ Change Conditions:	$

(12) Signature of Applicant(s) or Persons authorised to sign on behalf of Applicant(s):

IMPORTANT NOTES TO APPLICANTS

(a) Your application must be accompanied by the minimum fee (deposit) as determined by the council. A schedule of the minimum estimated initial fees for different consent applications is annexed. Please note that applications by private trusts and other group entities require the personal guarantees of the Trustees and/or Officers for the payment of costs to be submitted with the application.

- For complex applications, the council may require an additional deposit pursuant to section 36(3) of the Act, based on the estimated costs for processing such complex applications and may require progressive monthly payments during consent processing.
- The final fee is based on actual and reasonable costs including disbursements and where this fee exceeds the fee/deposit, the additional fee is subject to objection and appeal.

(b) All accounts are payable by the 20th of the month following the date of invoice. Any actual and reasonable costs, including but not limited to legal costs, debt collection fees or disbursements incurred as a result of any default in payment, shall be recoverable from the Applicant and is so notified in compliance with the Credit Contracts and Finance Act 2003. Submitting this application authorises the council to, if necessary, provide your personal information to a Credit Reporter in order to employ in its debt collection services in compliance with the Credit Reporting Privacy Code 2004, should payment default occur.

(c) Resource consents usually attract an annual fee to recover the reasonable costs of the council's monitoring, supervision and administration of the consent during its term.

(d) The information you provide is official information. It will be used to process the application and, together with other official information, assist the management of the region's natural and physical resources. Access to information held by the Northland Regional Council is administered in accordance with the Local Government Official Information and Meetings Act 1987 and the Privacy Act 1993.

Application Form continued on next page

I/we declare that, to the best of my/our knowledge and belief, the information given in this Application and attached Assessment of Environmental Effects is true and correct. I/we unconditionally guarantee jointly and severally to pay the actual and reasonable costs of processing this Application as and when charges become due and payable. I/we acknowledge that I/we understand the consequences of signing this declaration.

Signature: _____ **Signature:** _____

Full Name (print): JESSICA CRAWFORD **Full Name** (print): _____

Date: 3 MAY 2019 **Date:** _____

Continue with Trustees' and Authorised Officers' signatures below, as necessary.

Personal details and signatures of Trustees*, or Officers authorised to sign on behalf of and to bind Trusts, Societies and Unincorporated Entities.

* Private and Family Trusts only

Full Name and Status: (Trustee, Officer etc)	
Full Residential Address:	
Signature:	

Full Name and Status: (Trustee, Officer etc)	
Full Residential Address:	
Signature:	

Full Name and Status: (Trustee, Officer etc)	
Full Residential Address:	
Signature:	

Full Name and Status: (Trustee, Officer etc)	
Full Residential Address:	
Signature:	

CHECKLIST – Have you remembered to...

- ☑ Complete all details set out in this Application Form
- ☑ Include an Assessment of Effects of the activity on the environment, set out in the attached form
- ☑ Sign and date the Application Form
- ☑ Include a Site Plan
- ☑ Include the appropriate fee as set out in the *"Schedule of Minimum Estimated Initial Fees"*
- ☑ Complete details of Trustees and/or Authorised Officers on this page

Opononi WWTP

Far North District Council
Te Kaunihera o Tai Tokerau ki te Raki

Application to renew resource consents for the Opononi Wastewater Treatment Plant

17 May 2019

CONTENT

APPENDICIES

1 APPLICANT & PROPERTY DETAILS

Applicant:	Far North District Council
Address for Service:	Far North District Council Memorial Avenue Private Bag 752 Kaikohe 0440
Prepared by:	Jessica Crawford Senior Infrastructure Consents Planner
Document Number:	A2437843
Property details:	Baker Road, Opononi
Legal Description:	Lot 1 DP 110735 and Lot 1 DP 167208 Blk VII Hokianga
Co-ordinates:	1635620E 6069420N and 1635800E 6069350N

2 INFORMATION REQUIREMENTS

This application has been prepared in accordance with the requirements of Schedule 4 of the Resource Management Act 1991 ('the Act'), and includes:

- a description of the proposal,
- an assessment of the actual and potential effects on the environment (AEE) and
- consideration of the ways in which the application proposes to avoid, remedy or mitigate any adverse effects on the environment.

3 BACKGROUND

This is an application to renew resource consents associated with the Opononi Wastewater Treatment Plant (WWTP) owned and operated by the Far North District Council (FNDC), as follows:

AUT.002667.01.01	To discharge treated wastewater into the Hokianga Harbour at or about location co-ordinates 1634768E 6069462N.
AUT.002667.01.02	To discharge treated wastewater to land from the base of a wastewater treatment system at or about location co-ordinates 1635620E 6069420N and 1635800E 6069350N.
AUT.002667.01.03	To discharge contaminants, primarily odour, to air from a wastewater treatment system at or about location co-ordinates 1635620E 6069420N and 1635800E 6069350N.
AUT.002667.01.04	To occupy and use the bed of the Hokianga Harbour for an existing wastewater discharge pipeline.

No significant changes to the location and nature of consented discharges and occupation and use of the Hokianga Harbour are planned.

The urban area of Opononi and Omapere is serviced by the Opononi WWTP. There are 384 connections to the WWTP: 361 are residential; the remaining 23 are commercial, recreational, educational or accommodation connections. There is no significant industry serviced by the wastewater scheme but the Hokianga is a popular holiday destination.

The WWTP consists of a mechanically aerated lagoon, with one brush aerator, followed by a detention pond. The detention pond is now used for retention and sludge settling prior to transfer of wastewater to the constructed wetland.

The constructed wetland consists of four active surface flow cells, one inactive cell and one holding pond. The first and largest wetland cell has been sacrificed to enable placement of sludge and pulled weeds to avoid the costs of taking the sludge off-site. Treated effluent discharges to the Hokianga Harbour during an outgoing tide via a submerged outfall.

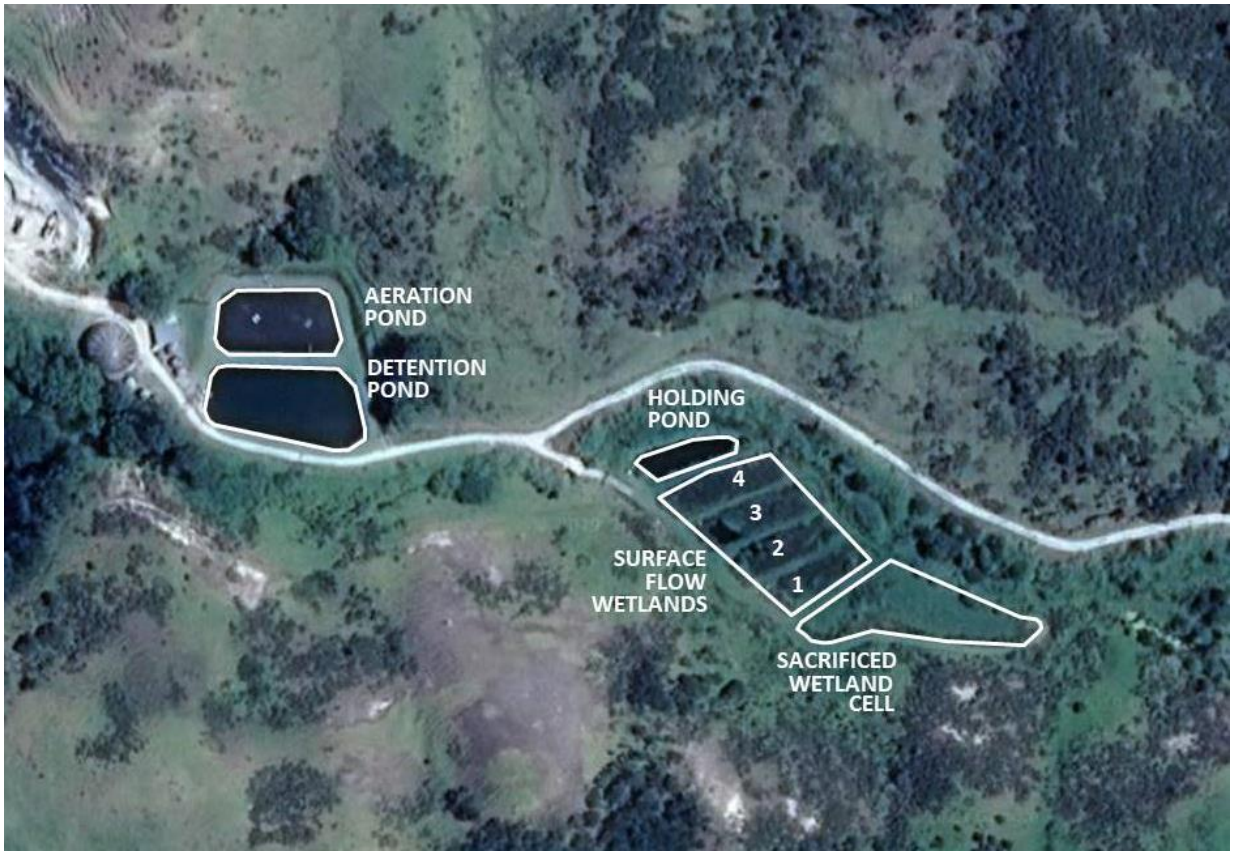

Figure 1 Opononi WWTP layout

4 ON-GOING PROJECTS

There are two on-going projects related to the Opononi WWTP, these are:

1. FNDC has engaged Met-Ocean Solutions (a division of MetService) to undertake a hydrodynamic study of wastewater discharges from FNDC's four WWTPs that discharge, or eventually discharge into the Hokianga Harbour.

   The purpose of this study is to provide information about the behaviour of the wastewater discharges within the Hokianga Harbour including residence times, dilutions, and plume pathways. A hydrological model is proposed that will model the behaviour of E.coli / Faecal coliforms, Total Ammoniacal Nitrogen, Total Suspended Solids and Biological Oxygen Demand. The scope for this work is attached as Appendix 1.

   It is expected that this work will be completed by the end of August 2019. FNDC is amenable to providing the results of the study as a Section 92(1) requirement, or part thereof.

2. Continued liaison with the community to discuss potential technology upgrades at the WWTP. This is discussed in Section 6.2 of the application. Section 6.2 also outlines recent performance improvements and significant maintenance at the WWTP.

5 REASONS FOR THE APPLICATION

Resource consent is required as follows:

The discharge of treated wastewater into the Hokianga Harbour

- **Regional Coastal Plan for Northland (RCP)**
  The discharge is into the Marine 2 (Conservation) Management Area. The discharge of treated effluent to coastal water from land-based wastewater treatment plants is a discretionary activity in accordance with Rule 31.4.6(f).

- **Commissioners' Recommendations Version of the Proposed Regional Plan for Northland (PRP)**
  The discharge is into the General Coastal Zone. The discharge of treated wastewater from a wastewater treatment plant into water or into land is a discretionary activity in accordance with Rule C.6.2.3.

The discharge of treated wastewater to land from the base of the WWTP

- **Regional Water and Soil Plan for Northland (RWSP)**
  The discharge of sewage effluent into or on to land … is a discretionary activity in accordance with Rule 15.3.1(a).

- **PRP**
  The discharge of treated wastewater from a wastewater treatment plant into water or into land is a discretionary activity in accordance with Rule C.6.2.3.

The discharge of contaminants, primarily odour, to air from the WWTP

- **Regional Air Quality Plan for Northland (RAQP)**
  The discharge of contaminants to air…is a discretionary activity in accordance with Rule 9.3.2.

- **PRP**
  The discharge of contaminants to air…is a restricted discretionary activity in accordance with Rule C.7.2.6C as follows:

An application for a new resource consent to replace an existing resource consent for a discharge to air associated with an industrial or trade premise that is not the subject of any other rule in this Plan is a restricted discretionary activity provided:

1) The existing air discharge is authorised by an existing resource consent at the time of the resource consent application; and

2) There is no increase in the scale of or change to the type of the discharge as authorised by the existing resource consent.

The occupation and use of the bed of the Hokianga Harbour for the wastewater discharge pipeline

- **RCP**
  The pipeline structure is in the Marine 2 (Conservation) Management Area. The occupation of space for, and use of, existing structures … is a discretionary activity in accordance with Rule 31.4.4 (c).

- **PRP**
  The structure is in the General Coastal Zone. The occupation of the common marine and coastal area by a discharge outlet that existed at 30 June 2004 and can comply with all relevant conditions of C.1.8 Coastal Works General Conditions is a permitted activity in accordance with Rule C.1.1.1

Pump station and reticulation pipe overflows

PRP

- The discharge of wastewater from a pump station or pipe network is provided for as a discretionary activity in accordance with Rule C.6.2.1. The Opononi Omapere wastewater reticulation network does not experience overflows and no application is made for pump station and reticulation wastewater overflow at this time. The expected frequency of overflows over time is discussed in Section 14.3

6 THE DISCHARGE OF TREATED WASTEWATER INTO THE HOKIANGA HARBOUR

6.1 Discharge of Treated Wastewater - Description of Activities

Wastewater influent from a township like Opononi and Omapere is expected to contain BOD, Ammoniacal-N, Nitrogen, Phosphorus, Faecal Bacteria and Pathogens. Heavy metal concentrations in the influent are likely to be very low because of the high proportions of domestic sources within the area and very little industrial contribution.

The existing discharge parameters are set by Conditions 11 and 19 of the current resource consent, as discussed below.

Condition 11 of current resource consent sets down the parameters for the discharge quality, as follows:

Condition 11

Notwithstanding any other conditions, the discharge of any contaminant (either by itself, or in combination with the same, similar, or other contaminants or water) shall not result in any of the following effects in the water quality of the Hokianga Harbour, as measured at any point at, or down-current of, where the treated wastewater first contacts the surface of the Hokianga Harbour:

(a) The production of conspicuous oil or grease films, scums or foams, floatable or suspended materials.

(b) Any conspicuous change in the colour or visual clarity;

(c) Any emissions of objectionable odour;

(d) Any significant adverse effects on aquatic life; and

(e) No more than minor adverse change in either Escherichia coliform or Enterococci concentration.

For compliance purposes, the down-current water quality shall be compared to the background water quality of the Hokianga Harbour at an up-current site that is not affected by this discharge, for each of the above parameters. The error of analytical method and measuring instrument at the 95%ile confidence level shall be included in determining parameters.

As shown in Figure 2, all water quality sampling occurs within the footprint of the WWTP at the outlet of the constructed wetland (CWL), at sampling point LOC.101580.

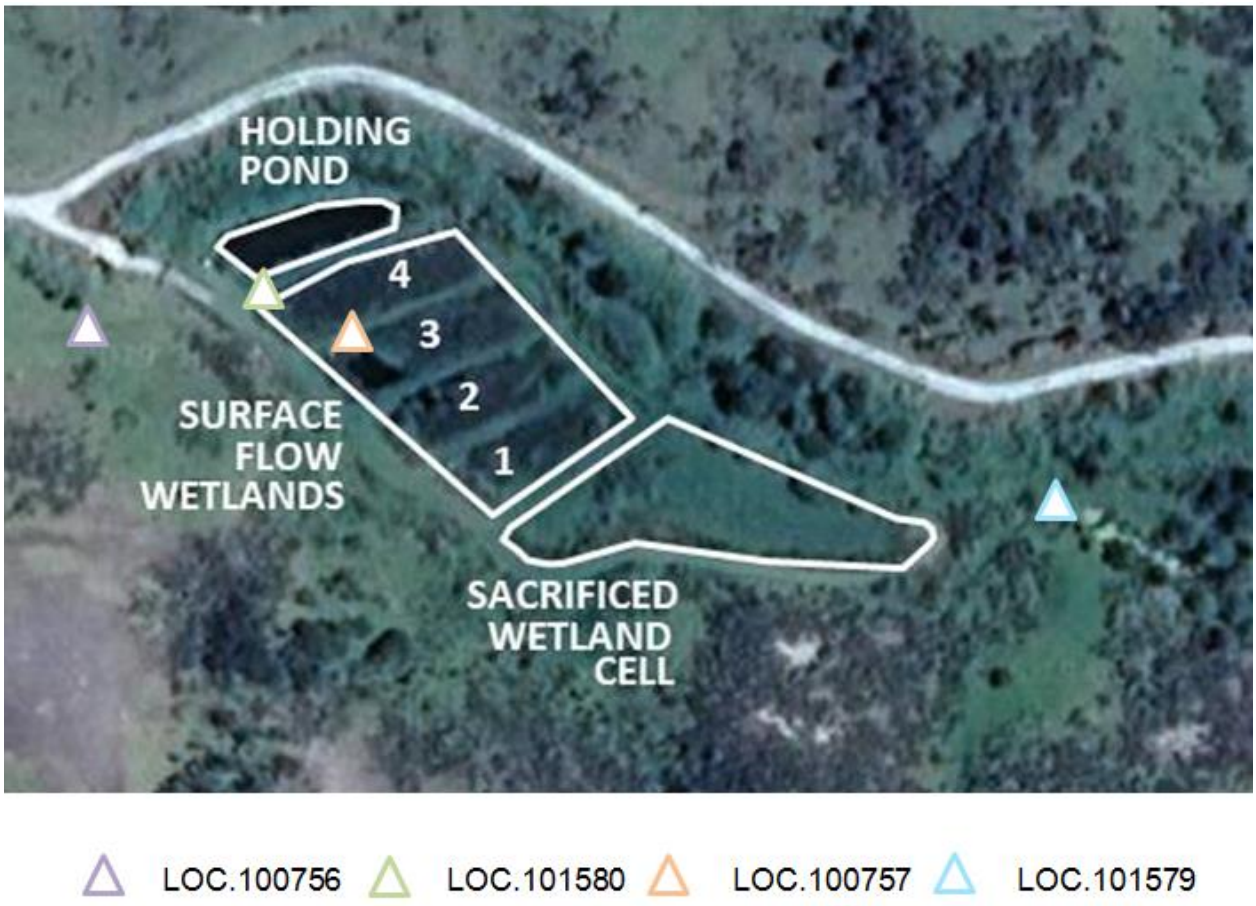

Figure 2 Opononi WWTP Sampling Sites

Colour and clarity

Neither FNDC nor NRC[1] have any records of any complaints about the colour and visual clarity of the discharge. FNDC understand, from discussions with community members, that there may be an obvious plume when the wastewater is discharging from time-to-time.

Of the discharge quality samples taken for this WWTP, total suspended solids (TSS) sampling is the best indicator of colour and clarity of the discharge. Figure 8 shows while there have been incidents of meeting or exceeding the trigger values for both the 12-day median and 90 percentile for TSS there is no consistent or on-going breach of the trigger values that would warrant linking the discharge to an effect on the colour or clarity of the receiving environment.

It is more likely that any conspicuous change in colour or visual clarity is due to the energy from the discharge disturbing the seafloor, or the mixing of salt and 'fresh' water, that causes the discolouration than the colour of the discharge itself.

Similarly, there are no recorded complaints in relation to the production of conspicuous oil or grease films, scums or foams, floatable or suspended materials, emissions of objectionable odour or significant adverse effects on aquatic life.

Escherichia coliform/Enterococci

As discussed above, there no data or representative samples of the wastewater within the Hokianga Harbour. All sampling of wastewater from the WWTP is from the outlet of the system, at sampling point LOC.101580, as shown in Figure 2

[1] Personal communication - NRC

Discharge quality conditions:

Rather than compliance limits, Condition 19 of the current resource consent provides trigger value concentrations for 5 day Biological Oxygen Demand (BOD), Escherichia Coli (E.coli), Total ammoniacal nitrogen (ammoniacal nitrogen) and Total suspended solids (TSS) in the wastewater as measured at LOC.101580, at the outlet of the CWL, as follows:

Condition 19

The Consent Holder shall monitor these consents in accordance with Schedule 1 (attached)… as measured at NRC sampling site 101580.

Determinand	Median concentration	90 percentile concentration
5 day Biochemical Oxygen Demand (grams per cubic metre)	20	35
Escherichia Coli (per 100 millilitres)	3000	5,500
Total ammoniacal nitrogen (grams per cubic metre)	30	38
Total suspended solids (grams per cubic metre)	35	80

If the trigger values are exceeded the Consent Holder is required the report to the NRC on the reasons for the exceedance, the actions to correct the exceedance and prevent it from re-occurring. Results of sampling for BOD, E.coli, Ammoniacal Nitrogen and TSS at LOC.101580 are discussed below.

Biological Oxygen Demand

The WWTP generally effectively treats BOD however for the last 12 months BOD appears to be trending close to both the 12-day median and 90 percentile trigger values. The increase in BOD is likely due to decreased retention time in the ponds due to delayed desludging which was addressed in November 2018.

The WWTP has no industrial discharges with naturally high BOD (e.g., a meat works) so BOD will only vary when the wastewater influent volumes vary, usually when the number of people using the wastewater scheme varies.

Although a person discharges roughly the same amount of wastewater into the reticulation in summer and winter, the population of Opononi and Omapere doubles in the summer. In summer, when the BOD loading is high, the plant has additional retention time. Conversely when retention time is limited in the winter, the loading in the WWTP is only 50% of capacity. The aeration and detention ponds are designed to effectively treat BOD in the wastewater prior to the wastewater being transferred to the wetland.

It is considered that the aeration and detention ponds have been designed to effectively treat BOD in the wastewater prior to the wastewater being transferred to the wetland.

E.coli and E.coli Inter-stage Testing

E.coli has recently trended upwards and in excess of the trigger values. This is likely due to decreased retention time in the ponds due to delayed desludging which was addressed in November 2018.

Inter-stage testing at Opononi WWTP took place over 6 weeks in August, September and October 2018. The results of the testing are presented in Figure 5 and Figure 6

Figure 5 collates the data by stage of treatment. It is clear in this figure that E.coli is reduced in each stage of treatment: the aeration pond, the detention pond and the surface flow wetlands. The final holding pond, where flows build up until they are released on an outgoing tide, often contributes bacteria, or allows bacteria to increase and decreases the quality of the effluent just prior to the sampling point. Figure 6 presents the cumulative reduction in bacteria. With the exception of the holding pond, the WWTP consistently performs a 3 to 4 log reduction in bacteria.

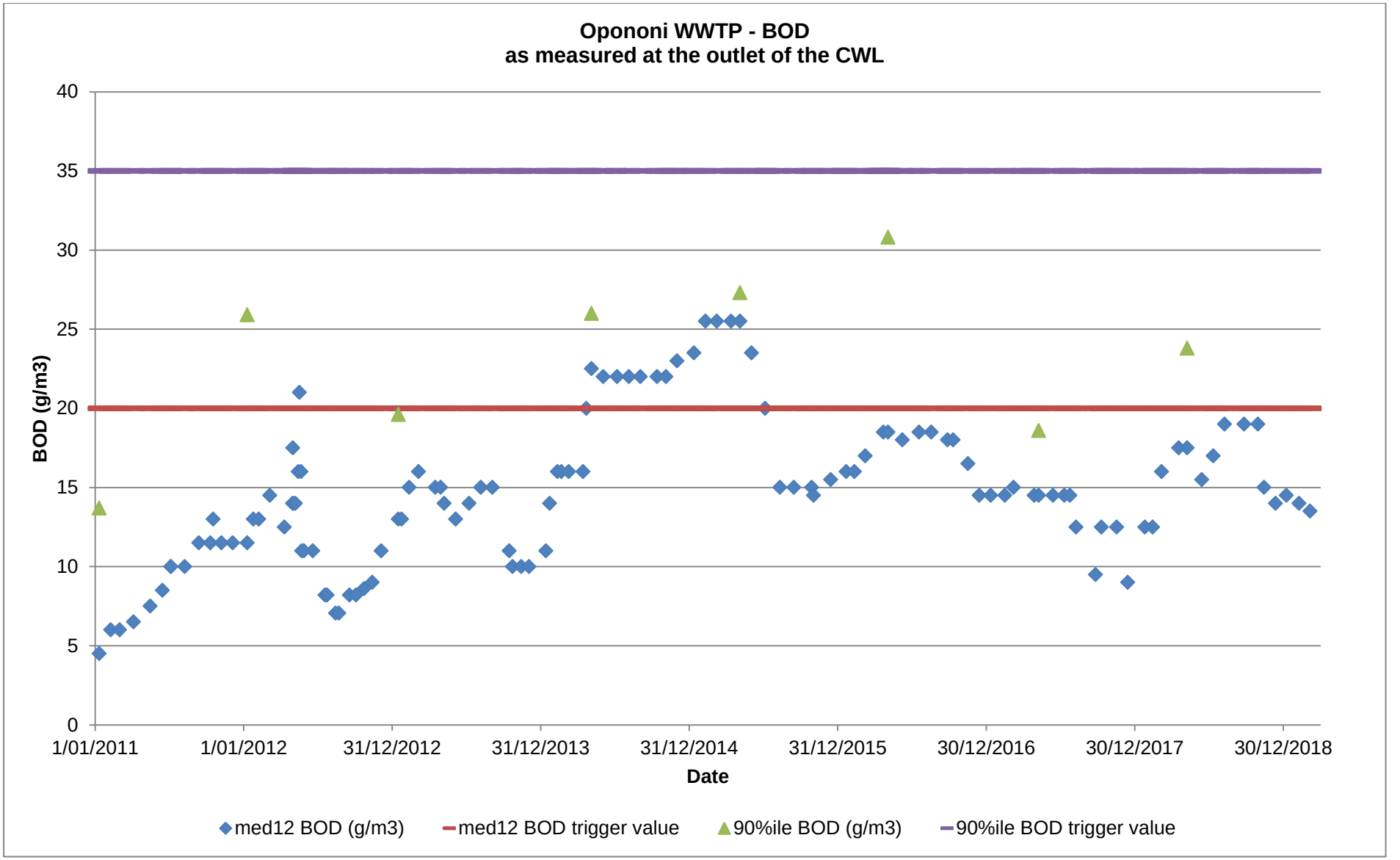

Figure 3 Scatter Graph, Biological Oxygen Demand (BOD)

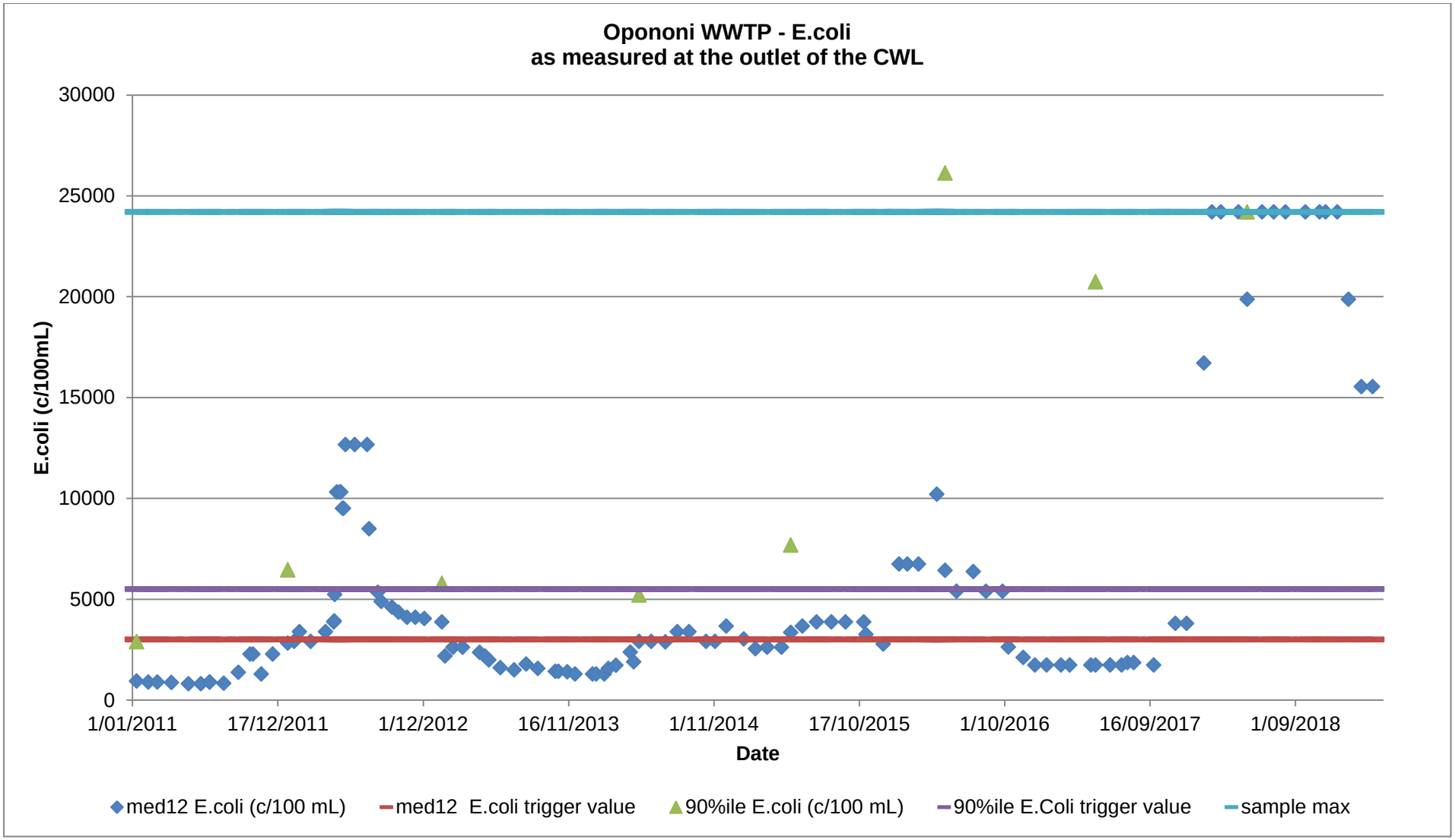

Figure 4 Scatter Graph, E.coli

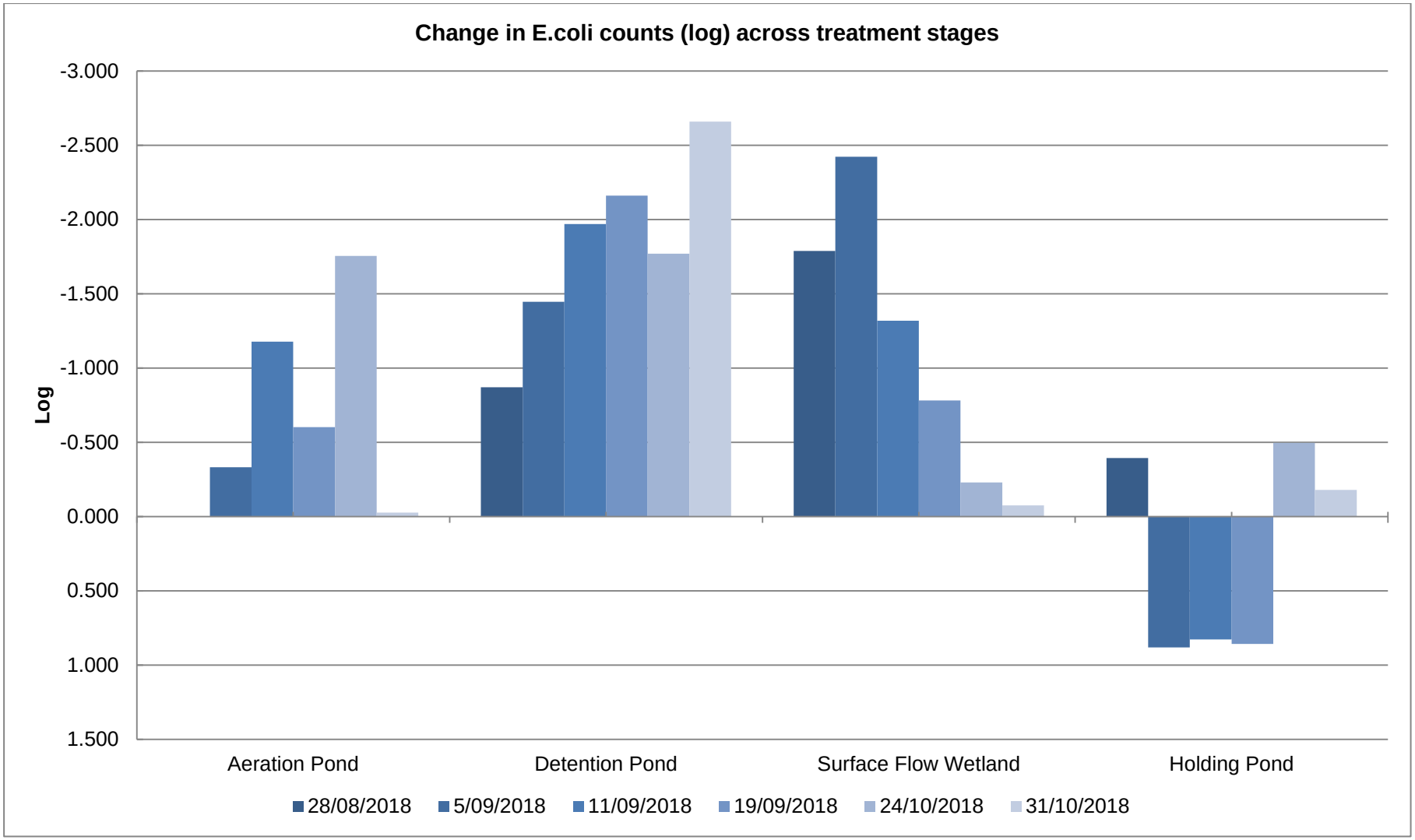

Figure 5 Change in E.coli counts (log) in each stage of the Opononi WWTP on six days of inter-stage testing

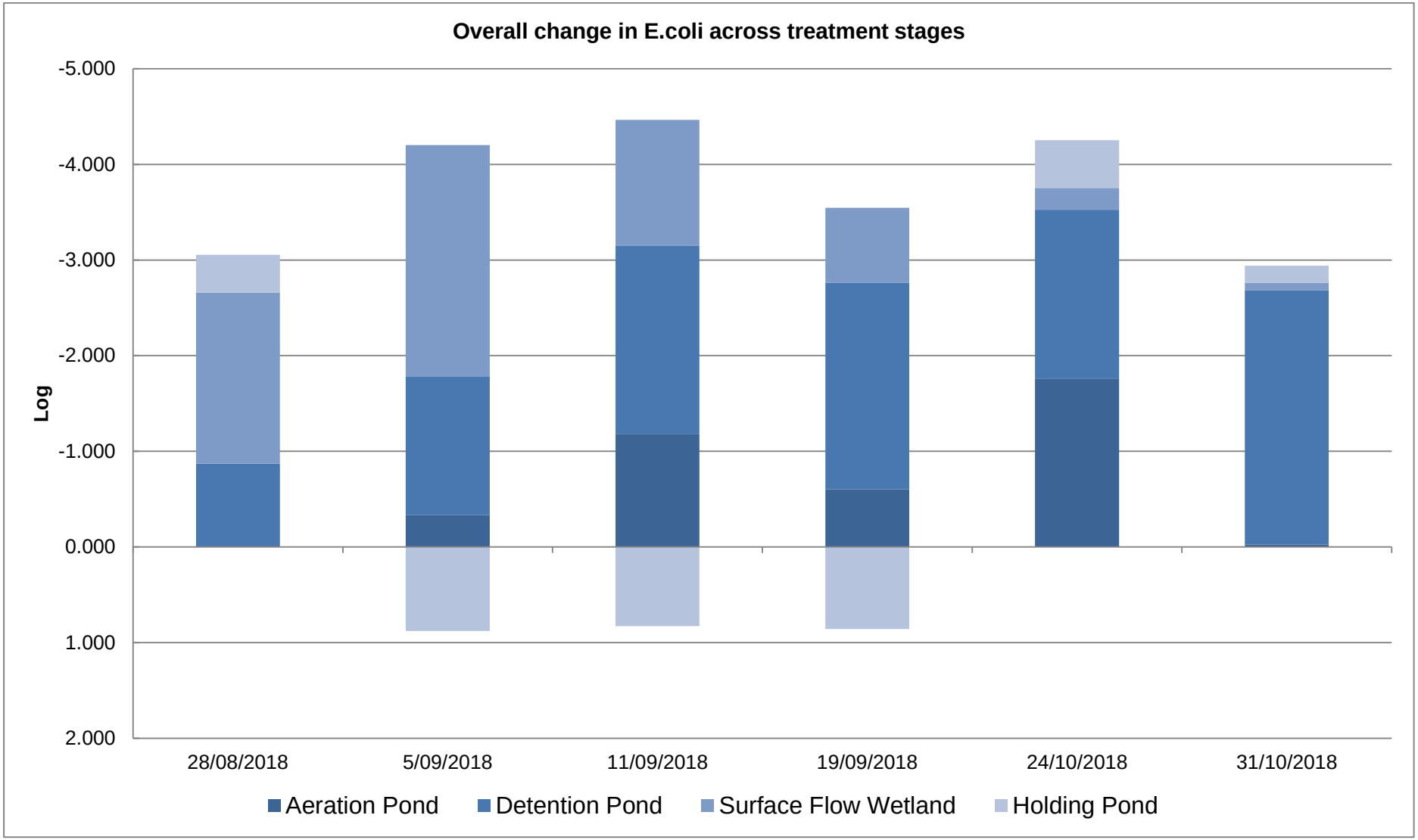

Figure 6 Overall change in E.coli counts (log) through the Opononi WWTP on 6 days of inter-stage testing.

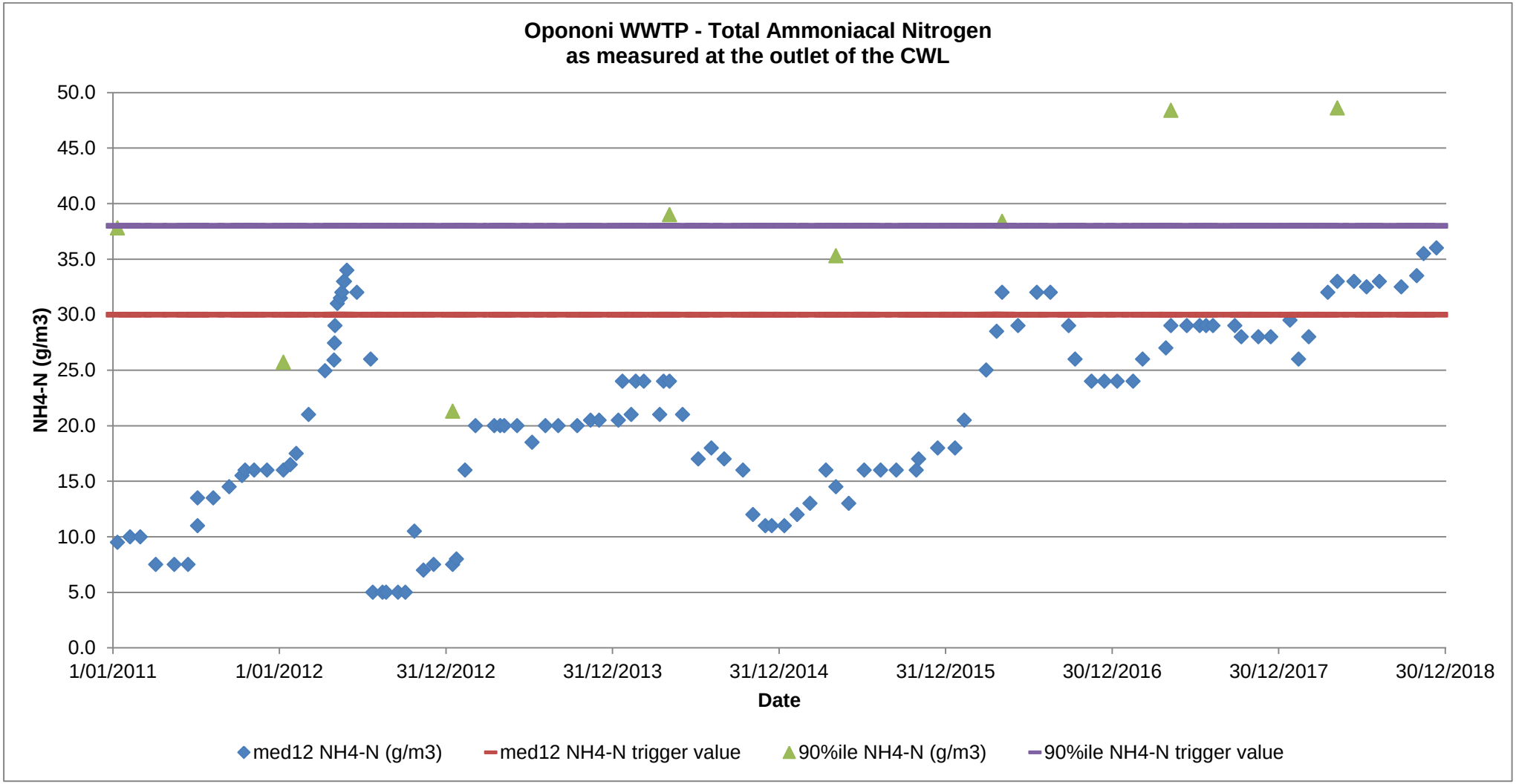

Figure 7 - Scatter Graph - Total Ammoniacal Nitrogen

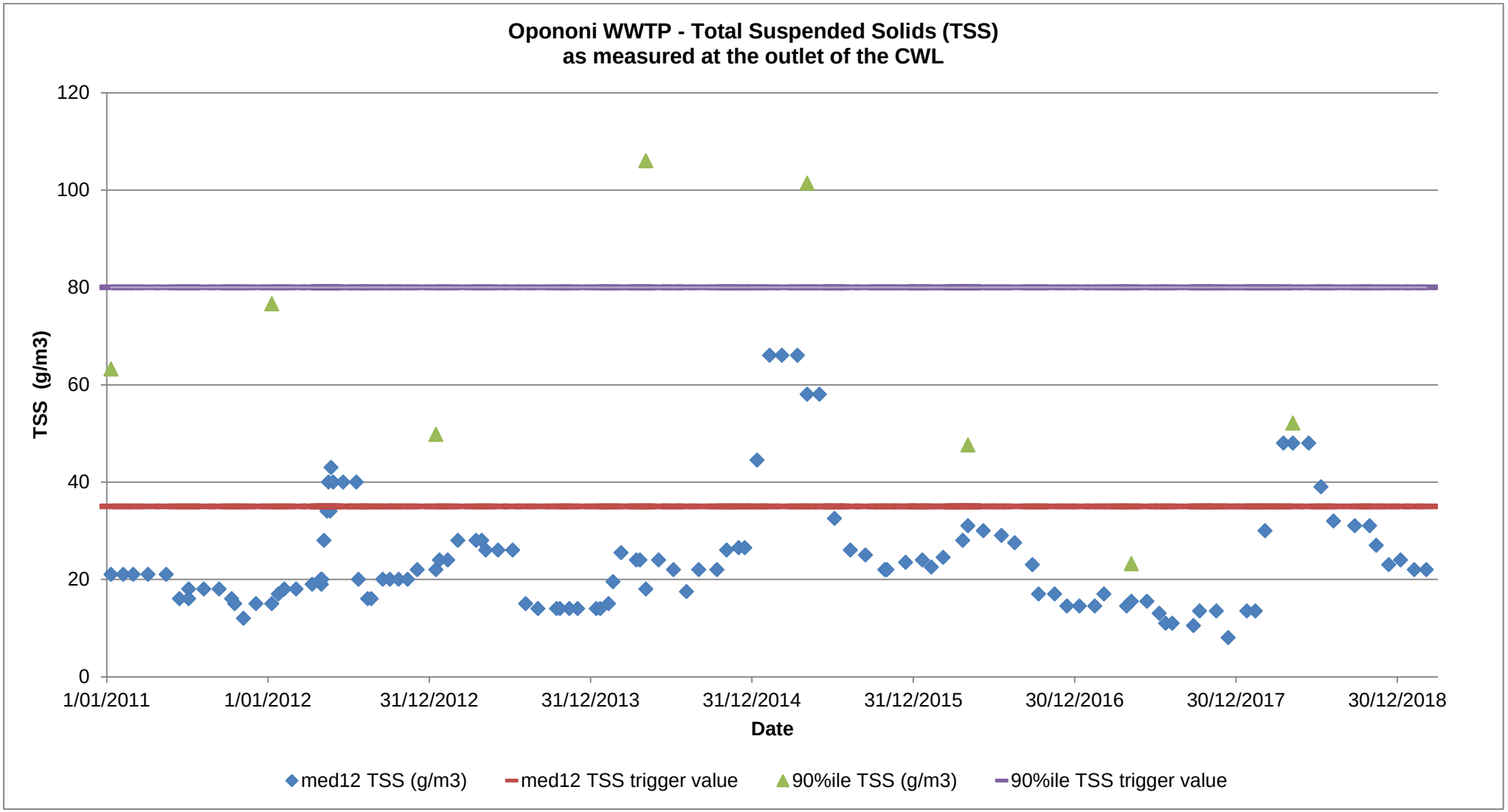

Figure 8 Scatter graph – Total Suspended Solids

Total Ammoniacal Nitrogen

Total Ammoniacal Nitrogen concentration has trended upwards and has recently exceeded the respective trigger values. The increase in ammoniacal nitrogen is likely due to decreased retention time in the ponds due to delayed desludging which was addressed in November 2018.

Total Suspended Solids

The WWTP treats TSS well and is generally well below the trigger values, however there have been limited exceedances of trigger values for TSS with both the 12-day median and 90 percentile.

6.2 Actions taken to address and correct exceedances:

FNDC is undertaking the following activities in order to address the WWTP's reduced ability to treat BOD, E.coli and Ammoniacal Nitrogen. These activities are in-line with Water NZ recommendations[2] for addressing the pond's capacity to treat these contaminants.

- **Continued inter-stage testing**

  Inter-stage testing works to trouble-shoot and isolate where poor performance may be occurring within the treatment system.

- **The desludging of the aeration pond and detention pond to increase retention times.**

  The detention pond was desludged in September 2017, however only a small volume of sludge was able to be removed. Most recently, desludging of the aeration pond and detention pond was undertaken between 15 November 2018 and 18 February 2019, a total of 141.12 tonnes of dry solids removed. With the returned treatment capacity and retention time it is expected that the ability of the ponds to treat BOD, E.coli, and Ammoniacal Nitrogen will return within a few months. The discharge quality is sampled at least monthly and the results are provided to NRC monthly.

- **Replaced aerators**

  Two tornado aerators in the aeration pond have recently been replaced by a brush aerator. The brush aerator is more fit for purpose than a tornado aerator as it feeds oxygen to a shallower depth which will result in less sludge production and more effective BOD treatment. Increased aeration will optimise the directional flow and mixing of wastewater through the aeration pond.

- **Technology upgrades**

  Alongside the Opononi Omapere Community Liaison Group (CLG), FNDC are considering treatment options (i.e., upgrading technology at the WWTP) to improve the quality of the wastewater discharge. Funding is available to enable an upgrade.

[2] https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=3122 (page 92)

6.3 Discharge of Treated Wastewater – Assessment of Effects on the Environment

Policy H.5.3 of the Commissioners' Recommendation Version of Proposed Regional Plan for Northland sets water quality standards as follows:

#	Attribute	Unit	Coastal water quality management unit	
			Compliance metric	Open Coastal water
1	Dissolved Oxygen	mg/L	Annual Median	No discernible change
1.1	Dissolved Oxygen	mg/L	Minimum	4.6
2	Temperature	Celsius	Maximum change	3
3	pH			8.0-84
4	Turbidity	NTU	Annual Median	No discernible change
5	Secchi depth	M	Annual Median	No discernible change
6	Chlorophyll-a	mg/L	Annual Median	No discernible change
7	Total phosphorus	mg/L	Annual Median	No discernible change
8	Total nitrogen	mg/L	Annual Median	No discernible change
9	Nitrite-nitrate-nitrogen	mg/L	Annual Median	No discernible change
10	Ammoniacal-nitrogen	mg/L	Annual Median	No discernible change
11	Copper	mg/L	Maximum	0.0003
12	Lead	mg/L	Maximum	0.0022
13	Zinc	mg/L	Maximum	0.0070
14	Faecal coliforms	MPN/100mL	Median	<14
14.1	Faecal coliforms	MPN/100mL	Annual 90th percentile	<43
15	Enterococci	/100mL	Annual 95th percentile	<40

The policy requires that the annual median discharge of a listed contaminant (other than heavy metals, temperature, pH, faecal coliforms and E.coli), or the effect of the discharge, into open coastal water must cause no discernible change to the receiving environment after allowing for reasonable mixing.

In terms of the listed heavy metals, these are unlikely to be present in a WWTP discharge from a source with very little industrial activity and low Rainfall Derived Inflow and Infiltration (RDII), such as Opononi and Omapere. Copper may be present (from plumbing) however

the water sources for the same area indicate that copper is in very low concentration in the general environment.

Any present heavy metals can be expected to settle out during the treatment process and become entrained within the sludge at the bottom of the ponds and/or wetlands. Any discharge of heavy metals is therefore likely to be able to meet the parameters listed.

Using a compliance point within the open coast, rather than within the footprint of the WWTP, it is likely that the attributes 1-10, and 14-15 will be met after allowing for reasonable mixing.

The definition of ‘reasonable mixing’ is provided in the Commissioners’ Recommendations Version of the Proposed Regional Plan for Northland, as follows:

Definition- Zone of Reasonable Mixing

For the purpose of a discharge of a contaminant permitted by a rule in this Plan …

2) in relation to a lake, wetland or coastal water, a distance 20 metres from the point of discharge

…

For the purpose of activities that require resource consent, the zone of reasonable mixing will be determined consistent with …2) above unless the nature or scale of the discharge requires a case-by-case determination is more appropriate, in which case the extent of departure from the zone defined under … 2) above will be determined in accordance with policy D.4.8 ‘Zone of Reasonable Mixing’.

The nature and scale of the discharge is such that the defined zone of reasonable mixing, i.e., 20 metres from the point of discharge is likely to be inappropriate for a WWTP discharge with a high concentration of DO.

This is supported by Policy D.4.8 – Zone of Reasonable Mixing that states:

Policy D.4.8 - Zone of Reasonable Mixing

When determining what constitutes the zone of reasonable mixing for a discharge of a contaminant into water … have regard to:

1) Using the smallest zone necessary to achieve the required water quality in the receiving waters, as determined under Policy D.4.5; and

2) Ensuring that within the mixing zone contaminant concentrations and levels of dissolved oxygen will not cause acute toxicity effects on aquatic ecosystems.

Given the dynamics and velocity of the coastal waters at the discharge point coupled with the discharge on the out-going tide, and the depth of the discharge pipe[3] it is considered that the receiving environment will provide significant and almost immediate dilution of the discharge.

The hydrological study, as discussed in Section 4, will allow for further qualification of the expected less than minor effects of the discharge on the receiving environment.

[3] approximately 11.8 metres on an out-going tide at the date of the last outfall dive inspection – 14 June 2018

7 ASSESSMENT OF DISCHARGE ALTERNATIVES

Section 105(1)(c) of the Act requires that the consent authority must have regard to any possible alternative methods of discharge, including discharge into any other receiving environment. It is also a clear from statutory documents and in te ao Maori that the discharge of wastewater to land is preferred over the discharge of wastewater to water.

Condition 20 of the resource consent requires that:

Condition 20

The Consent Holder shall undertake an investigation into alternative land areas that are considered by local Iwi to be suitable for the discharge of treated wastewater to land from Opononi and Omapere townships. The Consent Holder shall, within one month of the commencement of this consent, meet with the community liaison group required by Condition 21 to discuss the scope, process and timetable of the investigation and final written report. This investigation shall then be completed within 18 months of the commencement of these consent and the results forwarded to the representatives of the Community Liaison Group. A written report shall be forwarded to the Northland Regional Council's Monitoring Senior Programme Manager and the representatives of the Community Liaison Group within two years of the date of commencement of these consents which includes, but is not limited to the following:

(a) A detailed map showing the land areas that are considered by local Iwi as being suitable for a discharge to land of treated wastewater

(b) Details of the Consent Holder's investigation into these identified land areas being utilised as wastewater disposal area.

(c) Conclusions on whether the identified land areas can technically be utilised as treated wastewater disposal areas.

FNDC facilitates a Community Liaison Group (CLG) with representatives from the Pakanae, Kokohuia, Waiwhatawhata and Waimamaku Marae (Nga Marae O Te Wahapu), Te Runanga O Te Rarawa hapu and representatives of the Opononi and Omapere Communities invited to attend.

An initial investigation of potential land use options was undertaken by VK Consulting Environmental Engineers Ltd (VK) in 2011. That report was reviewed by FNDC in conjunction with the CLG and it was found that the investigation did not sufficiently meet the expectations and requirements of the CLG. In particular, the report did not address options for improving the wastewater treatment system itself and did not provide an assessment of the costs associated with partial land disposal (e.g. during summer or dry weather conditions only). Accordingly, a supplementary investigation[4] was undertaken by Mott Macdonald to address the outstanding issues with the 2011 work. The Mott Macdonald investigation was completed in December 2014. The investigations are summarised below:

Full land disposal (VK 2011)

- The work undertaken by VK in 2011 identified that full disposal of treated wastewater to land would require a very large land area. This was because the soils in the area are not very free draining, meaning that the treated wastewater needs to be spread over a large area to make sure there is no runoff.
- In addition, when it rains the ability for poor draining soils to absorb treated wastewater is minimal, so on wet days wastewater needs to be stored. These storage requirements are significant.
- The above issues are compounded by the steepness of the land in the vicinity of the treatment plant because the steepness if the land further increases the risk of runoff.
- Flat sites were identified around Pakanae, Waimamaku and Koutu Loop. However the costs associated with building the pipework to get the wastewater to these sites is significant.

Partial land disposal (Mott MacDonald 2014)

- This work looked at the option of partial land disposal at the two closest sites to the wastewater treatment plant identified in the VK report.
- The investigation looked at whether it would be practicable to discharge treated wastewater to these sites only on dry days, with the wastewater discharged via the outfall during wet weather. This would remove the requirement for storage and significantly reduce the land area necessary to carry out land disposal.

[4] FNDC reference: A1534292 – Opononi/Omapere Wastewater Treatment System. Treatment Upgrade and Land Disposal Options.

- Even with partial land disposal option, the report identified that the land areas were unsuitable for irrigation due to high slopes and the poor drainage properties of the soil and would likely have an adverse effect on soil and surface water.
- Irrigation will only occur for five months of the year with the remaining seven months' of wastewater to be discharged via the Hokianga Harbour.
- There were also some significant practical constraints associated with having to switch between land disposal and outfall disposal dependant on the weather.

The reports by VK and Mott MacDonald estimated the costs of implementing a land disposal regime would be in the range of approximately $2.5 to $5.0 million, with operation costs ranging from $200,000 - $300,000 per year.

Following the completion of this work, the CLG collectively concluded that land disposal, whilst the preferred option, was not affordable. The CLG accordingly decided that the next best option would be to improve the quality of the treated wastewater discharged into the Hokianga Harbour.

7.1 Best Practicable Option

Taking into account the ability of the receiving environment to assimilate the wastewater, the financial and adverse environmental implications of discharge to land, and the technical knowledge available about the discharge, it is reasonable to conclude that the discharge to water is the best practicable option for minimising any adverse effects on the environment.

7.2 WASTEWATER VOLUMES

7.3 Description of Activities

Discharge volumes

This application is for the following discharge volumes:

Discharge Flow Rate	75 cubic metres per hour
Peak Discharge	450 cubic metres per day
Average Daily Flow Discharge	240 cubic metres per day

Peak discharge

The current resource consent allows for a discharge not exceeding 685 cubic metres per day. This resource consent, and previous resource consents, contained a dry-weather flow where any day with 1 millimetre of rain or more, plus the following three days were excluded from the dry weather flow records. As a consequence of this flow data being excluded, the data given for compliance purposes (i.e., the flow excluding wet-weather flows) under represents the true volume of discharge.

Peak discharge is constrained by the tidal time limits and capacity of the discharge pipeline. FNDC plan to install a pump capable of discharging at 75 cubic metres per hour that will enable a maximum discharge rate of 450 cubic metres within the tidal time available.

Should the inflow to the ponds exceeds the discharge rate the existing pond system works to buffer peak inflows to enable compliance with the requested peak discharge. Each of the peak flow events over 600 cubic metres per day since 2011 have been simulated in order to understand how quickly the stored flows would take to discharge from the WWTP. With the exception of two storms in quick succession that took several days to clear, all peak discharges were able to be buffered by the ponds.

Stormwater Inflow and Infiltration

Condition 2 of the current resource consent requires that:

Condition 2

The Consent Holder shall minimise, as far as practicable, any increase in the quantity of wastewater discharge to the Hokianga Harbour as a result of stormwater inflow and infiltration into the sewage reticulation network and treatment system. This shall include the prevention, as far as is practicable, of stormwater run-off from the surrounding land entering the treatment system. For compliance purposes, the Consent Holder shall record the daily wastewater inflow volume to the treatment system.

The RDII for the WWTP is calculated at 0.9%[5]; less than 1% of the rainfall within the WWTP catchment finds its way into the wastewater network. 0.9% is considered a low and acceptable level of RDII[6]. On a national level FNDC has a very low RDII value; an average across all schemes of 1.6% varying from 0.2% to 7.0%.

Since 2011 the highest daily inflow was 1,290 cubic metres within 24 hours and related to a 140 millimetre rainfall event. An analysis of the peak flows showed that there was a rapid decrease in wastewater inflows after the rainfall event. This indicates that the majority of RDII is via inflow (from direct connections) rather than infiltration (seeping in to the network through the ground).

This further indicates that the sewerage network is in good condition and that stormwater infiltration is most likely associated with the portion of the reticulation on private properties (i.e., down pipes and gully traps).

Discharge flow rate

The maximum discharge flow rate is currently 58.9 cubic metres per hour, FNDC plan to install a larger pump with a capability of discharging up to 75 cubic metres per hour. As the discharge is only during outgoing tides (6 hours per day) this supports the requested peak discharge volume.

[5] RDII = recorded wet weather volume – average dry weather volume / measured rainfall depth x catchment area.
[6] https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=3629

Average Daily Flow discharge

Using an average daily flow will provide a realistic description of the flows from the WWTP. Excluding all days with more than 10 millimetres of rainfall was considered, however an average daily flow measured over an annual rolling average gives a realistic interpretation of the volume of actual inflow. Annual average daily flows have remained relatively static since 2011.

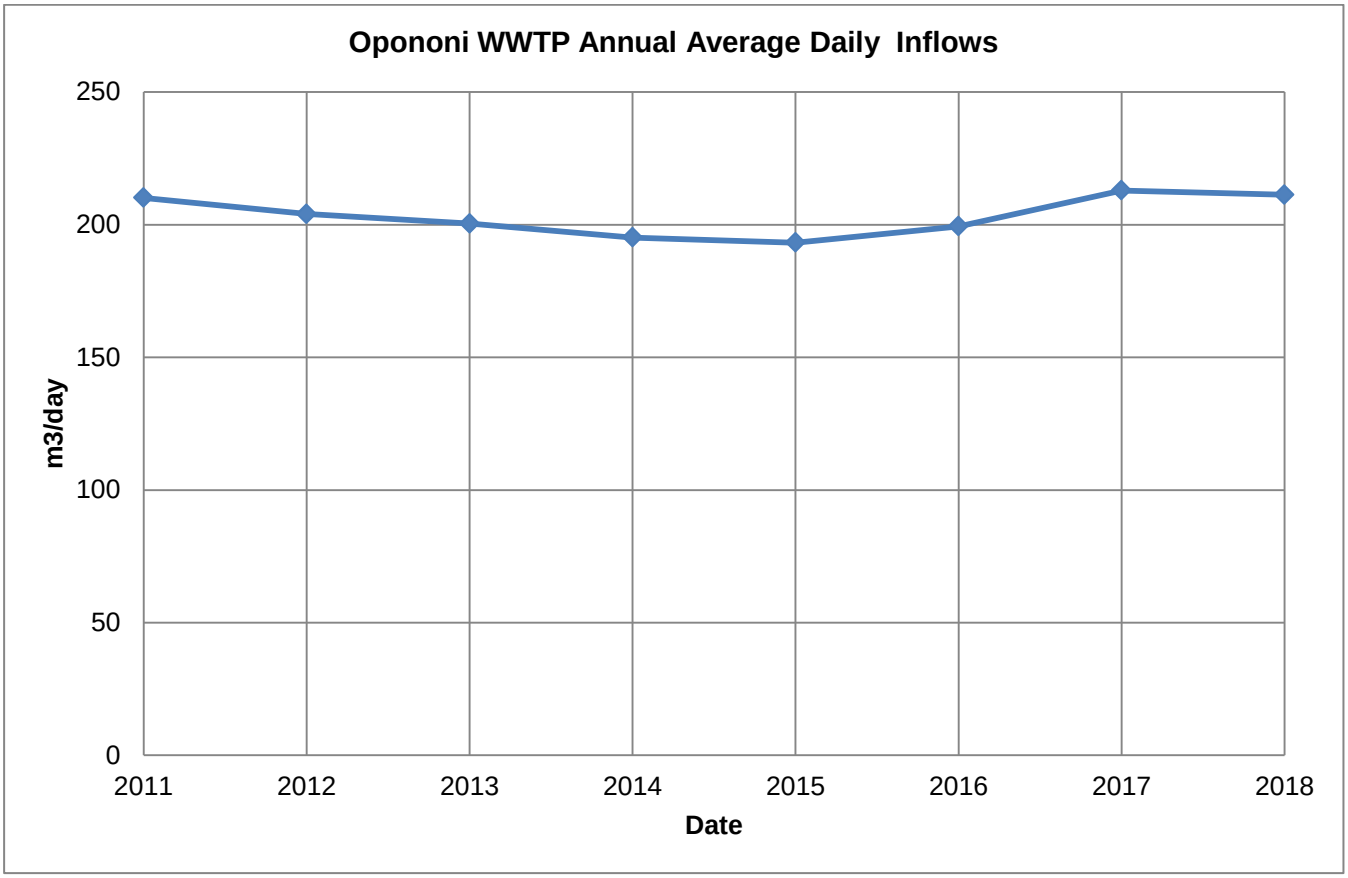

Figure 9 – Opononi WWTP - Annual Average Daily Inflows

In the period since 2011 there has been a general reduction in the permanent population of Opononi and Omapere, slow growth in new dwellings (per local observations), and a reduction in permanently occupied houses (per census data). The 2013 census showed that 50% of the houses in Opononi and Omapere were unoccupied i.e., holiday homes.

Forecasting indicates minimal population change, or possibly a decrease in the permanent population. With the limited information available FNDC assume a low level of growth in the permanent population over the next 20 years, but that there is likely to be growth in holiday-home occupation.

Discharge timing

The current resource consent (condition 6) sets down the timing of the discharge into the Hokianga Harbour. Condition 6 allows for the discharge of wastewater into the Hokianga Harbour for a maximum of three hours each tidal cycle between one and four hours after high tide via the discharge pipeline from the treatment system. The discharge is controlled by a pump with an automatic lunar clock timer.

No changes to the timing of the discharge are planned however the hydrological study may make recommendations in regards to discharge timing to further reduce any effects on the environment.

7.4 The Receiving Environment – Hokianga Harbour

Key contaminants within the wastewater are pathogenic indicator bacteria and nutrients. High concentrations of indicator bacteria can potentially increase the health risk of recreational swimmers. Nutrients can affect the overall quality of the harbour water as a result of eutrophication. The sensitivity of the receiving environment to pathogens and nutrients is assessed below.

Nutrients

The Estuary Trophic Index (ETI) toolbox is aimed at providing advice to support the development of a nationally consistent approach to the assessment of estuary eutrophication, including nutrient load thresholds, for NZ estuaries. The tool was developed using a GIS-based land-use model and a database of New Zealand estuaries, and makes predictions of potential nutrient concentrations and flushing times for most estuaries in New Zealand.

The susceptibility of the Hokianga Harbour to eutrophication was undertaken using ETI Tool 1[7]. This method applies a desktop susceptibility approach that is based on estuary physical characteristics, and nutrient input load/estuary response relationships for key NZ estuary types. The tool produces a single physical susceptibility score that can be used to classify the physical susceptibility (i.e., very high, high, moderate, low susceptibility), and/or be

[7] Zeldis, J., Plew, D., Whitehead, A., Madarasz-Smith, A., Oliver, M., Stevens, L., Robertson, B., Burge, O., Dudley, B. (2017). The New Zealand Estuary Trophic Index (ETI) Tools: Web Tool 1 - Determining Eutrophication Susceptibility using Physical and Nutrient Load Data. Ministry of Business, Innovation and Employment Envirolink Tools: C01X1420.https://shiny.niwa.co.nz/Estuaries-Screening-Tool-1/

combined with nutrient load data to produce a combined physical and nutrient load susceptibility rating.

For this assessment tool default physical and nutrient data for the Hokianga Harbour provided as part of the toolbox was used. The full results from the tool are attached as Appendix 2

Summary results are provided in Table 1 below, bands are ranked from A (good) to D (bad).

Name	Hokianga Harbour System
Physical Susceptibility	Low
N Load susceptibility	Moderate
Combined susceptibility	Moderate
ETI susceptibility	B
Macroalage Band	B
Phytoplankton Band	A

Table 1 ETI Tool 1 Summary and results for the Hokianga Harbour System

Physical susceptibility of an estuary to eutrophication is calculated based on the flushing potential of the system combined with its dilution potential. The tool output calculated the physical susceptibility of the Hokianga Harbour to eutrophication as being low based on the flushing[8] and dilution[9] potential of the system.

[8] Efficiency of the estuary to remove inputs through tidal flushing. Larger values represent estuaries with a higher flushing potential.

[9] Ability of estuary to dilute nutrient inputs. Smaller values represent estuaries with higher dilution potential.

Nutrient (total nitrogen and phosphorus) load susceptibility was calculated as moderate based on the influence of the nutrient areal load ($mgN.m^{-2}.d^{-1}$) on nuisance macroalgae and seagrass growth, using the following thresholds:

- Very high is >250
- High is >50-250,
- Moderate is 10-50,
- Low is <10$mgN.m^{-2}.d^{-1}$

The combined physical and N load susceptibility is determined based on the matrix provided as Figure 10.

		N load Susceptibility (mg/m²/d)			
Physical Susceptibility		Very High >250	High >50-250	Moderate 10-50	Low <10
	High	Band D Very High	Band C High	Band C High	Band B Moderate
	Mod	Band D Very High	Band C High	Band B Moderate	Band A Low
	Low	Band C High	Band B Moderate	Band B Moderate	Band A Low

Figure 10 Matrix developed by Robertson et al. (2016) to establish combined physical N load susceptibility

Figure 11 below provides guidance on the ecological condition that is likely to result from combined N load and physical susceptibility ratings using the following ecological condition bands that relate to Table 1.

Band	A	B	C	D
Ecological Quality	No stress caused by the indicator on any aquatic biota. Healthy seagrass communities present.	A minor stress on sensitive biota caused by the indicator. Some eutrophic symptoms (e.g. mac-roalgae) but still support healthy seagrass and fish communities.	Moderate stress on a number of aquatic biota caused by the indicator exceeding preference levels for some species and a risk of sensitive biota species being lost or reduced. Macroalgal growth moderate.	Significant, persistent stress on a range of aquatic biota caused by the indicator exceeding tolerance levels. A likelihood of local extinctions of keystone species and loss of ecological integrity. Algal dominated, turbid systems, seagrass absent or reduced.

Figure 11 Description of ecological quality for combined physical susceptibility and N Load susceptibility banding. Adapted from ETI tool 1 (Robertson et al. 2016).

The ETI assessment indicates that the physical characteristics of the Hokianga Harbour (or its ability to export nutrients) mean current nutrient loads into the system from the contributing catchment is unlikely to be resulting in the harbour system being affected by eutrophic conditions.

Because above assessment does not take into account inputs from point sources it is useful to gain an understanding of the relative contribution of the wastewater discharge compared to the modelled catchment inputs used for the above assessment. The total nutrient inputs into the Hokianga Harbour from rivers flowing into the system used for the above assessment are estimated to be 2.8 tonnes per day.

Total nitrogen and phosphorus are not monitored at the WWTP. Typical total phosphorus concentrations within pond-based treatment plant effluent is likely to be between 6 to 8.2 grams per cubic metre[10]. The higher value has been adopted for the purpose of this exercise.

With regard to total nitrogen, the New Zealand Guidelines for the Design, Construction and Operation of Oxidation Ponds (Revised 23 May 2005) indicate total nitrogen from a pond based system is likely to average 40 grams per cubic metre.

Typical nutrient concentrations (total nitrogen plus total phosphorus) from the WWTP are therefore assumed to be 50 grams per cubic metre. An analysis of flows from the WWTP between 1 January 2010 and 28 February 2019 indicates that average flows from the WWTP are 182 cubic metres per day (∓5.5 at 99% confidence) and the typical daily nutrient loading from the WWTP is estimated to be 9.1 kilograms per day. This value equates to approximately 0.3% of the total nutrient load estimated to be entering the harbour from river systems.

Taking into account the low susceptibility of the Hokianga Harbour to eutrophication, and the relative contribution of nutrients from the WWTP compared to inputs from the river systems, it is considered that the effects of the discharge of nutrients from the WWTP on the receiving environment will be no more than minor.

[10] (Hickey et al. 1989, Davies-Colley et al. 1994)

Pathogens

Wastewater has the potential to contain pathogenic organisms. An analysis of indicator bacteria monitoring at the outlet from the WWTP (before it enters the outfall) is provided in Section 6 of this report.

Before considering the effects of the discharge activity associated with the discharge of pathogens into the receiving environment, it is first necessary to consider the existing environment and its sensitivity to the wastewater discharge. NRC undertakes recreational bathing water quality monitoring at Omapere, Opononi and Rawene.

The results of the monitoring are provided in Figure 12 for the period between 2015 to the end of 2018. Rainfall is also shown and represents rainfall totals recorded on the day of sampling at Rawene.

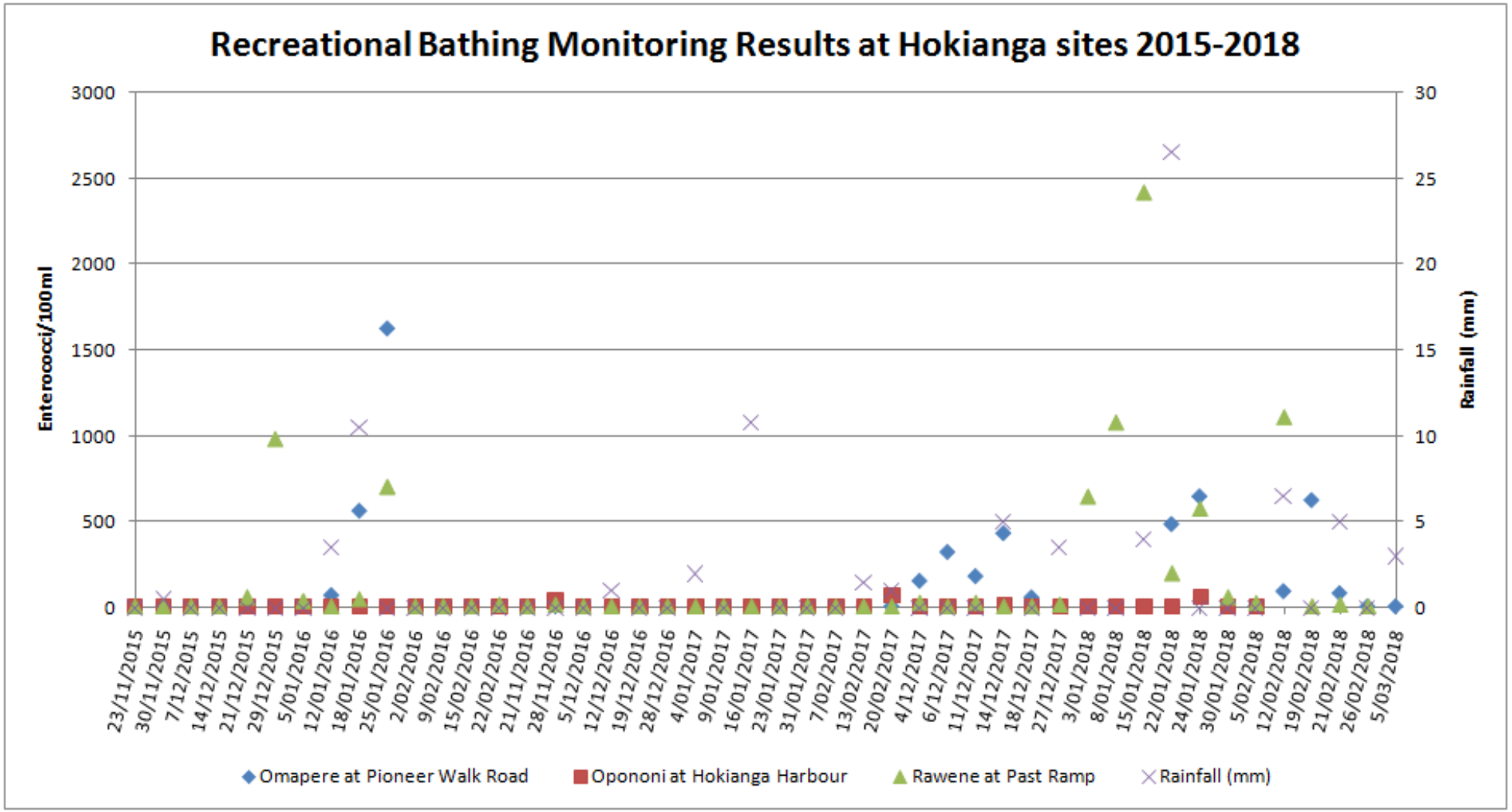

Figure 12 - Recreational bathing water quality monitoring results.

Figure 12 shows that water quality at the Omapere and Opononi sites appears to have degraded (in terms of Enterococci concentrations) since 2017, with a number of elevated samples having been recorded at these sites. As a consequence, these sites have been classified as being unsuitable for swimming. A number of exceedances appear to be linked with rainfall events, suggesting these exceedance are potentially linked with catchment runoff.

In late 2018, NRC undertook to investigate the source of faecal indicator bacteria by taking samples for faecal source tracking within the Hokianga Harbour, as shown in Table 2**Error! Reference source not found.** below.

Site	Site Name	Sample ID	Date collected	PCR	Sterols	Comments/ Conclusion
102317	Omapere at Pioneer Walk Road	20180496	22/01/2018	ND	Wildfowl Possible Ruminant	Wildfowl
102317	Omapere at Pioneer Walk Road	2018111	19/02/2018	ND	Wildfowl Possible ruminant	Possible Wildfowl/ Ruminant
100236	Rawene at past ramp	20180990	12/02/2018	Ruminant (50-100%)	Ruminant	Ruminant

Table 2 Faecal source tracking results from monitoring undertaken by NRC within the Hokianga Harbour

The results of the monitoring presented in Table 2 indicate that, at the time of sampling, the source of the contamination was birds and/or ruminants.

To that end, there is a wide body of evidence identifying significant effects of land use practices (preliminary agriculture) on the quality of water bodies. Section 4.9.3 of the report Section 32 report for the Proposed Regional Plan for Northland states:

"Research has revealed that livestock are the main source of E.coli contamination in water (an indicator of the presence of faecal pathogens). The access of livestock to water bodies is likely to be a dominant pathway by which E.coli enters water during normal flow conditions (that is, outside of heavy rainfall events). Microbiological water quality is generally poor in most of Northland's rivers and has the potential to impact on the health of humans and livestock."

To illustrate the effects of land use activities on water quality, the work of Snelder et al. (2016)[11] has been used to depict modelled median E.coli concentrations within the water bodies within the Hokianga Harbour catchment. The output from that assessment, which used raw data sourced from the Ministry for the Environment Data Service[12] is attached as Appendix 3. The analysis indicates that approximately 25% of rivers (around 580km) have a modelled E.coli median value exceeding 300 E.coli per 100ml and approximately 870km of the rivers in the catchment (around 37%) are predicted to be unsuitable for bathing due to the predicted E.coli values within the rivers exceeding a 95 percentile of 550 E.coli per 100ml.

It is reasonable to conclude the major source of indicator bacteria within the harbour environment is likely to be sourced from the wider catchment, as opposed to point sources. As demonstrated in the nutrients assessment the Hokianga Harbour has a high dilution and flushing factor. This an important consideration given the discharge occurs only during the outgoing tide, and the point of discharge is situated within the main harbour channel approximately 2.6km from the harbour mouth.

Taking into account the nature of the existing environment, the relatively low volume of wastewater being discharged and the dilution and flushing factors for the harbour, is it concluded the effects of the discharge on bacterial water quality within the harbour will be no more than minor.

[11] Snelder et al. (2016) Strategic assessment of New Zealand's freshwaters for recreational use: a human health perspective. LWP Client Report 2016-011

[12] https://data.mfe.govt.nz/layer/95562-river-water-quality-for-swimming-categories-raw-model-output/

7.5 Discharge monitoring

In terms of the consent conditions it is expected that NRC will determine the appropriate consent conditions for the wastewater quality based on its application of the new water quality standards set down by the PRP, and its determination of the appropriate zone of reasonable mixing. This may require amendments to the existing monitoring programme however it is expected that the most practicable location for frequent monitoring of the wastewater discharge will continue to be within the footprint of the WWTP.

FNDC and its alliance partner, Far North Waters operate the WWTP. As part of this relationship Far North Waters operational staff manages and monitors the WWTP and its discharge in accordance with the current resource consent and its monitoring programme. There is no anticipated change to this relationship. NRC monitor the discharges from the WWTP at least quarterly.

8 THE DISCHARGE OF TREATED WASTEWATER TO LAND FROM THE BASE OF THE WWTP

8.1 Description of activities:

The current consent provides for the possibility that wastewater may seep from the WWTP ponds and wetlands into the ground and/or into the Waiarohia Stream. Any discharge of contaminants to water as a result of seepage from the base of the treatment system is likely to be minimal.

While the WWTP is in very close proximity to the Waiarohia Stream, the sealing of the base of the ponds over time and the clayey nature of the surrounding subsoils will continue to prevent the contamination of the Waiarohia Stream

No changes to the discharge of treated wastewater to land from the base of the WWTP are requested through this application.

8.2 Assessment of Effects on the Environment

The current resource consent allows for the discharge of contaminants via seepage from the base of the treatment system. Resource consent condition 10 requires that:

Condition 10

The discharge of contaminants to land via seepage from the base of the treatment system shall not result in any adverse effects on the water quality of the Waiarohia Stream, as measured immediately downstream of either the treatment ponds or the constructed wetland system. For compliance purposes, the downstream water quality shall be compared with the water quality of immediately upstream of the constructed wetland…

Schedule 1 to the resource consent sets the sampling regime, as follows:

Schedule 1

On a quarterly basis, a sample of water shall be collected from the Waiarohia Stream at NRC sampling sites:

101579 Waiarohia Stream @ Above marsh, approximate location co-ordinated 1635907E 6069331N; and

101756: Waiarohia Stream @ Below marsh, approximate location co-ordinates 1635728E 6069372N.

These samples shall then be analysed for Escherichia coli concentration.

The upstream and downstream Escherichia coli concentration shall be compared after each sampling occasion to determine whether there is any adverse effect on the water quality of the Waiarohia Stream as a result of the discharge of contaminants to land via seepage from the base of the constructed wetland system (as regards condition 10).

This monitoring shall cease after a two year period if the results show that the discharge of contaminants to land via seepage from the base of the constructed wetland system is not having an adverse effect on the water quality of the Waiarohia Stream.

Samples of surface water from the Waiarohia Stream downstream and upstream of the WWTP wetland cells, (at LOC.100756 and LOC.101579 respectively, as shown in Figure 2 are taken on a frequent basis and at least quarterly

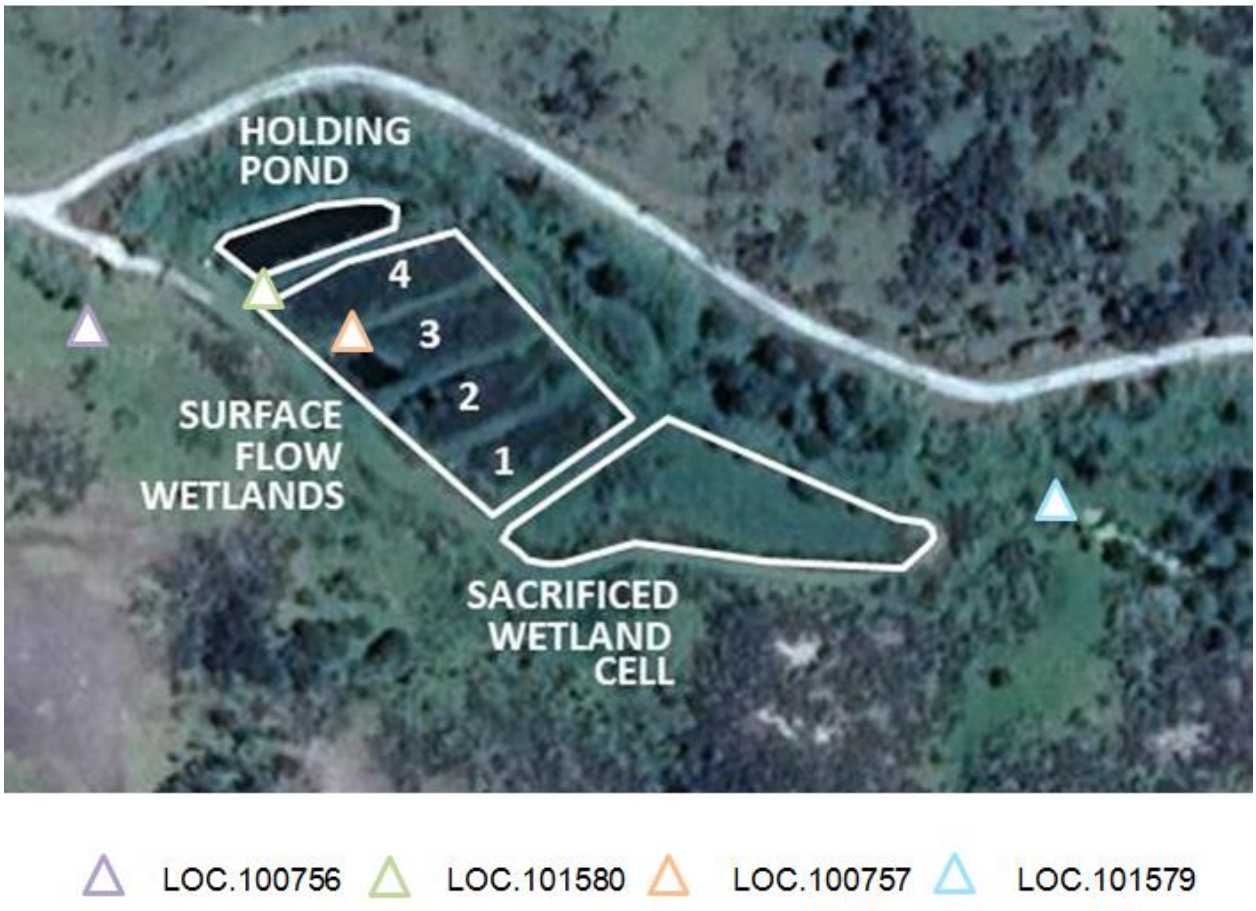

Figure 2 Opononi WWTP Sampling Sites

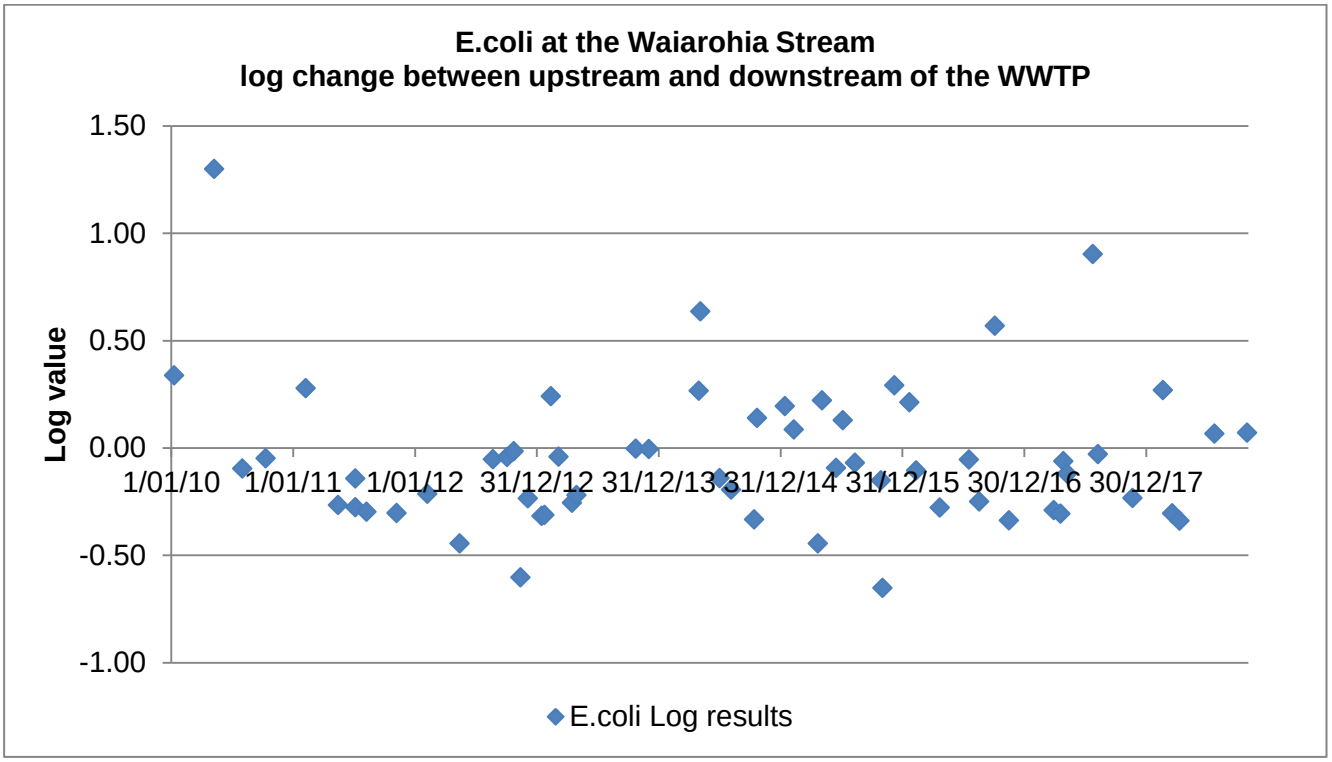

Figure 13 Scatter graph - E.coli log results from Waiarohia Stream

Using log base 10 to analyse bacteria data is useful because bacteria multiply exponentially. In this case an increase of 1 log has been used as a benchmark of an adverse effect. The data in Figure 13 displays the log increase (a positive value) or decrease (a negative value) between the sample point upstream of the WWTP and the sample point downstream of the WWTP. 60 samples from 61 present less than 1 log increase in bacteria indicating that the WWTP is not having an adverse effect on the water quality of the Waiarohia Stream

Infrequent faecal source tracking has been undertaken on the Waiarohia Stream, these results are collated below. The results indicate that E.coli present within the Waiarohia Stream are unlikely to be from a human source,

Date	Location (per lab sheet)	E.coli (MPN/100mL)	Results summary
15/04/2014	Downstream	299	• No human, ruminant or bird specific PCR markers were detected indicating the absence of fresh/recent human, ruminant or bird source.

			• These results suggest that faecal pollution from an unidentified source, other than those tested for, is present
14/04/2015	Opononi Downstream	2,046	• The ruminant specific marker was detected as present up to 100%. • Less dominant or degraded or no human source
06/07/2015	Waiarohia Stream, 50 metres upstream from bridge	N/A	• The ruminant specific marker was detected as present up to 50%. • Less dominant or degraded or no human source
06/07/2015	Waiarohia upstream	N/A	• The ruminant specific marker was detected as present between 10 and 50%. • Less dominant or degraded or no human source
06/07/2015	Waiarohia downstream	N/A	• The ruminant specific marker was detected as present up to 50%. • Less dominant or degraded or no human source
07/12/2015	Opononi Upstream	201	• Faecal contamination, source not identified
07/12/2015	Opononi Downstream	393	• Faecal contamination, ruminant source
07/12/2015	Opononi Bridge	404	• Faecal contamination, ruminant source

Figure 14 Faecal Source Tracking - Waiarohia Stream

The Waiarohia Stream – Potential Rehabilitation Project

The CLG has expressed concerns about the health of the stream and its proximity to, and use by a number of FNDC's assets. As a result of this interest staff have sought funding to improve the stream through the Annual Plan. This expenditure will need to be considered during the annual plan process.

9 THE DISCHARGE OF CONTAMINANTS, PRIMARILY ODOUR, TO AIR FROM THE WWTP

9.1 Description of Activities

All WWTPs and their operation have the potential to generate objectionable or offensive odour. No changes to the discharge of contaminants to air are requested through this application.

Condition 12 of the current resource consent requires that:

Condition 12

The consent holder's operations shall not give rise to any discharge of contaminants at or beyond the legal boundary of Lot 1DP 110735 and Lot 1 DP 167208 Blk VI Hokianga which is deemed by a suitably trained and experienced Enforcement Officer of the Regional Council to be noxious, dangerous, offensive or objectionable.

Schedule 1's Monitoring Programme – Section 6, Non-compliance with Consent Conditions requires that:

Schedule 1 Section 6

If the Consent Holder detects any noxious, dangerous, offensive or objectionable odours at the legal boundary of the treatment system then the Regional Council should be notified immediately.

The odour from the discharge into the Hokianga Harbour is controlled by Condition 11(c), as set out in Section 6, above.

9.2 Assessment of Effects on the Environment

FNDC keeps a register of odour complaints for all WWTPs. Over the period of this resource consent neither NRC nor FNDC has not received any complaints regarding odour from the WWTP or the discharge.

There is approximately 160 metres between the boundary of the WWTP at the detention pond and the nearest dwelling, the dwelling is elevated approximately 30 metres above the WWTP. The area is zoned by the Far North District Plan as Rural Production, and minimal further development around the WWTP should be expected.

The distance, vegetation and topography indicate that it is unlikely that the discharge of odour will have an adverse effect beyond the property boundary.

Provided that the treatment efficiency of the WWTP is maintained then the potential for objectionable or offensive odours, and the adverse effect of the discharge of contaminants to air, is minimal. Further, simple odour control measures are available should adverse odour be experienced during operations.

It is reasonable to conclude that the WWTP operations contributes a minimal odour discharge and unlikely to give rise to odours at or beyond the property boundary.

10 THE OCCUPATION AND USE OF THE BED OF THE HOKIANGA HARBOUR FOR THE WASTEWATER DISCHARGE PIPELINE

10.1 Description of Activities

Treated wastewater is discharged into the Hokianga Harbour via a discharge pipeline. The discharge pipeline extends off-shore in the general vicinity of the Waiarohia Stream confluence with the Hokianga Harbour. No changes to the design of the discharge pipeline are requested through this application.

The discharge pipeline is able to comply with the permitted activity criteria of Rule C.1.1.1, and the structure meets C.1.8, of the Commissioners' Recommendations Version of the Proposed Regional Plan, as follows:

C.1.8 - Coastal works general conditions	
1A) prior to undertaking activities on private land, including land owned by a territorial authority, written approval must be obtained from the landowner and provided to the Regional Council's monitoring manager upon request.	Not applicable.
2) Structures must at all times: a) be maintained in good order and repair, and b) except for culverts, not impede fish passage between fresh water and coastal water, for culverts there must be no perched entry or exit which prevents the passage of fish to upstream waterbodies or downstream to coastal water, except that temporary restrictions of fish passage may occur to enable construction works to be carried out; and c) not cause a hazard to navigation.	The discharge pipeline complies with these criteria.

3) Maintenance, alteration or addition to a structure must not result in a weakening of the structural integrity or strength of the structure.	Not applicable
4) Restrictions on public access along and through the coastal marine area beyond the footprint of the structure, during construction or disturbance for reasons of public health and safety, must not last more than seven days unless an alternate access route or controlled access is provided.	Not applicable
5) Disturbance activities, construction, alteration or addition, maintenance or removal activities must only be carried out during the hours between sunrise and sunset or 6.00am and 7.00pm, whichever occurs earlier, and on days other than public holidays. The exceptions to this are: a) the requirement to undertake emergency remedial work such as if a structure is damaged by a natural hazard event; and b) maintenance of regionally significant infrastructure, where the maintenance is required to be undertaken outside these times to minimise disruption to the services provided by the regionally significant infrastructure c) the removal of nuisance marine plant debris under rule C.1.5.4	The discharge pipeline complies with these criteria and is provided for as Regionally Significant Infrastructure

6) Upon the completion of a new structure, the structure owner must notify in writing (including a scale plan of the completed works) the regional council's monitoring manager.	Not applicable
7) All machinery, equipment and materials used for the activity must be removed from the foreshore and seabed at the completion of the activity. Additionally, vehicles and equipment must be in a good state of repair and free of any fuel or oil leaks. Refuelling must not be carried out in the CMA and for the duration of the activity, no vehicle or equipment is to be left in a position where it could come in to contact with coastal water.	Not applicable
8) There must be no damage to shellfish beds in mapped Significant Ecological Areas (refer I 'Maps')… .	The discharge pipeline complies with these criteria
9) Any visible disturbance of the foreshore or seabed must be remedied or restored within 48 hours of completion of works in a mapped (refer I 'Maps'): a) Area of Outstanding Natural Character Area, or a) Outstanding Natural Feature, or b) Site or Area of Significance to Tangata Whenua, or c) Significant Ecological Area.	Not applicable
9A) There must be no disturbance of indigenous or migratory nesting or roosting sites	The discharge pipeline complies with these criteria

10) Outside outstanding natural character, outstanding natural feature or significant ecological areas, any visible disturbance of the foreshore or seabed must be remedied or restored within seven days.	Not applicable
11) The structure or activity must not: a) cause permanent scouring or erosion of banks, or b) cause or exacerbate flooding of other property, or c) materially reduce the ability of a river to convey flood flows into the coastal marine area (including as a result of debris accumulating against structures).	Not applicable
13) Any discharges of sediment to water from any activity must not: a) occur for more than five consecutive days, and for more than 12 hours per day, or b) cause any conspicuous change in the colour of water in the receiving water or any change in horizontal visibility greater than 30% (after reasonable mixing) for more than 24 hours after the completion of the activity.	The discharge pipeline complies with these criteria

Table 3 - Coastal Works: General Conditions

Conditions 13-15 of the current resource consent allow for the occupation and use of the bed of the Hokianga Harbour for a wastewater discharge pipeline, as follows:

13 This consent only authorises the existing structure as installed at the date of the commencement of this consent.

14 The Consent Holder shall, within three months of the date of commencement of this consent forward to the Regional Council's Monitoring Senior Programme Manager and the representatives of the community liaison group required by Condition 21, a plan drawn by a registered surveyor that shows the location of the existing pipeline structure from State Highway 12 to the outlet of the pipeline

15 The pipeline shall be buried at all times and the structural integrity of the pipeline shall be maintained at all times. The Consent Holder shall undertake inspections of the bed of the Hokianga Harbour where the pipeline is installed and also the outlet of the pipeline at least once every two years, with the first inspection occurring within three months of the date of commencement of this consent. The Consent Holder shall give the representatives of the community liaison group required by Condition 21 at least seven days notice of the proposed inspection of the pipeline. A written report on the results of this inspection shall be forwarded to the Northland Regional Council's Monitoring Senior Programme Manager and the representatives of the Community Liaison Group by 1 May every two years from the date of commencement of this consent. The written report for the first inspection shall be forwarded with the plan required by Condition 14 to the Northland Regional Council's Monitoring Senior Programme Manager and the representatives of the community liaison group required by condition 21.

Advice note: Any maintenance or repair work on the discharge pipeline will need to meet the permitted activity criteria of Rule 31.4.4(f) of the Regional Coastal Plan for Northland or otherwise be the subject of an application for resource consent.

The discharge pipeline has been subject to dive inspections in 2009, 2012, 2013, 2015 and 2018 in order to ensure that the discharge pipeline is kept in good repair. The inspections conclude that the discharge pipeline is the same length and in the same location as surveyed in 2009 and that the discharge pipeline is in good condition.

10.2 Assessment of Effects on the Environment.

Habitat/Ecological

Because it is already in place, the discharge pipeline does not have an impact on plant, animal, or marine life. There are no known effects on the coastal processes in the area as a result of the existing structure. It is likely that any maintenance and/or repair to the discharge pipeline will be able to be undertaken within permitted activity criteria which have been designed to ensure minimal impact on habitat and ecology.

Natural Character

The discharge pipeline is located within an area of the coastal marine area (CMA) classified as having High Natural Character Values. There are no outstanding landscapes or outstanding natural features in the vicinity of the discharge pipeline. Within the CMA, the only visible part of the structure is a marker-buoy that indicates the location of the end of the discharge pipeline. The marker-buoy is a typical feature of the CMA in this area. The discharge pipeline as been in place since about 1982 and can now be considered to be part of the existing environment.

Navigation and Public Access

The continued presence of the jetty will not have an adverse effect on public access to or along the CMA. The coastal discharge pipe is buried and does not present any navigational issues.

Structural Integrity

FNDC undertake frequent inspections of the seabed to ensure that the pipeline remains buried and that its structural integrity, particularly at the discharge point, is assessed. Provided the pipeline remains buried and the structural integrity of the pipeline is maintained, the adverse effects from the occupation and use of the seabed for this pipeline are considered to be less than minor.

11 EFFECTS ON THE ENVIRONMENT - SOCIAL AND ECONOMIC WELLBEING

It is relevant to consider the positive effects associated the proposed discharge of treated wastewater when determining the overall effects associated with the activity. The WWTP provides an important and significant contribution to the social and economic wellbeing of the Opononi and Omapere communities.

The area's economy relies heavily on tourism and holiday-makers, especially during summer. According to the 2013 census 50% of the homes in the area are not permanently occupied and it can be assumed that the majority of these homes are holiday homes. The sewage reticulation network has allowed for the residential and economic development, such as for tourism, in the area that would have been more difficult if a connection to a reticulated sewage network were not available.

At the time that the original application was made for the WWTP, significant health and environmental risks were posed by failing on-site sewage systems; a WWTP presents an opportunity to manage and control these risks.

12 EFFECTS ON THE ENVIRONMENT – PUBLIC HEALTH

The vicinity of the discharge location is popular for recreational use, shell fish gathering and fishing. Given the small zone of reasonable mixing and the dynamics of the receiving environment it is reasonable to consider that adverse effects on water quality that have the potential to affect public health will be less than minor.

13 EFFECTS ON THE ENVIRONMENT – TANGATA WHENUA & CULTURAL VALUES

Statutory Acknowledgement Areas

The Hokianga Harbour is a Statutory Acknowledgement Area for Te Runanga O Te Rarawa. The likely effect on Te Runanga O Te Rarawa is on cultural values due to the mixing of wastewater with freshwater and the impacts on the mana and the mauri of the Hokianga Harbour.

Te Runanga O Te Rarawa has not been directly consulted in the preparation of this application but has been involved in the CLG where the continued discharge of wastewater

to the Hokianga Harbour and alternatives are discussed. Hapu and iwi management plans provide one useful mechanism for tangata whenua interests to be taken into account. Because Te Runanga O Te Rarawa does not have an Iwi Management Plan it is difficult to assess the scale of the effects of the discharge on cultural values. However. this application will be circulated to Te Runanga O Te Rarawa as a Statutory Acknowledgement. This will allow Te Runanga O Te Rarawa to determine the scale of the effects of the discharge on their cultural values.

Should Te Runanga O Te Rarawa express interest in discussing the effects of the activities on cultural values FNDC is willing and able to undertake this consultation.

Tangata Whenua

Issues and policies of available hapu and iwi management plans relevant to the location of the WWTP and associated activities are discussed below:

Te Kahukura a Ngati Korokoro, Ngati Wharara me Te Pouka. Nga hapū o Te Wahapū o Te Hokianga-nui o Kupe.[13] Hapu Environmental Management Plan

Ngāti Korokoro, Ngāti Wharara and Te Poukā have never consented to the continued use of waterways and especially the Hokianga to discharge human waste.

However the Hapū recognise the importance of forming partnerships with FNDC and NRC to monitor household septic systems and assist where required either by providing information or practical solutions. This partnership includes the Opononi/Omapere wastewater treatment system.

A collective approach and shared responsibility to these major problems will advance the cultural, public and economic welfare concerns of the area. Our focus and commitment will be to work collectively with Councils and to investigate land based options (dual system), limit the amount of discharge to water, enhanced water quality and to monitor the effectiveness of the present Opononi/Omapere wastewater system.

Issues

- Discharge to waterways and sea is culturally offensive and degrading;

[13] https://www.fndc.govt.nz/services/maori-development/hapu-and-iwi-management-plans/Tuhinga-Hapu-IMP.pdf

- Continued housing and commercial developments;
- Increased public water demand increases wastewater discharge.
- No dual (land and sea) effluent discharge system at Opononi/Omapere site.
- Poor effluent discharge quality

Policy

- Limit effluent discharge to sea.
- Increase effluent discharge quality
- That land base effluent discharge systems and other effluent treatment options be investigated, i.e. UV radiation, spray irrigation.

Methods

The Pākanae Resource Management Committee will:

- Work collectively with FNDC on effluent discharge options and discharge quality of the Opononi/Omapere system.

It is well understood by FNDC that the discharge of wastewater to fresh water, regardless of how well it is treated before it is discharged, is culturally unacceptable in te ao Maori. It is clear from the Hapu Management Plan that discharge to land is preferred over discharge to the Hokianga Harbour, and that any discharge to the sea should be of a limited volume and of a high quality.

Based on the information and preferences provided by the Hapu Management Plan, it is reasonable to conclude that the continued discharge of wastewater from the WWTP will have a less than minor effect on the hapu cultural values.

Members of the hapu have worked closely with FNDC over the term of the current resource consent to investigate land based effluent discharge systems and treatment options to increase the discharge quality and can be commended for their endurance and commitment.

14 NATURAL HAZARDS

14.1 Coastal Erosion Hazard

Coastal Erosion Hazard Zones (CEHZ) have been established by NRC[14]. The CEHZ documentation includes three periods for information on hazards to plan for future development:

- 2015 CEHZ (current)
- 2065 CEHZ (50 years)
- 2115 CEHZ (100 years)

2015 CEHZ represents short term erosion extents including associated dune instability. The 2065 and 2115 CEHZ periods represent the long term recession of frontal dunes and the landward retreat of the coastline due to future sea level rise. The 2065 CEHZ represents an erosion extent with a 66% probability of being exceeded at 2065. The 2115 CEHZ represents a value with a 5% probability of being exceeded at 2115.

2115 CEHZ

Assessing the risk against the 2115 CEHZ was not considered necessary given the zone represents a potential erosion scenario that is outside the replacement life of the core reticulation assets. It can be expected that the assets will have been relocated (if necessary) as part of the normal reticulation renewals programme well before the potential erosion scenario occurs.

2065 CEHZ

GIS software was used to locate core assets (pipelines and pump stations) located seaward of the 2065 CEHZ. The results of the analysis indicate that approximately 930 metres of the Opononi-Omapere reticulation network is located seaward of the 2065 CEHZ. Approximately 110 metres of that extent is located within the current 2015 CEHZ. No pump stations are situated within the 2015 CEHZ extent. The extent located seaward of the 2065 CEHZ represents approximately 7% of the (approximately) 13.5 kilometres of reticulation network comprising the Opononi-Omapere wastewater reticulation network.

[14] Coastal Erosion Hazard Zone Assessment for Selected Northland Sites - 2017 Update. December 2017. Prepared By Tonkin and Taylor Limited.

2015 CEHZ

With regard to the extent of the network located within the 2015 CEHZ, FNDC will continue to undertake routine inspections of the potentially affected sections of reticulation to monitor the rate of erosion.

The potentially affected assets are located on the seaward side of State Highway 12. These assets can be practicably relocated to the landward side of the carriageway should monitoring indicate the assets are at risk of becoming exposed. Taking into account FNDC's risk management response to the above described erosion hazards, it is considered that the risks to the reticulation network presented by coastal erosion both currently and as a result of future climate change will be managed appropriately.

Maps depicting the output of the assessments are attached as Appendix 4.

FNDC's response to the effects of climate change on coastal hazards is set out in Section 14.4.

14.2 Coastal Flood Hazards

Coastal Flood Hazard Zones (CFHZ) have been established by NRC. These have been mapped based on the extreme static water levels caused by storm tide, wave set-up and the effects of sea level rise. The CFHZ have been established with the same periods as the CEHZ and are summarised as follows:

- 2015 CFHZ (current):Extent of 1% Annual Exceedance Probability (AEP) static water level at 2015
- 2065 CFHZ (50 years): Extent of 2% (AEP) static water level at 2065
- 2115 CFHZ (100 years). Extent of 1% (AEP) static water level at 2115

2015 and 2065 CFHZ

GIS software was used to locate core assets (pipelines and pump stations) located within the 2065 CFHZ extent. The results of the analysis indicate that approximately 428 metres of the reticulation network is located within the 2065 CFHZ extent. The extent located within 2065 CFHZ represents approximately 3% of the reticulation network. Approximately 33 metres of that length is located within the 2015 CFHZ. No pump stations are located within the 2015 CFHZ and one pump station is situated within 2065 CFHZ (the northern-most pump station).

With the above considered, a very small portion of the pipe network and a single pump station is likely to be exposed to coastal flooding by 2065.

FNDC will manage these risks in accordance with its 30 Year Infrastructure Strategy and the decision making process required under the Local Government Act 2002 as discussed in Section 14.4.

With regard to the section of network exposed to current coastal flooding hazards, this represents an extremely small section of the network and it is considered unlikely that coastal flooding events represented by the 2015 CFHZ will give rise to any material effect on the wastewater network.

14.3 Extreme Rainfall

Wastewater networks can be affected by extreme rainfall events due to significant stormwater flows entering the system and increased groundwater infiltration into pipes. In extreme cases, where wastewater networks have relatively high stormwater inflow and infiltration, severe weather events can result in the network being overloaded, resulting in network overflows. Extreme inflow and infiltration events can also reduce the treatment capacity of the wastewater treatment plant by reducing residence time as a result of significant increases in wastewater flows.

The magnitude and frequency of storm events is predicted to increase as a result of global warming. An increase in the magnitude and frequency of storm events may potentially increase the magnitude and frequency of wastewater overflows due to inflow and infiltration.

The High Intensity Rainfall Design System (HIRDS) can estimate high intensity design rainfall depths at any point in New Zealand. It can be used for assessing storm rarity and for hydrological design purposes. HIRDSv4 has been used to predict the changes in extreme rainfall intensity and duration in at Opononi.

Output tables include predicted changes in rainfall depth based on the four climate change scenarios ‘Representative Concentration Pathways’ by the Intergovernmental Panel on Climate Change (IPCC). Representative Concentration Pathways represent different climate change mitigation scenarios, one (RCP2.6) leading to very low anthropogenic greenhouse gas concentrations (requiring removal of CO_2 from the atmosphere), two stabilisation

scenarios (RCPs 4.5 and 6.0), and one (RCP8.5) with very high greenhouse gas concentrations. Therefore, the Representative Concentration Pathways represent a range of twenty first century climate policies. HIRDSv4 output table for the RCP8.5 scenario is provided in Table 4 below[15].

ARI (years)	Duration						
	30m	2h	6h	12h	24h	48h	72h
2	17.6 (9.7)	32.2 (9)	48.8 (7.6)	61.9 (6.6)	77.1 (5.8)	94.3 (5)	105 (3.8)
5	22.9 (10)	42.1 (9.5)	64.1 (8.3)	81.4 (7.2)	101 (5.7)	124 (4.8)	139 (5)
10	26.8 (10.1)	49.4 (9.7)	75.4 (8.4)	96 (7.5)	120 (6.7)	147 (5.4)	165 (5.5)
20	30.7 (10.1)	57 (9.8)	87.2 (8.6)	111 (7.2)	139 (6.5)	171 (5.8)	191 (5.2)
30	33.1 (10.3)	61.5 (9.9)	94.3 (8.7)	120 (7.5)	150 (6.7)	185 (5.9)	207 (5.3)
50	36.2 (10.2)	67.3 (10)	103 (8.4)	132 (7.6)	165 (6.7)	204 (5.9)	228 (5.3)
100	40.4 (10.4)	75.3 (10)	116 (8.6)	148 (7.4)	186 (7)	229 (5.7)	257 (5.4)

Table 4 HIRDSv4 projected rainfall depth duration frequency statistics for Opononi based on RCP8.5 for the period 2031-2050.

Based on the output from the HIRDSv4 RCP8.5 scenario, it is projected that for the period 2031-2050 rainfall depths associated with extreme rainfall events will increase by 7% to 10% for events less than 12 hours in duration and between 4% and 5% for events occurring over a period of between 24 hours and 72 hours.

Overflows within the network associated with rainfall events are extremely uncommon. Although the WWTP does experience high inflow during extreme rainfall events, it is considered that the changes in rainfall extremes identified above are unlikely to materially affect the capacity of the network or the WWTP.

[15] Values in each column are in are rainfall depth in millimetres. Values in parentheses are the percentage increase in depth compared current day statistics.

14.4 Managing the effects of natural hazards

The Far North District Council 30 Year Infrastructure Strategy sets out the need to manage change as a result of climate change as a strategic priority. The 30 Year Infrastructure Strategy identifies responses to climate change impacts on infrastructure that requires active management alongside affected communities throughout the term of the strategy. Responses to climate change will likely be varied, ranging from relocating affected assets through to managed retreat and associated reduction in levels of service. These are significant decisions that will potentially result in major impacts on Far North communities.

The assessments provided in Sections 14.1, 14.2, and 14.3 has identified that a small portion of the Opononi Omapere network is likely to be affected by coastal flooding and erosion by 2065. The 30 Year Infrastructure Strategy sets out a strategic commitment to ensure the resilience of the wastewater network is improved taking into account the impacts of climate change.

The decisions made by FNDC will require consultation within the community in accordance with the Local Government Act 2002, and it is not possible at this time to confirm what those management approaches might entail. Taking into account the relatively low risk to the network associated with anticipated climate change impacts, it is not considered necessary to do so for the purpose of this resource consent application, particularly given the most extreme impacts are unlikely to occur within the term of the replacement resource consent.

15 NOTIFICATION AND AFFECTED PARTY ASSESSMENT

Based on the Assessment of Environmental Effects carried out above it is reasonable to conclude that the continued operation of the WWTP will have a no more than minor effect on the environment and that public notification is not required by the Act.

Section 95B of the Act is used to determine whether to give limited notification to an application.

Step 1: Certain Affected Groups and Affected Persons must be notified

The application must be limited notified to the relevant persons if the following is determined:

(1) Determine whether there are any—

(a) affected protected customary rights groups; or

(b) affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity).

(2) Determine—

(a) whether the proposed activity is on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11; and

(b) whether the person to whom the statutory acknowledgement is made is an affected person under section 95E.

There are no protected customary rights groups, or customary marine title groups.

As discussed in Section 13 the Hokianga Harbour is a Statutory Acknowledgement Area for Te Runanga O Te Rarawa. It is appropriate for Te Runanga O Te Rarawa to determine whether the scale of effects of the discharge on its cultural values and it is the role of the Consent Authority to decide whether Te Runanga O Te Rarawa is an affected person.

Step 2: Limited Notification Precluded in Certain Circumstances

(1) The criteria for Step 2 are as follows:

(a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:

(b) the application is for a resource consent for either or both of the following, but no other, activities:

(i) a controlled activity that requires consent under a district plan (other than a subdivision of land):

(ii) a prescribed activity (see section 360H(1)(a)(ii)).

There is no rule in the plan or national environmental standard that precludes notification. The application is not a controlled activity or a prescribed activity. Therefore Step 2 does not apply and Step 3 must be considered.

Step 3: Certain Other Affected Persons must be notified

An assessment under section 95E to determine affected persons must occur in the following circumstances: (1) Determine whether, in accordance with section 95E, the following persons are affected persons:

(a) in the case of a boundary activity, an owner of an allotment with an infringed boundary; and

(b) in the case of any activity prescribed under section 360H(1)(b), a prescribed person in respect of the proposed activity.

The activity is not a boundary activity, or prescribed activity. The activities will have a less than minor effect on any adjacent properties.

Overall, the adverse effects on any persons are considered to be less than minor. Accordingly, it is considered that the this application will have less than minor adverse effects on any persons and therefore Step 3 does not apply and Step 4 is to be considered.

Step 4: Further Notification and Special Circumstances

The council must determine the following: whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under section 95E as not being affected persons)

It is considered that there are no special circumstances that would warrant the notification of this application to any other persons.

Overall, from the assessment undertaken, Steps 1-4 do not apply and there are no identified affected persons.

16 DURATION OF CONSENT

A 35 year consent term is considered reasonable and is requested.

Because of the similarities between the consent duration policies of the operative plans and the PRP, and the weight that can now be given to the policies of the PRP, only the policies of the PRP have been assessed below.

Policy D.2.12 of the PRP provides that in determining the term of consent, particular regard must be had to the matters discussed below.

Matter	Comment
1) the security of tenure for investment (the larger the investment, the longer the consent duration), and	It is difficult to apply this provision without a scale or definition of 'large investments' to compare the capital spend for this investment to, however financially this is a significant investment for FNDC and for Opononi and Omapere residents. The consent is for a WWTP, which is an essential and permanent activity. Security of the tenure is imperative for this activity. It is relevant to note that resource consents are considered council assets and the LGA 2002 requires that all assets are depreciated. Depreciation is funded by rates. The value of a resource consent is determined by the capital cost of gaining the initial or previous consent (e.g., the application process) and the rates are set per year of the consent duration. Put simply, a five year resource

	consent term will require the depreciation value of the consent to be rated over five years which will result in higher rates than if the consent has a 35 year term and is rated over 35 years.
2) The administrative benefits aligning the expiry date with other resource consents for the same activity in the surrounding area or catchment, and	There are three other WWTPs that discharge into the Hokianga Harbour. These consents have either expired (i.e., Kohukohu WWTP) or will expire in the next five years and therefore the alignment of expiry dates with other WWTPs in the catchment is not considered reasonable in this instance.
3) Certainty of effects (the less certain the effects, the shorter the consent duration).	The activities have been determined to have a less than minor effect on the receiving environment. Monitoring and reporting are likely to be recommended in the consent conditions. A Section 128 review condition is a standard provision, and it will enable the Northland Regional Council to address any issues.
4) whether the activity is associated with regionally significant infrastructure (generally longer consent durations for regionally significant infrastructure), and	The WWTP is considered Regionally Significant Infrastructure.
5) the following additional matters where the resource consent application is to re-consent an activity:	As discussed in Section 6, while trigger values have been exceeded FNDC has been compliant with resource consent

a) the applicant's past compliance with the conditions of any previous resource consent or relevant industry guidelines or codes of practice (significant previous non-compliance should generally result in a shorter duration), and b) the applicant's voluntary adoption of good management practice (the adoption of good management practices that minimise adverse environmental effects could result in a longer consent duration).	conditions. The WWTP is operated in accordance with national industry standards.

17 STATUTORY ASSESSMENT

17.1 Section 104(1) (a) of the Act

Section 104(1)(a) requires that when considering an application for a resource consent, the consent authority must, subject to Part 2, have regard to 'any actual and potential effects on the environment of allowing the activity'. An assessment of the adverse effects of the proposed activities is set out above. It is reasonable to conclude that the adverse effects on the environment are less than minor.

17.2 Section 104(1) (b) of the Act

Section 104(1) (b) of the Act requires that when considering an application for a resource consent, the council must, subject to Part 2, have regard to any relevant provisions of the following:

Document	Reference
National Environmental Standard (NES)	NES for Air Quality is not applicable
National Policy Statement (NPS)	• NPS for Freshwater Management • NPS Urban Development Capacity
New Zealand Coastal Policy Statement (NZCPS)	The NZCPS is applicable
Regional Policy Statement or proposed Regional Policy Statement (RPS)	Regional Policy Statement for Northland
Plan or Proposed Plan	• Regional Water and Soil Plan for Northland • Regional Air Quality Plan for Northland • Regional Coastal Plan for Northland • Proposed Regional Plan for Northland (Commissioners' Recommendation Version)

17.2.1 National Policy Statement for Freshwater Management

The provisions of the National Policy Statement for Freshwater Management (NPS Freshwater Management) that are relevant to this application have been assessed below.

Provision	Comment
Objective A1 To safeguard: a) the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and b) the health of people and communities, as affected by contact with fresh water; in sustainably managing the use and development of land, and of discharges of contaminants.	The WWTP and associated activities demonstrate sustainable management while safeguarding the health of people and communities.
Objective A2 The overall quality of fresh water within a freshwater management unit is maintained or improved while: (a) protecting the significant values of outstanding freshwater bodies; (b) protecting the significant values of wetlands; and (c) improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.	The Hokianga Harbour is not an outstanding freshwater body, wetland or degraded source.
Objective A4 To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quality, within limits.	The WWTP allows for the Opononi and Omapere community to provide for its economic-wellbeing.

Table 5 - NPS Freshwater Management

17.2.2 National Policy Statement on Urban Development Capacity 2016

The National Policy Statement on Urban Development Capacity (NPS UDC) recognises the national significance of:

a) Urban environments and the need to enable such environments to develop and change; and
b) Providing sufficient development capacity to meet the needs of people and communities and future generations in urban environments.

The objectives of the National Policy Statement on Urban Development Capacity (NPS UDC) apply to all local authorities.

The policies of the NPS UDC apply where medium growth or high growth urban areas exist, or to an urban environment that is expected to experience growth. Opononi and Omapere do not meet the requirements of the definitions of medium-growth or high-growth urban areas. ForecastID[16] demonstrates that Opononi and Omapere will not experience growth over the period to 2043.

The following, Table 6, is an assessment of relevant objectives that apply to all decision-makers when making planning decisions that affect an urban environment:

[16] https://forecast.idnz.co.nz/far-north/Population-households-dwellings?WebID=250

Objective	Comment
Outcomes for Planning Decisions – OA1 Effective and efficient urban environments that enable people and communities and future generations to provide for their social, economic, cultural and environmental wellbeing	As demonstrated in Section 11, the WWTP enables people and communities to provide for their social, economic, cultural and environmental wellbeing.
Responsive Planning - OC1 Planning decisions, practices and methods that enable urban development which provides for the social, economic, cultural and environmental wellbeing of people and communities and future generations in the short, medium and long-term.	The consent authority's decision on this application must enable urban development. As demonstrated in Section 11, the social, economic, cultural and environmental wellbeing of people and communities and future generations in the short, medium and long-term will is provided for by the WWTP.

Table 6 - NPS Urban Development Capacity

17.2.3 New Zealand Coastal Policy Statement:

Objective	Comment
Objective 1 To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by: • maintaining or enhancing natural biological and physical processes in the coastal environment and recognising their dynamic, complex and interdependent nature; • protecting representative or significant natural ecosystems and sites of biological importance and maintaining the diversity of New Zealand's indigenous coastal flora and fauna; and • maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity.	The WWTP and associated activities work to maintain coastal water quality.

Objective 2 To preserve the natural character of the coastal environment and protect natural features and landscape values through: • recognising the characteristics and qualities that contribute to natural character, natural features and landscape values and their location and distribution; • identifying those areas where various forms of subdivision, use, and development would be inappropriate and protecting them from such activities; and • encouraging restoration of the coastal environment.	The natural character of the coastal environment is not affected by the WWTP or its associated activities.
Policies	**Comment**
Policy 2 - The Treaty of Waitangi, tangata whenua and Māori heritage In taking account of the principles of the Treaty of Waitangi (Te Tiriti o Waitangi), and kaitiakitanga, in relation to the coastal environment: a. recognise that tangata whenua have traditional and continuing cultural relationships with areas of the coastal environment, including places where they have lived and fished for	This application takes the relevant Hapu Management Plan into account.

generations; … … e. take into account any relevant iwi resource management plan and any other relevant planning document recognised by the appropriate iwi authority or hapū and lodged with the council, to the extent that its content has a bearing on resource management issues in the region or district; and …	
Policy 6 - Activities in the coastal environment 1. In relation to the coastal environment: a. recognise that the provision of infrastructure, the supply and transport of energy including the generation and transmission of electricity, and the extraction of minerals are activities important to the social, economic and cultural well-being of people and communities; … 2. Additionally, in relation to the coastal marine area: …	As discussed in Section 11 the WWTP is important to the social, economic and cultural well-being of the Opononi and Omapere community. The discharge pipeline has a functional need to be located within the coastal environment.

1. recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places.	
Policy 13 Preservation of natural character 1. To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use, and development: …avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural character in all other areas of the coastal environment; including by	The discharge pipeline avoids significant adverse effects on natural character.
Policy 23 Discharge of contaminants 1. In managing discharges to water in the coastal environment, have particular regard to: a. the sensitivity of the receiving environment; b. the nature of the contaminants to be discharged, the particular concentration of contaminants needed to achieve the required water quality in the receiving environment, and the risks if that concentration of contaminants is	1. The listed parameters have been taken into account in this application. It has been determined in Section 7.4 that the discharge will have a no more than minor effect on the receiving environment. 2. An assessment of the alternatives has been undertaken and it has been determined that discharge into the coastal environment remains the best practicable option.

exceeded; and c. the capacity of the receiving environment to assimilate the contaminants; and: d. avoid significant adverse effects on ecosystems and habitats after reasonable mixing; e. use the smallest mixing zone necessary to achieve the required water quality in the receiving environment; and f. minimise adverse effects on the life-supporting capacity of water within a mixing zone. 2. In managing discharge of human sewage, do not allow: a. discharge of human sewage directly to water in the coastal environment without treatment; and b. the discharge of treated human sewage to water in the coastal environment, unless: i. there has been adequate consideration of alternative methods, sites and routes for undertaking the discharge; and ii. informed by an understanding of tangata whenua values and the effects on them.…	

Table 7 New Zealand Coastal Policy Statement

17.2.4 Regional Policy Statement for Northland

The Regional Policy Statement for Northland (RPS) aims to promote the sustainable management of Northland's natural and physical resources, with a focus on key management issues such as water quantity and quality, biodiversity, economic potential and social wellbeing, infrastructure, natural hazard risk and natural character.

Objective	Comment
3.7 Regionally Significant Infrastructure Recognise and promote the benefits of regionally significant infrastructure, (a physical resource), which through its use of natural and physical resources can significantly enhance Northland's economic, cultural, environmental and social wellbeing.	The WWTP is regionally significant infrastructure as defined in the Regional Policy Statement. The provision of this infrastructure provides for economic, cultural, environmental and social wellbeing benefits to Opononi and Omapere.
3.10 Use and allocation of common resources Efficiently use and allocate common natural resources, with a particular focus on: a. Situations where demand is greater than supply; b. The use of freshwater and coastal water space; and c. Maximising the security and reliability of supply of common natural resources for users	The WWTP and its associated activities represent and efficient use and allocation of the natural resource.
3.14 - Natural character, outstanding natural features, outstanding natural landscapes and historic heritage.	The discharge pipeline and discharge itself is located within an area recognised as having high natural character.

Identify and protect from inappropriate subdivision, use and development; a. The qualities and characteristics that make up the natural character of the coastal environment, and the natural character of freshwater bodies and their margins; b. The qualities and characteristics that make up outstanding natural features and outstanding natural landscapes; …	As discussed in Section 10, the WWTP and associated activities do not have an adverse effect on the natural character of the receiving environment.
Policy	**Comment**
Managing effects on natural character, features / landscapes and heritage	
4.6.1 Policy – Managing effects on the characteristics and qualities natural character, natural features and landscapes (1) In the coastal environment: … b) Where (a) does not apply, avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of subdivision, use and development on natural character, natural features and natural landscapes. Methods which may achieve this include: …	The discharge pipe is located within an area recognised as having high natural character values. As discussed in Section 10, the WWTP and associated activities do not have an adverse effect on the natural character of the receiving environment. The discharge pipeline was lawfully established before the area was established as having high natural character values and the discharge pipe is not visible within the landscape.

(3) When considering whether there are any adverse effects on the characteristics and qualities of the natural character, natural features and landscape values in terms of (1)(a), whether there are any significant adverse effects and the scale of any adverse effects in terms of (1)(b) and (2), and in determining the character, intensity and scale of the adverse effects: a. Recognise that a minor or transitory effect may not be an adverse effect; b. Recognise that many areas contain ongoing use and development that: i. Were present when the area was identified as high or outstanding or have subsequently been lawfully established ii. May be dynamic, diverse or seasonal; c. Recognise that there may be more than minor cumulative adverse effects from minor or transitory adverse effects; and d. Have regard to any restoration and enhancement on the characteristics and qualities of that area of natural character, natural features and/or natural landscape.	

Efficient use of coastal water space	
4.8.1 Policy – Demonstrate the need to occupy space in the common marine and coastal area (1) Only consider allowing structures, the use of structures and other activities that occupy space in the common marine and coastal area where: a. They have a functional need to be located in the common marine and coastal area, unless the structure, use or activity is consistent with Policy 4.8.1(2); b. It is not feasible for the structure, the use or the occupation of space to be undertaken on dry land (land outside the common marine and coastal area), unless it is consistent with Policy 4.8.1(2); c. It is not feasible to use an existing authorised structure; and the area occupied is necessary to provide for or undertake the intended use. … 3) If the public are excluded from using a structure or common marine and coastal area, the exclusion is: a. Only for the time period(s) and the area necessary to provide for or	The discharge pipe serves a wastewater discharge into the coastal environment and therefore has a functional need to be located within the CMA. It is highly unlikely that the general public are able to, or want to access the discharge pipeline or the area of the seabed that the discharge pipeline occupies.

undertake the intended use ;or b. Necessary to ensure the integrity of the structure; or c. Necessary to ensure the health and safety of the public.	
4.8.4 Policy – Private use of common marine and coastal area Recognise activities which provide a net gain in environmental and / or public benefit from persons occupying space in the common marine and coastal area.	The WWTP and associated discharge pipeline provide for the social and economic wellbeing of the public.
Effective and efficient infrastructure	
5.2.2 Policy – Future-proofing infrastructure Encourage the development of infrastructure that is flexible, resilient, and adaptable to the reasonably foreseeable needs of the community	The WWTP and associated activities allow for resilience and adaptability for the reasonably foreseeable needs of the community. The increased peak discharge volume will allow for flexible use of the WWTP for the reasonably foreseeable needs of the community.
5.2.3 Policy – Infrastructure, growth and economic development. Promote the provision of infrastructure as a means to shape, stimulate and direct opportunities for growth and economic development.	The provision of a wastewater network and WWTP works to shape, stimulate and direct opportunities for growth and economic development.

Regionally Significant Infrastructure	
Policy 5.3.1 Identifying regionally significant infrastructure. The regional and district councils shall recognise the activities identified in Appendix 3 of this document as being regionally significant infrastructure.	Appendix 3 Section 1 (h) of the RPS recognises wastewater trunk lines and treatment plants as Regionally Significant Infrastructure. The policy allows for the benefits of the WWTP to be weighed against any adverse effects.
Policy 5.3.2 Benefits of regionally significant infrastructure. Particular regard shall be had to the significant social, economic, and cultural benefits of regionally significant infrastructure when considering and determining resource consent applications or notices of requirement for regionally significant infrastructure.	The intent of this policy is to assist regionally significant infrastructure when it comes to the overall judgement to be made in terms of Section 5 of the Act, during the resource consent process, by providing clear recognition of the social, economic and cultural benefits of regionally significant infrastructure. As discussed in Section11, the WWTP provides significant social, economic and cultural benefits to Opononi and Omapere

Policy 5.3.3 Managing adverse effects arising from regionally significant infrastructure….where: … 3. When managing the adverse effects of regionally significant infrastructure decision makers will give weight to: a. The benefits of the activity in terms of Policy 5.3.2; b. Whether the activity must be recognised and provided for as directed by a national policy statement; c. Any constraints that limit the design and location of the activity, including any alternatives that have been considered which have proven to be impractical, or have greater adverse effects; d. Whether the proposal is for regionally significant infrastructure which is included in Schedule 1 of the Civil Defence Emergency Management Act as a lifeline utility and meets the reasonably foreseeable needs of Northland. e. The extent to which the adverse effects of the activity can be practicably reduced. Such an assessment shall also take into account appropriate measures, when	This policy provides guidance on matters to be considered when assessing proposals for regionally significant infrastructure. … a. Policy 5.3.2 is discussed, above. b. The provision of this infrastructure is provided for by the NPS UDC c. Alternatives have been considered and are outlined in Section 7, above. d. The infrastructure is a lifeline utility in accordance with Part B of Schedule 1 of the Civil Defence Emergency Management Act 2002, as an entity that provides a wastewater or sewerage network that disposed of sewage … . Section 7.2 discusses the ways that the infrastructure meets the reasonably foreseeable needs of the community. e. There are no anticipated adverse effects as a result of these activities. FNDC is considering rehabilitation of the Waiarohia Stream, as discussed above. f. There are no identified significant adverse effects anticipated as a result of these activities. g. No direct effect on development and land use is anticipated.

offered, to provide positive effects, either within the subject site or elsewhere provided that the positive effects accrue to the community of interest and / or resource affected; and f. Whether a monitoring programme for any identified significant adverse effects with unknown or uncertain outcomes could be included as a condition of consent and an adaptive management regime (including modification to the consented activity) is used to respond to such effects. g. Whether the infrastructure proposal helps to achieve consolidated development and efficient use of land.	

Table 8 Regional Policy Statement for Northland

The WWTP and associated activities are consistent with the RPS as they supports economic and social wellbeing by providing vital services to the Opononi and Omapere townships, while ensuring that any adverse effects on the environment are mitigated or avoided.

17.2.5 Regional Water and Soil Plan for Northland.

The objectives and policies of the Regional Water and Soil Plan for Northland, which are relevant to the activities, are set out below:

Section 6 Recognition of and provision for Maori and their culture and traditions	
Objective	**Comment**
6.3.1 The management of the natural and physical resources within the Northland region in a manner that recognises and provides for the traditional and cultural relationships of tangata whenua with the land and water.	The relevant Hapu Management Plan has been taken into account in this application. Alongside Tangata Whenua FNDC have investigated alternative options for this discharge and have determined that discharge to water is the best practicable option.
Policy	**Comment**
6.4.1 To recognise and, as far as practicable provide for the relationship of Maori and their culture and traditions with respect to the use, development and protection of natural and physical resources in the Northland region.	The relevant Hapu Management Plan has been taken into account in this application. Alongside Tangata Whenua FNDC have investigated alternative options for this discharge and have determined that discharge to water is the best practicable option.
Section 7 Water Quality Management	
Policy	**Comment**
7.5.4.4.	This policy implemented via the process of deciding on discharge permit applications

The Council will not grant a discharge permit which, either on its own or in combination with other lawful discharges, will result in any of the following effects in the receiving water, after reasonable mixing: a) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; b) Any conspicuous change in the colour or visual clarity; c) Any emission of objectionable odour; d) The rendering of freshwater unsuitable for consumption by farm animals. Except where: i. exceptional circumstances justify the granting of a permit; or ii. the discharge is of a temporary nature; or iii. the discharge is associated with necessary maintenance work …	under s.105 of the Act. As demonstrated in Section 6.1, above, the discharge to water does not result in any of the listed effects.
Transitional Policy 7.8 1. When considering any application for a discharge the consent authority must have regard to the following matters:	The effects of the discharge on the listed parameters are discussed in Section 6.3, above. There are no anticipated adverse effects on the listed parameters as a result of the discharge.

(a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water and (b) the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided.	
2. When considering any application for a discharge the consent authority must have regard to the following matters: (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their secondary contact with fresh water; and (b) the extent to which it is feasible and dependable that any more than minor adverse effect on the health of people and communities as affected by their secondary contact with fresh water resulting from the discharge would be avoided.	The effects of the discharge on the listed parameters are discussed in Section 6.3, above. There are no anticipated adverse effects on the listed parameters as a result of the discharge.

8 Discharges	
Objective	**Comment**
8.6 1. The effective treatment and/or disposal of contaminants from new and existing discharges in ways which avoid, remedy or minimise adverse effects on the environment and on cultural values.	The WWTP allows for effective treatment and disposal of contaminants.
8.6.2. The reduction and minimisation of the quantities of contaminants entering water bodies, particularly those that are potentially toxic, persistent or bio-accumulative.	As discussed in Section 7.2 above, the wastewater discharge is minimised to the extent possible for infrastructure of this nature.
Policy	
8.7.2 To require by the year 2004 or according to an upgrading programme established as part of the conditions on a discharge permit all existing discharges of sewage or discharges with a high organic content to be: (a) By land disposal; or (b) To water, if after reasonable mixing: (i) it does not cause a discernible adverse change in the	As discussed in Sections 6.3 and 7, above the discharge of wastewater to the Hokianga Harbour is considered the best practicable option for discharge. The discharge does not result in adverse change of the listed parameters after reasonable mixing.

physicochemical and/or microbiological water quality of the receiving water at the time of discharge; and (ii) it is the best practicable option (as defined by Section 2 of the Act)	

Table 9 Regional Water and Soil Plan for Northland

17.3 Regional Air Quality Plan for Northland

Discharges Of Contaminants To Air	
Objective	**Comment**
6.6.1 The sustainable management of Northland's air resource including its physical, amenity and aesthetic qualities by avoiding, remedying or mitigating adverse effects on the environment from the discharge of contaminants to air.	There are no anticipated adverse effects to the air resource as a result of the discharge of odours to air.
Policy	**Comment**
6.7.1 To recognise and, as far as practicable provide for the relationship of Maori and their culture and traditions with respect to the use, development and protection of natural and physical resources in the Northland region.	There are no anticipated adverse effects to the air resource as a result of the discharge of odours to air.

17.4 Regional Coastal Plan for Northland

7 Preservation of Natural Character	
Objective	**Comment**
7.3 The preservation of the natural character of Northland's coastal marine area, and the protection of it from inappropriate subdivision, use and development.	The discharge pipe is located within an area recognised as having high natural character values. As discussed in Section 10, the discharge pipeline does not have an adverse effect on the natural character of the receiving environment.
Policy	**Comment**
7.4.1. In assessing the actual and potential effects of an activity to recognise that all parts of Northland's coastal marine area have some degree of natural character which requires protection from inappropriate subdivision, use and development.	As discussed in Section 10, the discharge pipeline does not have an adverse effect on the natural character of the receiving environment.
11. Recognition of and provision for Maori and their culture and traditions	
Objective	**Comment**
11.3 The management of the natural and physical resources within Northland's coastal marine area in a manner that	Alongside Tangata Whenua FNDC have investigated alternative options for this discharge and have determined that discharge to water is the best practicable option.

recognises and respects the traditional and cultural relationships of tangata whenua with the coast.	
Policy	**Comment**
11.4.1. To recognise and, as far as practicable, provide for the concerns and cultural perspective of tangata whenua with respect to the protection of natural and physical resources (especially seafood) in the coastal marine area.	Alongside Tangata Whenua FNDC have investigated alternative options for this discharge and have determined that discharge to water is the best practicable option.
11.4.2. To recognise and, as far as practicable, provide for the concerns and cultural perspectives of tangata whenua in regard to the disposal of waste into water.	Alongside Tangata Whenua FNDC have investigated alternative options for this discharge and have determined that discharge to water is the best practicable option.

17.5 Proposed Regional Plan for Northland (Commissioners' Recommendations Version)

Policy General	Comment
D.2.2 Social, cultural, and economic benefits of activities Regard must be had to the social, cultural and economic benefits of a proposed activity, recognising significant benefits to local communities, Maori and the region including local employment and enhancing Maori development, particularly in areas of Northland where alternative opportunities are limited	As discussed in Section 11 the WWTP provides for social, cultural and economic benefits.
D.2.2C Benefits of regionally significant infrastructure. Particular regard must be had to the national, regional and locally significant social, economic, and cultural benefits of regionally significant infrastructure	As discussed in Section 11 the WWTP is regionally significant infrastructure and it provides for social, cultural and economic benefits.
D.2.2D Minor adverse effects arising from the establishment and operation of regionally significant infrastructure. Enable the establishment and operation (including reconsenting) of regionally significant infrastructure by allowing any minor adverse effects providing:	The application for the reconsenting of this regionally significant infrastructure is consistent with the listed policies.

1) The regionally significant infrastructure proposal is consistent with: a) all policies in Section D.1 Tangata whenua, and b) D.2.6 Managing adverse effects on historic heritage, and c) D.2.6A Managing adverse effects on natural character, outstanding natural landscapes and outstanding natural features, and_ d) D.2.7 Managing adverse effects on indigenous biodiversity, and 2) the regionally significant infrastructure proposal will not likely result in over-allocation having regard to the allocation limits in Policy H.6.3 Allocation limits for rivers, and 3) other adverse effects arising from the regionally significant infrastructure are avoided, remedied, mitigated or offset to the extent they are no more than minor.	
D.2.2DB Appropriateness of regionally significant infrastructure proposals When considering the appropriateness of a regionally significant infrastructure activity in circumstances where adverse effects are greater than envisaged in Policies D.2.2D and D.2.2DA, have regard and give appropriate weight to:	1) The benefits of the activity are discussed in Section 11 2) The provision of this infrastructure is provided for by the NPS UDC 3) The activity serves a function need in terms of the Local Government Act 2002.

1) the benefits of the activity in terms of D.2.2C Benefits of regionally significant infrastructure, and 2) whether the activity must be recognised and provided for by a national policy statement, and 3) any demonstrated functional need for the activity, and 4) the extent to which any adverse environmental effects have been avoided, remedied or mitigated by route, site or method selection, and 5) any operational, technical or location constraints that limit the design and location of the activity, including any alternatives that have been considered which have proven to be impractical, or have greater adverse effects, and 6) whether the activity is for regionally significant infrastructure which is included in Schedule 1 of the Civil Defence Emergency Management Act as a lifeline utility and meets the reasonably foreseeable needs of Northland, and 7) the extent to which the adverse effects of the activity can be practicably reduced, inclusive of any positive effects and environmental offsets proposed, and …	4) There are no anticipated adverse effects as a result of these activities. 5) Alternatives have been considered and are outlined in Section 7, above. 6) The infrastructure is a lifeline utility in accordance with Part B of Schedule 1 of the Civil Defence Emergency Management Act 2002, as an entity that provides a wastewater or sewerage network that disposed of sewage. Section 7.2 discusses the ways that the infrastructure meets the reasonably foreseeable needs of the community. 7) There are no identified significant adverse effects anticipated as a result of these activities.

D.2.6A

Managing adverse effects on natural character, outstanding natural landscapes and outstanding natural features.

Manage the adverse effects of activities on natural character, outstanding natural landscapes and outstanding natural features by:

1) avoiding adverse effects of activities as follows:

Place / value	**Location of the place**	**Effects to be avoided**
Natural character	The coastal marine area and freshwater bodies.	Significant adverse effects on the characteristics, qualities and values that contribute to natural character.

2) recognising that in relation to natural character in waterbodies (where not identified as outstanding natural character), appropriate methods of avoiding, remedying or mitigating adverse effects may include:

   a) ensuring the location, intensity, scale and form of activities is appropriate having regard to natural elements and processes, and

   b) in areas of high natural character in the coastal marine area, minimising to the

The activity avoids adverse effects on natural character in the CMA.

extent practicable indigenous vegetation clearance and modification (seabed and foreshore disturbance, structures, discharges of contaminants), and c) in freshwater, minimising to the extent practicable modification (disturbance, structures, extraction of water and discharge of contaminants), and a) … 4) recognising that uses and development form part of existing landscapes, features and waterbodies and have existing effects.	
D.3 Air	
D.3.1 General approach to managing air quality When considering resource consent applications for discharges to air: 1A) ensure that discharges of contaminants to air do not occur in a manner that causes, or is likely to cause, a hazardous, noxious, dangerous or toxic effect on human or animal health or ecosystems, and … 4) take into account the cumulative effects of air discharges and any constraints that may occur from the granting of the consent on the operation of existing activities, and 5) recognise that discharges to air may have	As discussed in Section 9, the discharge to air does not cause any of the listed effects on human, animal or ecosystem health. No cumulative effects are anticipated.

adverse effects across the property boundary (including reverse sensitivity effects) and adverse effects on natural character, and 6) take into account the current environment and surrounding zoning in the relevant district plan including existing amenity values, and ... 10) generally enable discharges of contaminants to air from industrial and trade premises provided the best practicable option for preventing or minimising the adverse effects of the discharge is adopted and significant adverse effects on human health, amenity values and ecosystems are avoided.	
D.4 Land and Water	
D.4.5 Maintaining overall water quality When considering an application for a resource consent to discharge a contaminant into water: 1) have regard to the need to maintain the overall quality of water including the receiving water's physical, chemical and biological attributes and associated water quality dependent values, and 2) have regard to the coastal sediment quality guidelines in H.5 Water quality standards and guidelines, and	As discussed in Section 6, the discharge is likely to meet the water quality standards.

3) generally not grant a proposal if it will, or is likely to, exceed or further exceed a water quality standard in H.5 Water quality standards and guidelines.	
D.4.7 Industrial or trade wastewater discharges to water An application for resource consent to discharge industrial or trade wastewater to water will generally not be granted unless the best practicable option to manage the treatment and discharge of contaminants is adopted.	The discharge of wastewater to water has been determined to be the best practicable option.
D.4.7A Municipal, domestic and production land wastewater discharges An application for resource consent to discharge municipal, domestic, horticultural or farm wastewater to water will generally not be granted unless: 1) the storage, treatment and discharge of the wastewater is done in accordance with recognised industry good management practices, and 2) a discharge to land has been considered and found not to be economically or practicably viable.	1) The storage, treatment and discharge of wastewater is managed in accordance with industry best practice. 2) Discharge of wastewater to land has been considered and was found to be neither economically nor practically viable.
Policy H.5.1 Water quality standards for continually or intermittently flowing rivers The water quality standards in Table 20 'Water quality standards for ecosystem health in rivers'	The results of upstream and downstream E.coli sampling of the Waiarohia Stream indicate that any wastewater discharge via seepage

apply to Northland's continually or intermittently flowing rivers, and they apply after allowing for reasonable mixing.	from the base of the WWTP to the Waiarohia Stream is are likely to be renovated by the underlying soils. It is likely that the water quality standards will be met after allowing for reasonable mixing.
Policy H.5.3 Coastal water quality standards The water quality standards in Table 22 'Water quality standards for ecosystem health in coastal waters, contact recreation and shellfish consumption' apply to Northland's coastal waters, and they apply after allowing for reasonable mixing.	Policy H.5.3 is discussed in Section 6.3.
Objectives	
F.1.2 Water quality Manage the use of land and discharges of contaminants to land and water so that: 1) existing overall water quality is at least maintained, and improved where it has been degraded below the river or lake water quality standards set out in Appendix H5 Water quality standards and guidelines, and 2) the sedimentation of continually or intermittently flowing rivers, lakes and coastal water is minimised, and 3) the life-supporting capacity, ecosystem processes and indigenous species, including their associated ecosystems, of fresh and coastal water are safeguarded,	As discussed in Section 6, the discharge is likely to meet the water quality standards.

and 4) the health of people and communities, as affected by contact with fresh and coastal water, is safeguarded, and 5) the health and safety of people and communities, as affected by discharges of sewage from vessels, is safeguarded, and 6) the quality of potable drinking water sources, including aquifers used for potable supplies, is protected, and 7) the significant values of outstanding freshwater bodies and natural wetlands are protected, and 8) kai is safe to harvest and eat, and recreational, amenity and other social and cultural values are provided for.	
F.1.5 Regionally significant infrastructure Recognise the national, regional and local benefits of regionally significant infrastructure and renewable energy generation and enable their effective development, operation, maintenance, repair, upgrading and removal.	This objective echoes the objectives and policies of the RPS.
F.1.7 Use and development in the coastal marine area Use and development in the coastal marine area: 1) makes efficient use of space occupied in the common marine and coastal area, and 2) is of a scale, density and design compatible	This objective echoes the objectives and policies of the RPS.

with its location, and 3) recognises the need to maintain and enhance public open space and recreational opportunities, and 4) is provided for in appropriate places and forms, and within appropriate limits.	
F.1.11 Natural character, outstanding natural features, historic heritage and places of significance to tangata whenua Protect from inappropriate use and development: 1) the characteristics, qualities and values that make up: a) outstanding natural features in the coastal marine area and in fresh waterbodies, and b) areas of outstanding and high natural character in the coastal marine area and in fresh waterbodies within the coastal environment, and c) natural character in fresh waterbodies outside the coastal environment, and d) outstanding natural seascapes in the coastal marine area, and 2) the integrity of historic heritage in the coastal marine area, and 3) the values of places of significance to tangata whenua in the coastal marine area and freshwater bodies.	This objective echoes the objectives and policies of the RPS.

F.1.12 Air quality Adverse effects from discharges to air are managed by: 1) minimising cross-boundary effects on sensitive areas from discharges of dust, smoke, agrichemical spray drift, and odour, and 2) protecting dust, odour, smoke and spray-sensitive areas from exposure to dangerous or noxious levels of gases or airborne contaminants, and 3) recognising that land use change can result in reverse sensitivity effects on existing discharges to air, but existing discharges should be allowed to continue providing they are employing best practice, and 4) Maintaining, or enhancing where it is degraded by human activities, ambient air quality by avoiding significant cumulative adverse effects of air discharges on human health, cultural values, amenity values and the environment.	This objective echoes the objectives and policies of the RPS.

17.5.1.1 Section 104(b) Summary

The weight given to the objectives, policies and other provisions of the operative regional plans depends on how far the Proposed Regional Plan is through the statutory process. At the stage of public notification, the provisions of the Proposed Regional Plan may be given limited weight as they are still subject to submissions, Council decisions and appeals. As the Proposed Regional Plan moves closer to becoming operative, the importance of those provisions increases as the opportunity for challenge is reduced.

Because the Proposed Regional Plan is now a considerable way through the statutory process (but not beyond appeal) it is considered that more weight should be given to the objectives, policies and other provisions of the Proposed Regional Plan than the operative regional plans.

The above assessments demonstrate that the granting of resource consent for these activities is consistent with the relevant objectives and policies and assessment criteria of the statutory documents.

17.6 Section 104(1)(c) of the Act

Section 104(1)(c) of the Act states that consideration must be given to "any other matters that the consent authority considers relevant and reasonably necessary to determine the application."

RMA, Sections 30 and 31 – Functions of regional councils and local authorities under this Act

2017 amendments to Section 30 the RMA require that the Regional Council has, as per Section 30(1)(ba) the function of: the establishment, implementation, and review of objectives, policies, and methods to ensure that there is sufficient development capacity in relation to housing and business land to meet the expected demands of the region. Similarly, FNDC is required by Section 31(1)(aa) to have the function of: the establishment, implementation, and review of objectives, policies, and methods to ensure that there is sufficient development capacity in respect of housing and business land to meet the expected demands of the district.

Development, and the ability to demonstrate that FNDC can ensure that there is sufficient development capacity, is reliant on the continued provision of the WWTP . The granting of this resource consent is consistent with both Section 30(1)(ba) and Section 31(1)(aa) in that both Council's are required to implement objective and policies that ensure sufficient development capacity.

The WWTP allows FNDC to fulfil its purpose under the Local Government Act 2002, in that it meets the current and future needs of the community for good quality infrastructure, in a way that is most cost-effective for households and businesses.

18 PART 2 OF THE ACT: PURPOSE AND PRINCIPLES

Part 2, Section 5 – Purpose and Principles

Part 2, Section 5, of the Act identifies the purposes of the Act as being the sustainable management of natural and physical resources.

The WWTP and associated activities represent a sustainable use of resources. The WWTP allows the community to provide for its social and economic well-being. The activities are undertaken in a manner that avoids remedies and mitigates any adverse effects on the environment.

Part 2, Section 6 – Matters of national importance

Part 2, Section 6 of the Act identifies the following relevant matters of national importance and states that they should be recognised and provided for:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers.

(h) the management of significant risks from natural hazards.

These provisions have been demonstrated in this application and in the statutory documents discussed above.

Part 2, Section 7 – Other matters

Part 2, Section 7 of the Act requires that particular regard shall be had to the following relevant matters:

(b) the efficient use and development of natural and physical resources;
(d) the intrinsic values of ecosystems;
(f) maintenance and enhancement of the quality of the environment;

(g) any finite characteristic of natural and physical resources.

Particular regard has been had to these matters has been demonstrated in this application and in the statutory documents discussed above.

Part 2, Section 8 – Treaty of Waitangi

The principles of the Treaty of Waitangi have been taken into account by the applicant and have been taken into account by the statutory documents discussed above.

19 CONCLUSION

- The adverse effects on the environment can be determined to be less than minor and support Regionally Significant Infrastructure.
- Granting these resource consents in accordance with Sections 104B and 104C, is consistent with the relevant statutory documents, the purpose and principles of the Act, and Sections 30 and 31 of the Act.

APPENDIX 1

HOKIANGA HARBOUR HYDRODYNAMIC STUDY OF WASTEWATER DISCHARGES

Hokianga Harbour

Hydrodynamic Study of Wasterwater Discharges and Survey of Possible Transport Routes

Proposal prepared for Far North District Council

April 2019

MetOcean SOLUTIONS

Proposal

Date

Version	Revision Date	Summary	Reviewed by
0.1	06/02/2018	Initial document created	Berthot
0.2	11/02/2018	Document for Client Review	Berthot
0.3	05/04/2018	Document for Client Review	Berthot
0.4	29/04/2018	Document for Client Review	Berthot

1. Background

The Far North District Council (FNDC) currently discharges wastewater from four municipal wastewater treatment plants (WWTP) into the Hokianga Harbour or its tributaries (Figure 1). FNDC are in the process of renewing two of these resource consents. In the community, there is growing concern over the health of the harbour and FNDC requires information about the effects of these discharges in the receiving environment, and/or identify simple ways to minimise the effects.

In addition, the Council is also mandated to accelerate development of a long-term plan for the existing Hokianga ferry and therefore require advice and acquisition of a range of surveys in order to ascertain the viability of alternative route options and northern landing locations for the ferry. The required surveys should cover a 2.2sq km triangle between Rawene, Motukaraka and the existing northern landing and may include Sub-bottom Geophysics, Bathymetric and Hydrodynamic surveys.

This document presents MetOcean Solutions (MOS, division of the Meteorological Service of New Zealand Limited) proposal to undertake this study scope.

For the surveys work MetOcean Solutions propose to partner with Scantec Ltd and the Cawthron Institute

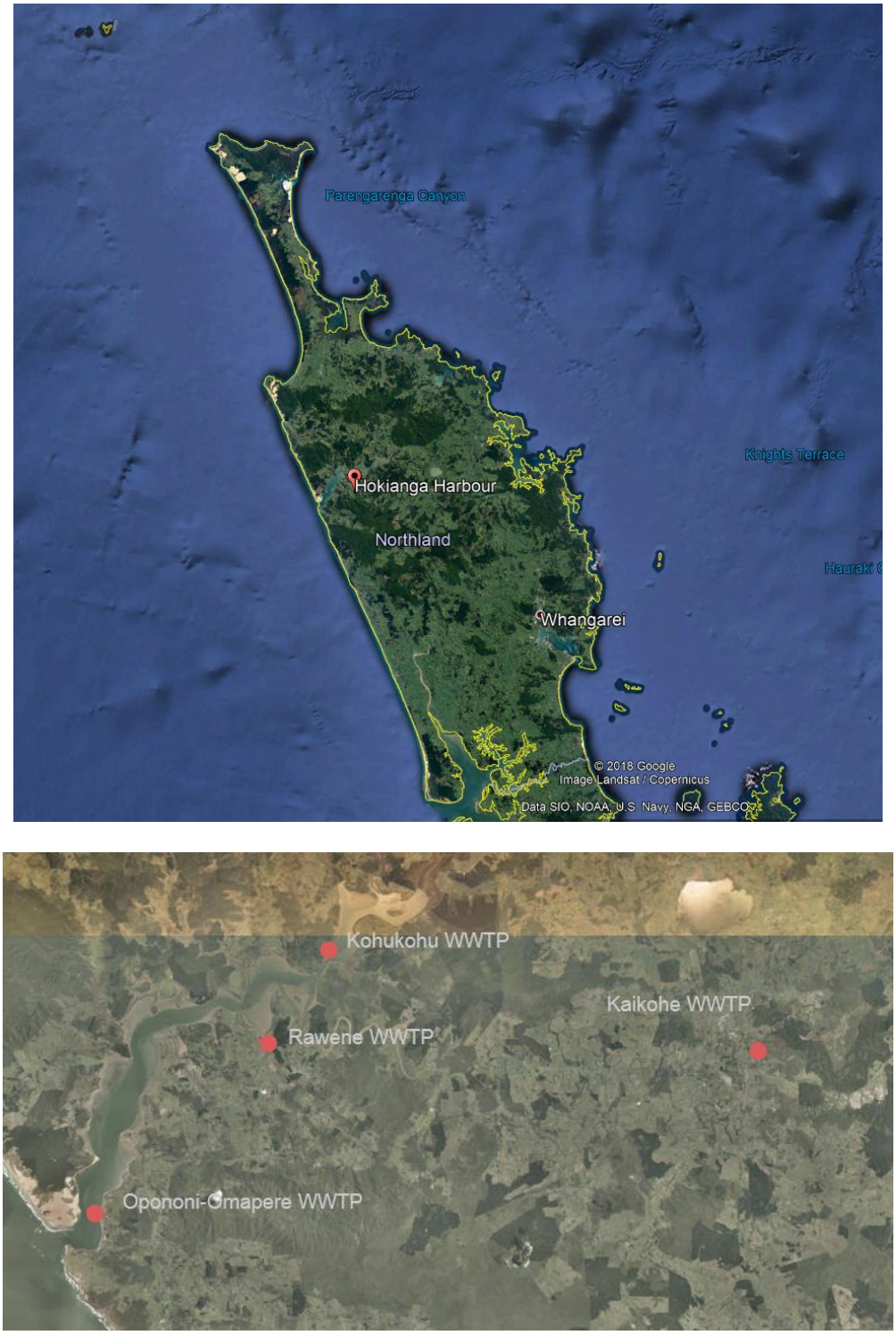

Figure 1: Hokianga Harbour Location (top) - Municipal Wastewater Treatment Plant Discharges in the Catchment of the Hokianga Harbour (bottom).

2. Company Background

MetOcean Solutions :

MetOcean Solutions (MOS) is a science-based consultancy with specialisation in the numerical modelling of estuarine, coastal, ocean and atmospheric processes. Metocean Solutions is a division of the Meteorological Service of New Zealand (MetService). The Metocean Solutions team provides numerical and analytical services worldwide, with clients that include national weather services, navies and maritime industries, ports and harbours, engineering consultants, offshore explorers and operators plus various coastal management agencies.

MetOcean Solutions group consists of 35 people, including 17 PhD scientists, who cover a range of physical and mathematical disciplines. There are four key science teams (atmospherics, waves, ocean currents and coastal processes). Many of the studies undertaken by the company leverage the expertise from all these teams in developing an understanding of the project environment and the processes therein. A process-based understanding is necessary to identify the best solutions and most practical options for engineering or management outcomes in complex marine environments. The core ethic in the company is maintaining scientific integrity by employing exceptional people and using the latest technology and open-source code to produce robust and defendable outcomes and advice.

The company operates several scientific computing facilities, both in-house and externally hosted, which allows computational scalability.

MOS has undertaken an extensive number of harbour and port studies globally, including New Zealand, Australia, Pacific Region, Middle East, Europe, South America. These includes numerical modelling to assess estuarine hydrodynamics, water discharges, plume dispersion and water quality processes.

A selection of MOS previous ports studies is listed below and additional details on specific studies are presented in Appendix A:.

- For New Zealand ports, detailed wave studies have been completed at Lyttelton, Taranaki, Dunedin, Nelson, Motueka, Manukau, Gisborne, Napier, Whangarei, Pitt and Chatham Islands, Tarakohe, Auckland Islands, Hauraki Gulf, and Stewart Island.

- Australian port wave studies include Western Port, Sydney, Brisbane, Fremantle, Geraldton, Bunbury, Esperance, Portland, Cockburn Sound, James Price Point, Albany, Hedland and Dampier.

- Other wave study locations for coastal or harbour applications include Oman, Persian Gulf, Red Sea, England, Ireland, Scotland, Germany, Netherlands, Angola, Indonesia, Malaysia, Mozambique, North Sea, Bougainville, French Polynesia, Fiji, Philippines, Canada, Brazil, various Caribbean Islands, Israel, Marshall Islands.

- Dynamic underkeel clearance and channel optimisation studies have been undertaken at the ports of Gisborne, Taranaki, Centreport and Lyttelton.

- Hydrodynamic studies have been completed for all the major New Zealand ports and harbours as part of an extensive biosecurity modelling project for the Ministry of Primary Industries. Local-scale tidal harbour models have been nested within a 10-year duration 3D model that includes most of the EEZ. An exhaustive validation against measured data from around the continental shelf has been performed, including the detailed examinations in the Cook Strait region, Taranaki and East Coast South Island.

- A 35-year high-resolution ROMS current hindcast of all New Zealand waters has been used to support and plan offshore survey and exploration in numerous basins around the country. These include the Pegasus Basin (east of Cook Strait) as well as the other pioneer areas such as East Cape, Canterbury, Great South and offshore Taranaki.

- Trajectory and dispersal studies have been made to identify the 3D movement of hydrocarbons (surface and deep water releases), drill cuttings, sediment plumes from dumping, microbes and pollutants in sewage, motile organisms and larvae, hot and cold water discharges, produced water discharges and mud plumes from drilling. These studies have been made at numerous locations around New Zealand, and highly sophisticated particle modelling code has been developed to allow multi-year simulations to be conducted. This code is planned to be open sourced to the scientific community later in the year.

An example of estuarine flushing characteristics is given in Figure 2, while an example of plume dynamics relating to the discharge of contaminants is given Figure 4.

- In recent years, detailed wave and sediment dynamics investigations have been completed at Dunedin, Timaru, Motueka, Port Taranaki, Port Otago, CentrePort (Wellington), Lyall Bay (Wellington), Lyttelton and the Whangarei harbour for Refining New Zealand. These studies have demonstrated the company's expertise in running the Delft3D model.

Figure 2: Waikouaiti Estuary modelling. Relative concentration of river nutrients after 24H of continuous release from Orbell's Crossing under the three flow states considered during spring tide

ScanTec Ltd

ScanTec is a New Zealand owned and operated company providing geophysical expertise to the engineering, environmental, archaeological and mineral exploration communities.

ScanTec has international experience in the research and commercial application of the following techniques:

- Ground Penetrating Radar (GPR) – 3D imaging
- Seismic reflection / MASW
- Well logging (borehole geophysics)
- Sidescan Sonar/Sub-bottom profiler
- Magnetic (Land and Marine)
- Microgravity
- Resistivity and EM imaging

ScanTec is based in Whangarei and operate throughout NZ, Australia, Asia, South Pacific and Antarctica and our clients include engineering and environmental consultants and local to central government and research organisations.

Cawthron Institute:

Cawthron Institute is New Zealand's largest independent science organisation, offering a broad spectrum of services to help protect the environment and support sustainable development of primary industries.

Based in the Nelson region, Cawthron works with regional councils, government departments, major industries, private companies, and other research organisations throughout New Zealand and around the world. Cawthron is a diverse organisation employing more than 250 scientists, laboratory technicians, researchers and specialist staff from 26 countries.

Cawthron's scientists have expertise in aquaculture research, marine and freshwater resource management, food safety and quality, algal technologies, biosecurity and analytical testing. Its ground-breaking science is supported by substantial testing and research laboratories, state-of-the-art technology and a purpose-built aquaculture park.

3. Data

3.1 Data and Report Review

Review of any existing studies and measured data, e.g. river discharge, current and water level near Hokianga Harbour as well as wastewater discharge and water quality data will be undertaken.

The review and analysis will also aim at carefully identifying data and existing reports which may be used as input parameters for the desktop and modelling assessment.

It is anticipated that the following dataset will be required:

- Bathymetry available near the site.
- Locally measured wind, water level wave and current data.
- WWTP locations, discharge rates and water quality data:
    - Opononi WWTP
    - Kohukohu WWTP
    - Rawene WWTP
    - Kaikohe WWTP

3.2 Available Data Sources

3.2.1 Bathymetry

MOS have compiled an extensive national and regional bathymetric dataset from various sources, and these have been used and validated in previous hydrodynamic studies. The datasets will be updated with the latest harbour data. This will include:

- LIDAR data available for parts of the harbour (Opononi-Omapere, Rawene and Kohukohu).
- Hydrographic surveys of the Hokianga Harbour completed by LINZ in 2015 (from the mouth to the upper reaches, see Figure 3).
- Hydrographic surveys of the Hokianga Harbour completed by NRC in 2006 (Motuti, Omapere and lower harbour).

Specialist data manipulation tools have been developed in-house to allow merging, interpolation and QA of raw bathymetric data when establishing numerical model domains.

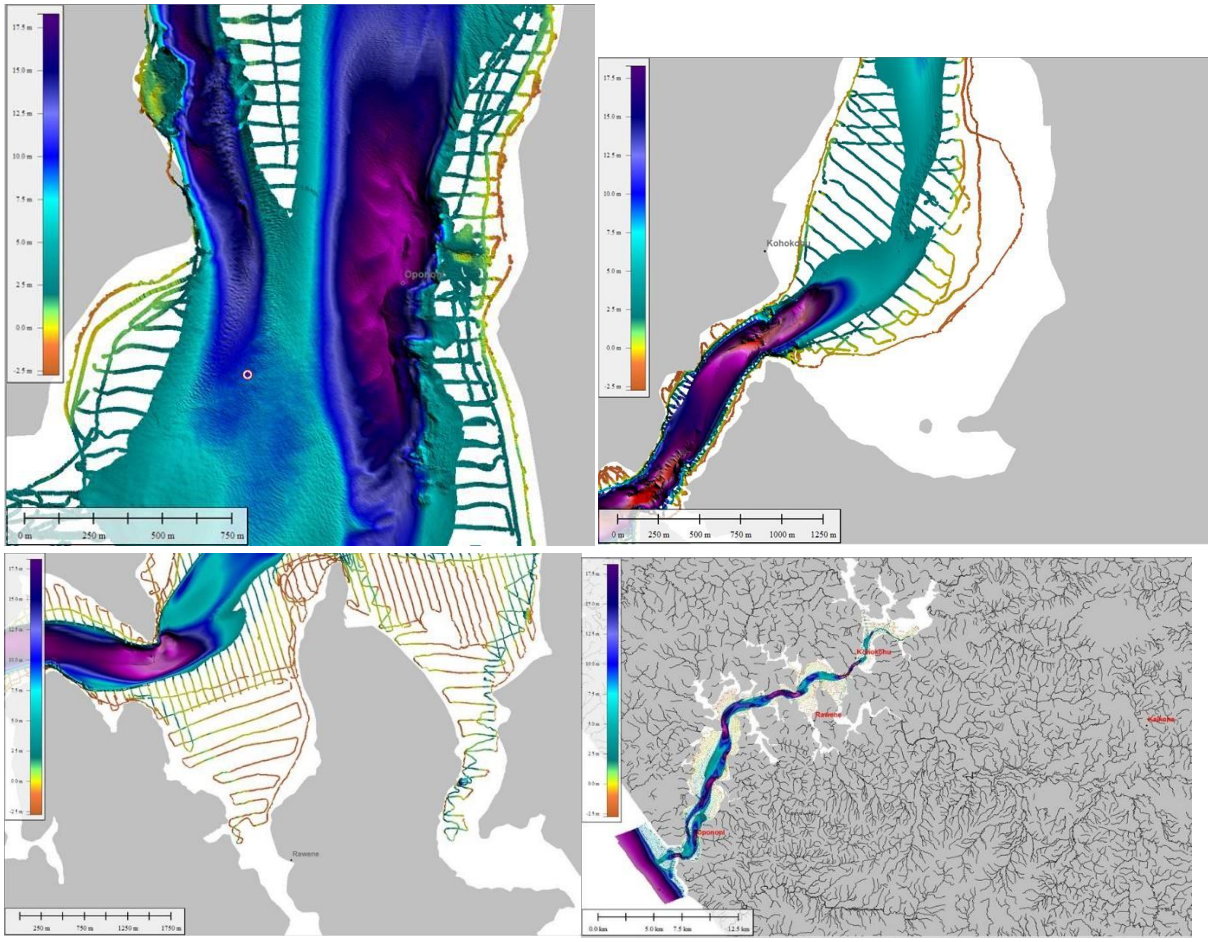

Figure 3: Hydrographic Survey for Hokianga Harbour completed by LINZ in 2015 near the WWTP (Top left: Opononi, Top right: Kohokohu, Bottom left: Rawene, Bottom right: Kaikohe)

3.2.2 Atmospheric

The spatially-varying wind field used in the model studies will be an extract of a 35-year regional atmospheric hindcast constructed by MOS. The hindcast was obtained by running the Weather Research and Forecasting model (WRF) nested within the Climate Forecast System Reanalysis (CFSR) data set from NOAA. The result is a nationwide 12 km resolution hindcast of full 3-dimensional atmospheric variables for each hour since January 1979, with a 4 km nested region through central New Zealand. The variables

include the surface wind field (i.e. 10 minute mean at 10 m elevation) along with air temperature, humidity, solar radiation, and precipitation. This hindcast has been validated at numerous sites around New Zealand.

Hindcast model wind data will be compared to measured wind velocities; extracted from the closest available AWS weather station to the Hokianga Harbour environs.

3.2.3 Currents and water levels

Current and Water level boundaries will be sourced from the MOS 35-year hindcast ROMS depth-averaged tide model of New Zealand. The ROMS model is a three dimensional ocean model nested within the CFSR ocean hindcast. By using the CFSR boundary, a realistic time-varying deepwater boundary can be prescribed for ROMS. The hindcast is forced with the NZ atmospheric hindcast described in Section 2.2. Numerous current meter data from around NZ have been used to validate the regional scale ROMS model.

Existing water level and current data will be used to validate the model. This will include the below data set as well as any additional current data collected during this project as described in Section 4.6.

Existing data:

-1982 study of the proposed Opononi-Omapere discharge (Tai Tokerau District Maori Council Advisory Services).

- The Northland Regional Council has a water level gauge. Data is available online at: https://www.nrc.govt.nz/environment/river-and-rainfall-data/river-andrainfall-data/

4. Proposed methodology

4.1 Hydrodynamic model

The simulation of effluent far-field dispersion within a complex estuary system such proposed by FNDC requires high resolution hydrodynamic fields. For the present study, high-resolution 3D modelling of the tidal/river/stream discharge hydrodynamics would

be simulated using the open source model SCHISM[1][2]. Open source science models allow full transparency of the code, numerics, boundary conditions and outputs. Further, it allows other consultants and researchers to replicate or enhance any previous modelling efforts for a given environment. The native outputs from SCHISM can be read directly by the WaterRide[3] software (operated by Regional Councils throughout New Zealand). In this study both native output format and NetCDF file formats will be supplied and supported.

SCHISM is a prognostic finite-element unstructured-grid model designed to simulate 3D baroclinic, 3D barotropic or 2D barotropic circulation. The barotropic mode equations employ a semi-implicit finite-element Eulerian-Lagrangian algorithm to solve the shallow-water equations, forced by relevant physical processes (atmospheric, oceanic and fluvial forcing). A detailed description of the SCHISM model formulation, governing equations and numerics can be found in Zhang and Baptista (2008).

The finite-element grid structure (i.e. triangles) used by SCHISM has resolution and scale benefits over other regular or curvilinear based hydrodynamic models (such as Delft3D). SCHISM is computationally efficiently in the way resolves the shape and complex bathymetry associated with estuaries, while the governing equations are similar to other open source models such as Delft3D. SCHISM has been used extensively within the scientific community[4], and forms the backbone to operational systems used to predict nowcast and forecast estuarine water levels, currents, water temperature and salinity[5].

The model resolution will be optimised to ensure the salient hydrodynamic processes are accurately captured, with offshore resolution expected to be 10-100 m, and inside the rivers and at 5-10 m, depending on the bathymetry gradients. The model domain will include all salient river systems which discharge into the Hokianga Harbour. To ensure that the hydrodynamics are accurately accounted for and the region of interest is fully covered, the model domain will extend out into Tasman Sea. It is noted that this extent may be useful for other work scopes FNDC may be considering, and as such this work package may provide a price point saving for any additional works; particularly given that all model outputs and the model itself will be supplied to FNDC.

Model bathymetry will be sourced from available dataset as presented in Section 3.2.

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[1] http://ccrm.vims.edu/schism/
[2] http://www.ccrm.vims.edu/w/index.php/Main_Page#SCHISM_WIKI
[3] http://www.waterride.net/
[4] http://ccrm.vims.edu/schism/schism_pubs.html
[5] https://tidesandcurrents.noaa.gov/ofs/creofs/creofs_info.html

4.2 Boundary conditions

Offshore tidal elevation and velocity data will be prescribed from MOD NZ ROMS scaled tidal model. Assuming the completion of an applicable field program to collect current and water level data, calibration of the model will to be undertaken (Section 2.3, refer Section 2.6), with offshore residual current velocities, salinity and temperature data sourced from the NZ ROMS implementation. It is expected that discharge flow data at or near the boundary of the salient rivers discharging into Hokianga Harbour will be supplied by FNDC.

4.3 Model calibration and validation

The governing fluvial and tidal flow dynamics will be validated against available measured existing data.

The hydrodynamic model may also be validated with any additional data collected as part of this project, however based on the proposed timeframe of the project by FNDC it is unlikely that current data will be able to be collected prior to the modelling commencing however this will be undertaken as soon as the data is available.

4.4 WWTP Discharge and Nearfield Modeling

As presented in the FNDC documents the nature of the WWTP discharges into Hokianga Harbour are as follows:

Opononi WWTP

- Discharged directly into the harbour via outfall pipe.
- Pumped from a holding pond for maximum of 4 hours on an outgoing tide.

Kohukohu WWTP

- Discharged into unnamed tributary of the Hokianga Harbour (tidal mud flat)
- Continuous gravity discharge. Known to have zero discharge in dry periods.
- Kohukohu wastewater scheme is an Efffluent Disposal System (EDS). Only the liquid from septic tanks enters the WWTP.

Rawene WWTP

- Discharged into Omanaia River (tidal mud flat)
- Continuous gravity discharge from the WWTP but once the discharge enters the drain it is controlled by a flood gate discharging to the Omanaia River. There are other contributors to the drain and therefore the discharge from the floodgate.

Kaikohe WWTP

- Discharged into unnamed tributary of the Wairoro Stream
- Continuous gravity discharge into freshwater that runs into the Hokianga Harbour.

Near-field modelling of the initial turbulent mixing will be undertaken using CORMIX[6] CORMIX is a USEPA-supported mixing zone model and decision support system for environmental impact assessment of regulatory mixing zones resulting from continuous point source discharges. The system emphasizes the role of boundary interaction to predict steady-state mixing behaviour and plume geometry.

CORMIX will be used to define the near-field plume characteristics (extent, initial dilution) under a range of representative conditions (water depth, current velocities, discharge characteristics) for input into the far-field model.

4.5 Plumes associated with wastewater discharge - Far-field modelling

The far-field dispersal and dilution of wastewater discharged into the marine environment will be treated as a passive tracer and modelled using proprietary particle code developed by MOS (ERCore). ERCore has been used in numerous trajectory applications, including drilling muds and predictions and persistence of the surface expression of a plume. The ERCore particle model undertakes computationally-intensive Lagrangian simulations within hydrodynamic flow fields.

Plume modelling will be undertaken within hydrodynamic flow fields, climatic representations of the expected hydrodynamics, based on the discharge information

[6] http://www.cormix.info/

provided by FNDC with Initial dilution estimates quantified using equations from the Water Research Centre Design Guide for Marine Treatment Schemes[7].

The hydrodynamic model will be run for year-long simulations within two contrasting historical contexts: La Niña /El Niño episodes. This allows robust probabilistic estimates of the plume dispersion and dilution patterns to be determined and thus provide some guidance on expected concentration levels associated with the Waste Water discharges.

During El Niño conditions, New Zealand typically experiences stronger or more frequent westerly winds during summer. This leads to a greater risk of drier-than-normal conditions in east coast areas and more rain than normal in the west. In winter, colder southerly winds tend to prevail, while in spring and autumn, south-westerlies tend to be stronger or more frequent, bringing a mix of the summer and winter effects.

During La Niña conditions more north–easterly winds are characteristic, which tend to bring moist, rainy conditions to the north–east of the North Island, and reduced rainfall to the south and south–west of the South Island.

Results from the model will be assessed in terms of residence times, dilutions, and plume pathways (see example on Figure 4). The behaviour of the following parameters: E.coli / Faecal coliforms, Total Ammoniacal Nitrogen, Total Suspended Solids, Biological Oxygen Demand, will be described based on the dilution and dispersion within the harbour either as a passive tracer and/or considering decay when required.

Comparison of the model results with anecdotal evidence provided by FNDC (e.g. eddies, flushing observations…) will also be included

[7] WRC (1990) Design guide for marine treatment schemes. Water Research Centre Report UM 1009. Swindon, UK

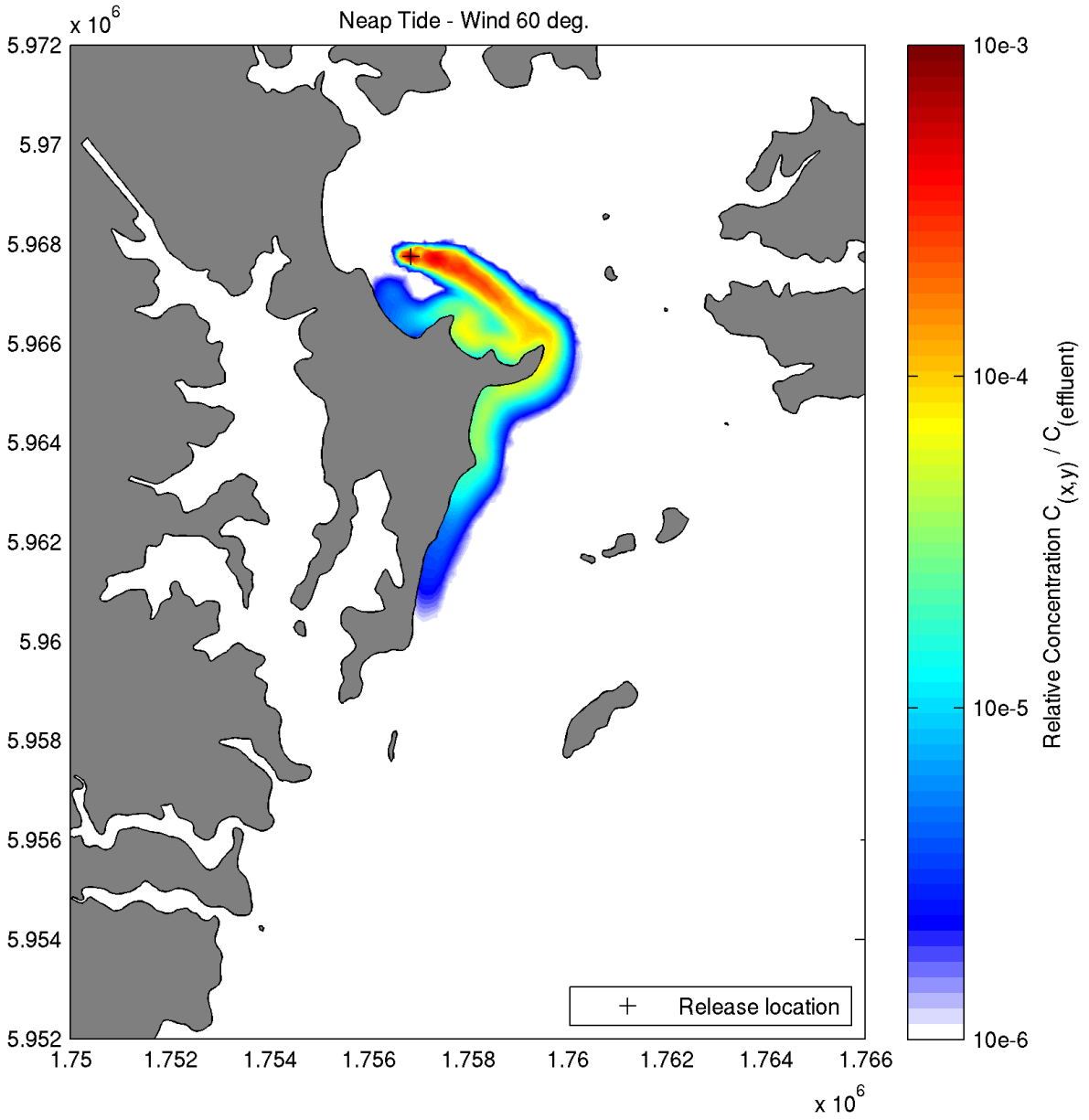


Figure 4 *Example of Relative concentration map for the proposed 1 km outfall, under neap tide conditions and a wind from 60º True (4.5 m.s^{-1}) – Snells Beach discharge point.*

4.6 Sub-Bottom Surveys and Water level/Current data

It is understood that Council is working on development of a long term plan for the existing Hokianga ferry (beyond the expected remaining 10 year life). In order to progress with this project a survey able to identify seabed type (i.e. sediment or bedrock) over an area approximately 2.2sq km (triangle between Rawene, Motukaraka and the existing northern landing) is required. Hydrographic survey of the area has already been undertaken for the Land Information New Zealand in 2015. Review of the 2015 survey shows that sufficient data is available for setting up the hydrodynamic model as shown on Figure 3.

Additional water level and current measured data is needed in order to calibrate and validate the hydrodynamic model and therefore increase confidence in the ability of the numerical model to realistically reproduce the fate and transport of the WWTP discharges in the harbour.

MetOcean Solutions proposes to partner with Scantec Ltd and Cawthron Institute to undertake survey and data collection work.

Sub Bottom Profiling - Scantec Ltd:

The survey scope would include measuring general stratigraphy and sediment thickness over bedrock in a triangular area of approx. 1.7 square kilometres (170 hectares) at a line spacing of 100m. Equipment will be mounted on a 5.5m vessel which can be launched from the boatramp at Rawene. A high powered 3.5kHz to 7kHz SBP system is used to penetrate the seabed and obtain reflections from bedrock (see example below). The data is processed using seismic processing packages and data displayed in 2D and also maps showing depth to bedrock.

Water level and Currents Surveys - Cawthron Institute:

In order to calibrate/validate the hydrodynamic model and therefore improve the ability of the model to accurately current patterns within Hokianga Harbour, additional current measurements would be needed.

Following further discussion with FNDC , MetOcean Solutions and Cawthron Institute have endeavour to develop a data collection campaign able to provide a good database of water level and currents measurements able to support this hydrodynamic study.

The proposed data collection campaign will consist of the collection of water level and ocean current information via deployment of four to six separate moorings in ~10-20m water depths throughout the Hokianga Harbour for 30 days. This will include:

- Two sea bed mounted ADCP instruments to record water level and current velocity profiles.
- Two single-point current meters deployed on individual moorings, recording current velocities at a single point.
- Two RBR Solo pressure sensors (supplied by MetOcean Solutions) to be deployed on individual moorings, recording water levels.

Figure 5 shows indicative potential locations for the proposed instruments deployment.

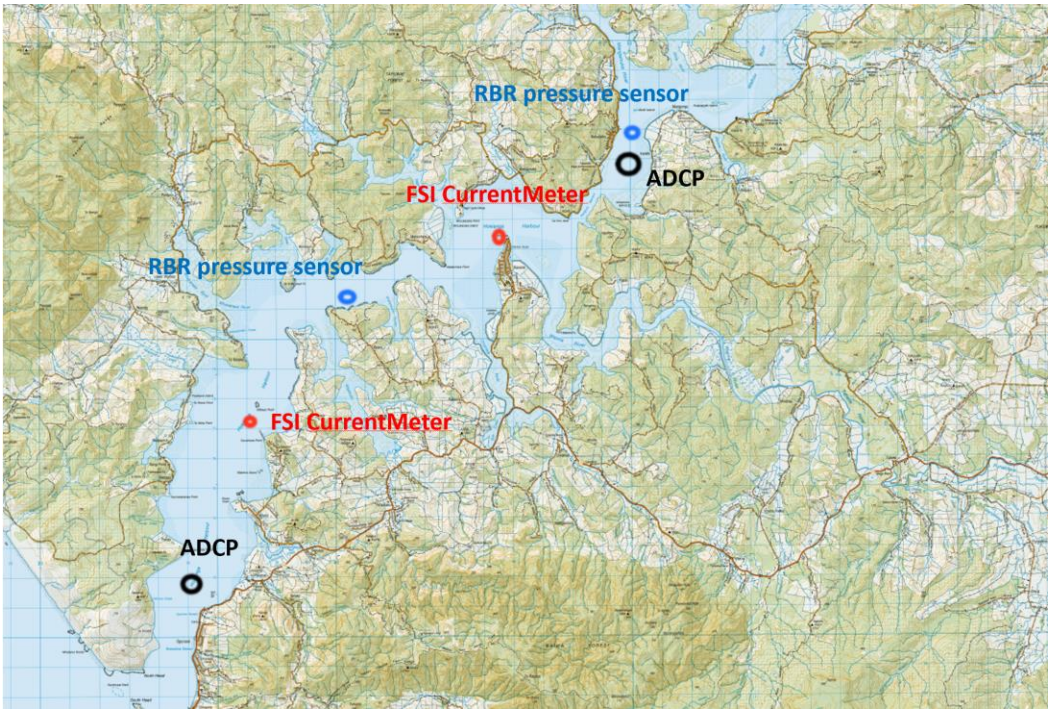


Figure 5:Indicative Instruments Locations.

The data collection scope includes set-up, deployment, retrieval and data supply.

Cawthron Institute is currently considering The Hokianga Express (9m Aluminium Fly Hull) for the instrument deployment vessel hire. The Hokianga Express (Owner Peter Clarke) has previously done survey work within the harbour for LINZ and NRC.

5. Deliverables

A report describing the data, methodology, model configuration and validation and results will be provided.

Annual time-series of contaminant levels (including die-off) will be supplied at key locations specified within the model domain by client, while spatial maps will be produced under a range of representative tidal stages.

Discussion on the effects of these discharges in the receiving environment, and/or potential ways to minimise the impact of the discharge will be included.

Presentation on the findings of the work on the wastewater discharges will also be undertaken in Kaikohe once to elected members, and once to members of various community liaison groups interested in the topics.

6. Personnel

We have assembled a team with the knowledge and technical skills required to successfully deliver the project.

The experience of the project team and key team members is provided below, and CVs can be provided on request. The key team members will be supported by additional MetOcean Solutions oceanographers and scientists for the modelling work and metocean analysis.

Dr Brett Beamsley - Senior Physical Oceanographer

Brett has 25 years' experience in physical oceanography, coastal processes, ocean engineering applications and managing port projects relating to dredging and disposal of dredged material. His professional outputs include more than 30 peer reviewed papers and scientific publications (author and co-author) In addition he has been involved in more than 150 technical reports covering a broad range of topics, including sediment dynamic and transport (including morphological modelling), drill cuttings and dredged sediment disposal characteristics, hydrodynamics and wave processes. Brett has specialist skills in finite-element model establishment and is a long-time user of the SELFE/SCHISM code.

Dr Alexis Berthot – Marine Project Consultancy Manager

Alexis has more than 18 years' experience in coastal, ocean and estuarine research and consulting and has provided professional services for a wide range of coastal and ports projects. He has a PhD in Physical Oceanography from the University of Western Australia. His expertise is in numerical modelling and data analysis with particular emphasis in hydrodynamic, wave, sediment transport and morphological modelling. Alexis has extensive experience in undertaking hydrodynamic modelling in support of environmental impact assessment and harbour engineering and channel optimisation projects.

Dr Marian Cussioli - Physical Oceanographer

Mariana is an oceanographer, specialising in coastal oceanography and coastal environments. She has previous experience in consulting and numerical modelling for

several projects involving dredging and coastal developments, such as marinas and piers. She has a PhD in Coastal Oceanography from the University of Waikato and her expertise extends from hydrodynamic, wave and sediment transport modelling to modelling and monitoring of dredging plumes and sediment disposal. Mariana is also an experienced user of the Delft3D numerical modelling system for hydrodynamic, wave and sediment transport applications.

Simon Weppe - Physical Oceanographer

Simon is a specialist numerical modeller with expertise in many numerical solutions. His experience extends from wave and hydrodynamics models to sediment transport and coastal system morphodynamics. His MSc in oceanography was from the University of Waikato and his thesis focused on the field monitoring and modelling of oceanographic and morphodynamic processes in the vicinity of a submerged reef. Since joining MOS in 2010, Simon has been involved in a wide range of consultancy projects including large scale dredging and disposal projects at many locations in NZ, as well as wave penetration and agitation in harbours and ports. He is an experienced user of the open source Deflt3D suite as well as nearshore wave models. Simon's modelling expertise extends to Lagrangian modelling applied to dredging and disposal plumes, oil spill tracking and pollution dispersal, and is responsible for open sourcing the Lagrangian particle tracking model.

Remy Zyngfogel - Physical Oceanographer

Remy has 13 years of experience as a Physical Oceanographer and has an MSc from Southampton University. Since graduating, he has gained extensive maritime knowledge through many hours at sea on a wide range of projects extending from hydrographic surveys to mooring deployment. For MOS, Remy specialises in design and implementation of oceanographic field work, and he is also involved in data post-processing, finite-element hydrodynamic and particle modelling and software development.

7. Timing and Cost

Our fee for the proposed scope in this proposal is presented in MOS_hokiangahydro_price_rev04.pdf document.

The estimated time frame for the delivery of the entire work scope is approximately 4 months from engagement and receipt of data. A proposed timeframe is presented in Table 1.

The proposed data collection will allow for a robust calibration and validation of the model which is a critical phase of a numerical modelling study in particular when environmental impact and resource consents are required. A thorough validation of the model will improve the confidence in the numerical model to accurately describe the physical processes and therefore associated pollutant dispersion patterns within Hokianga harbour. The data collection would need to be undertaken prior or simultaneously that the model setup.

The timeframe presented in Table 1 assume that the data collection will be able to be undertaken over the month of June. However, it should be noted that the deployment of instruments should be undertaken safely during a weather period. Some delays in the instruments deployments or retrieval may be experience in case of inclement weather.

APPENDIX 2

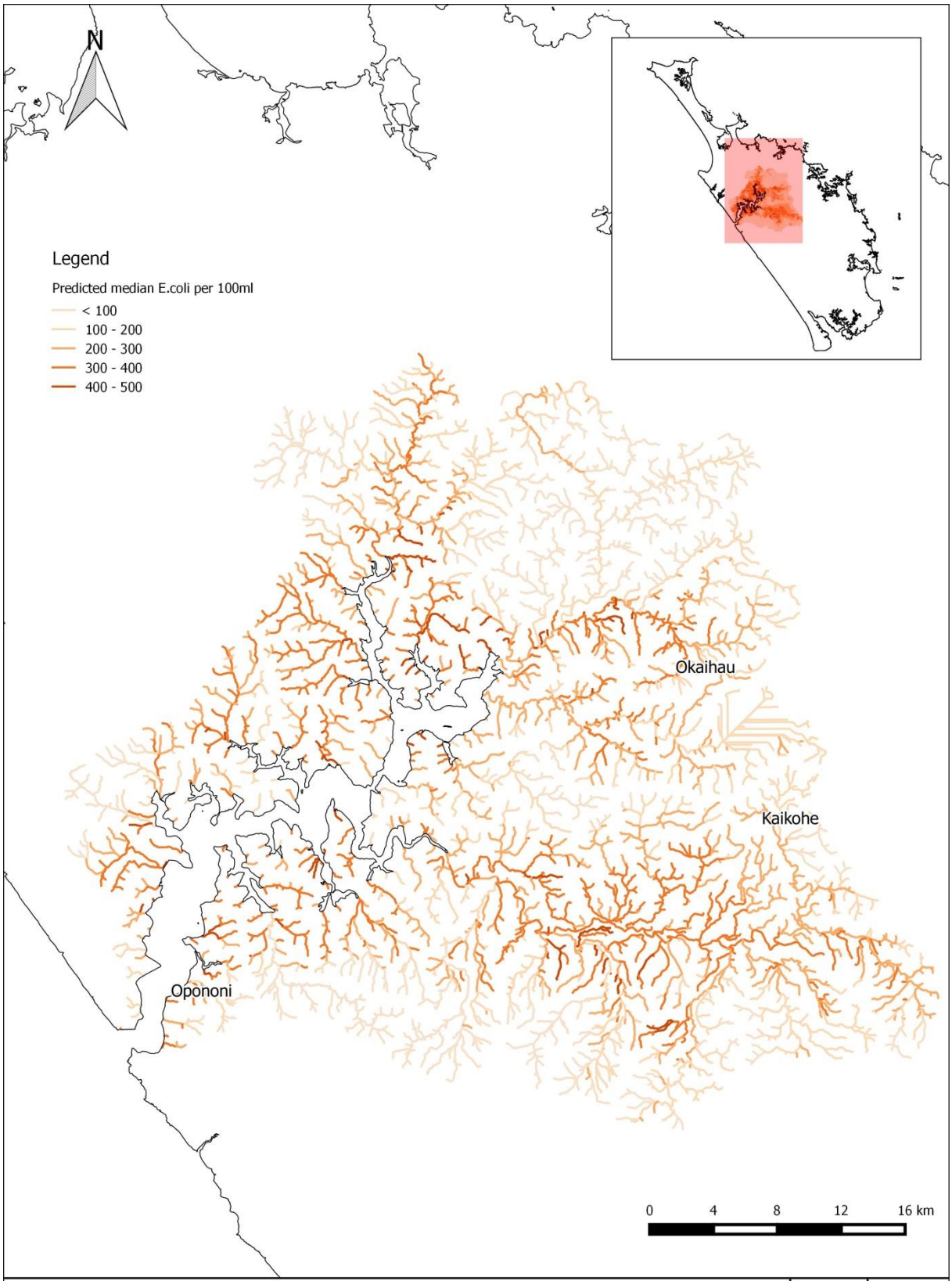
ETI TOOL 1 RESULTS FOR THE HOKIANGA HARBOUR

Variable Name	Value	Description
Estuary Number	224	unique ID for each estuary
Estuary Name	Hokianga Harbour System	Name of the estuary
NZCHS geomorphic code	8	New Zealand Coastal Hydrosystem classification from Hume 2016
NZCHS geomorphic class	Shallow drowned valley	New Zealand Coastal Hydrosystem classification from Hume 2016
ETI Class	SIDE	Estuary type according to the Estuarine Trophic Index
Freshwater inflow (m3/s)	43.20803	Freshwater inflow per second
Annual river total nitrogen loading (T/yr)	1026.52197	Tonnes per year of total nitrogen from the catchment
Annual river total phosphorus loading (T/yr)	292.32504	Tonnes per year of total phosphorus from the catchment
Volume (m^3)	266800327.1	Estuary volume at high tide
Tidal Prism (m^3)	216172096.2	Tidal prism
Return flow fraction (unitless)	0.888809605	Fraction of incoming tidal volume that was in the estuary on the previous tide. Range 0 to 1. Uses default calculation based on tidal prism and freshwater inflow if not supplied by user.
ACExR fitted exponent (unitless)	-0.949307879	Coefficient used to calculate ACExR model parameter
ACExR fitted constant (unitless)	2950.078302	Coefficient used to calculate ACExR model parameter
Ratio NO_3 (unitless)	0.750389957	Proportion of riverine total nitrogen in the form of nitrate. Ranges from 0 to 1.
Ratio DRP (unitless)	0.724414627	Proportion of riverine total phosphorus in the form of disolved reactive phosphorus. Ranges from 0 to 1.
Ocean salinity (ppt)	35.2980817	Annual mean surface salinity of the ocean near the estuary
Ocean nitrate concentration (mg/m^3)	35.55011289	Annual mean surface nitrate concentration of the ocean near the estuary
Ocean DRP concentration (mg/m^3)	9.386512866	Annual mean surface DRP concentration of the ocean near the estuary
Intertidal area (%)	48.69	The percentage of the estuary that is intertidal. Ranges from 0 - 100.
Estuary Area (m^2)	106497969	Can be obtained from coastal explorer. Estuary water area at high tide MHW m2
Mean depth (m)	4.535038816	Can be obtained from coastal explorer. Mean depth of estuary in m
Tidal height (m)	2.683	Can be obtained from coastal explorer. Tidal range in m
ETI Susceptibility	B	Overall banding for ETI susceptibility using the CLUES Estuary Approach. Range A (good) to D (bad) based on the combination of intertidal area, macroalgae and phytoplankton banding.
Macro Algae Band	B	Macro algae susceptibility banding. Range A (good) to D

		(bad)
Phytoplankton Band	A	Phytoplankton susceptibility banding.Range A (good) to D (bad)
Combined susceptibility	moderate	Combined susceptibility using the ASSETS approach. Based on the physical and N Load susceptibility values.
Physical susceptibility	low	Physical susceptibility
N Load susceptibility	moderate	N Load susceptibility
High ICOE susceptibility	FALSE	High ICOE susceptibility
Flushing potential class	high	Classification of efficiency of the estuary to remove inputs through tidal flushing.
Dilution potential class	moderate	Classification of ability of estuary to dilute nutrient inputs
Dilution model	Luketina	The type of model used to calculate dilution. Values are "Luketina", "ACExR", "Freshwater", "Tidal Prism"
Dilution (unitless)	13.38606526	Dilution factor used to calculate estuary concentrations
Flushing time (days)	5.338942105	Mean flushing time for the estuary when open to the sea
River TN (mg/m^3)	753.350665	Concentration of total nitrogen in the freshwater inflow
River TP (mg/m^3)	214.5334145	Concentration of total phosphorus in the freshwater inflow
Estuary TN (mg/m^3)	89.17308111	Predicted potential total nitrogen concentration in the estuary
Estuary TP (mg/m^3)	24.71192012	Predicted potential total phosphorus concentration in the estuary
Estuary NO3(mg/m^3)	75.12534653	Predicted potential nitrate concentration in the estuary
Estuary DRP (mg/m^3)	20.29521738	Predicted potential dissolved reactive phosphorus (DRP) concentration in the estuary
Chlorophyll-a (mg/m^3)	2.559707022	Predicted Chl-a concentration in the estuary
Daily river N load (mg/day)	2812388959	Estimated N load from river in mg/day
Daily river N load per m2 (mg/m^2/day)	26.40791167	Estimated N load from river in mg/m2/day
River N concentration (mg/m^3/sec)	753.350665	Estimated N concentration from river in mg/m3/sec
Tidal height class	macrotidal	Tidal height class calculated using tidal height. Microtidal 0.8 m < Mestotidal < 1.8m Macrotidal
Estuary volume f3 (f3)	9421973511	Estuary volume in cubic feet
Flushing potential	0.013992388	Efficiency of the estuary to remove inputs through tidal flushing. Larger values represent estuaries with a higher flushing potential.
Dilution potential (mg/L)	1.06E-10	Ability of estuary to dilute nutrient inputs. Smaller values represent estuaries with higher dilution potential.

APPENDIX 3

MODELLED MEDIAN E.COLI CONCENTRATIONS WITHIN THE WATER BODIES OF THE HOKIANGA HARBOUR CATCHMENT

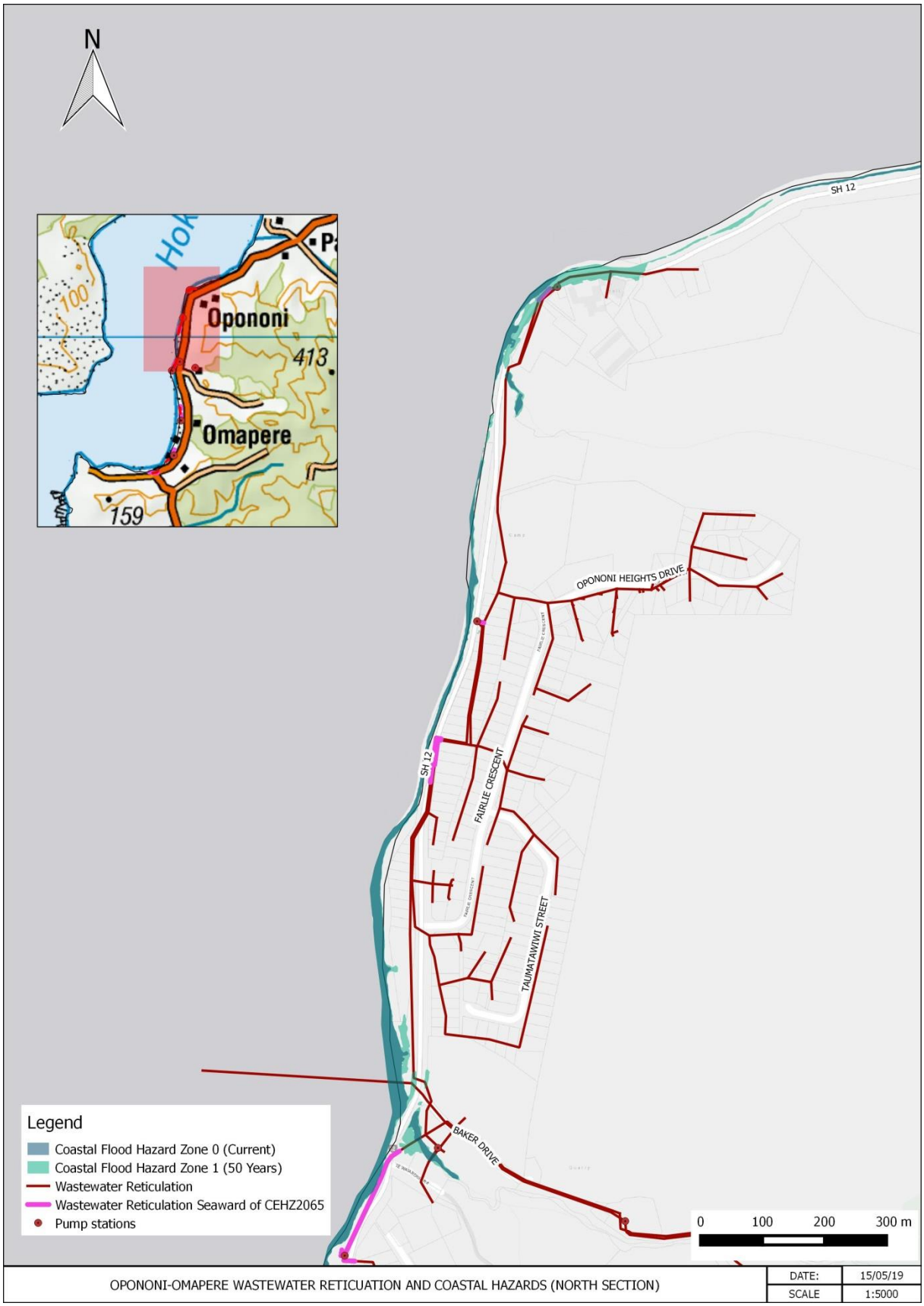


PREDICTED E.COLI CONCENTRATIONS WITHIN THE HOKIANGA HARBOUR CATCHEMENT RIVERS.

DATE:	15/05/19
SCALE	1:200000

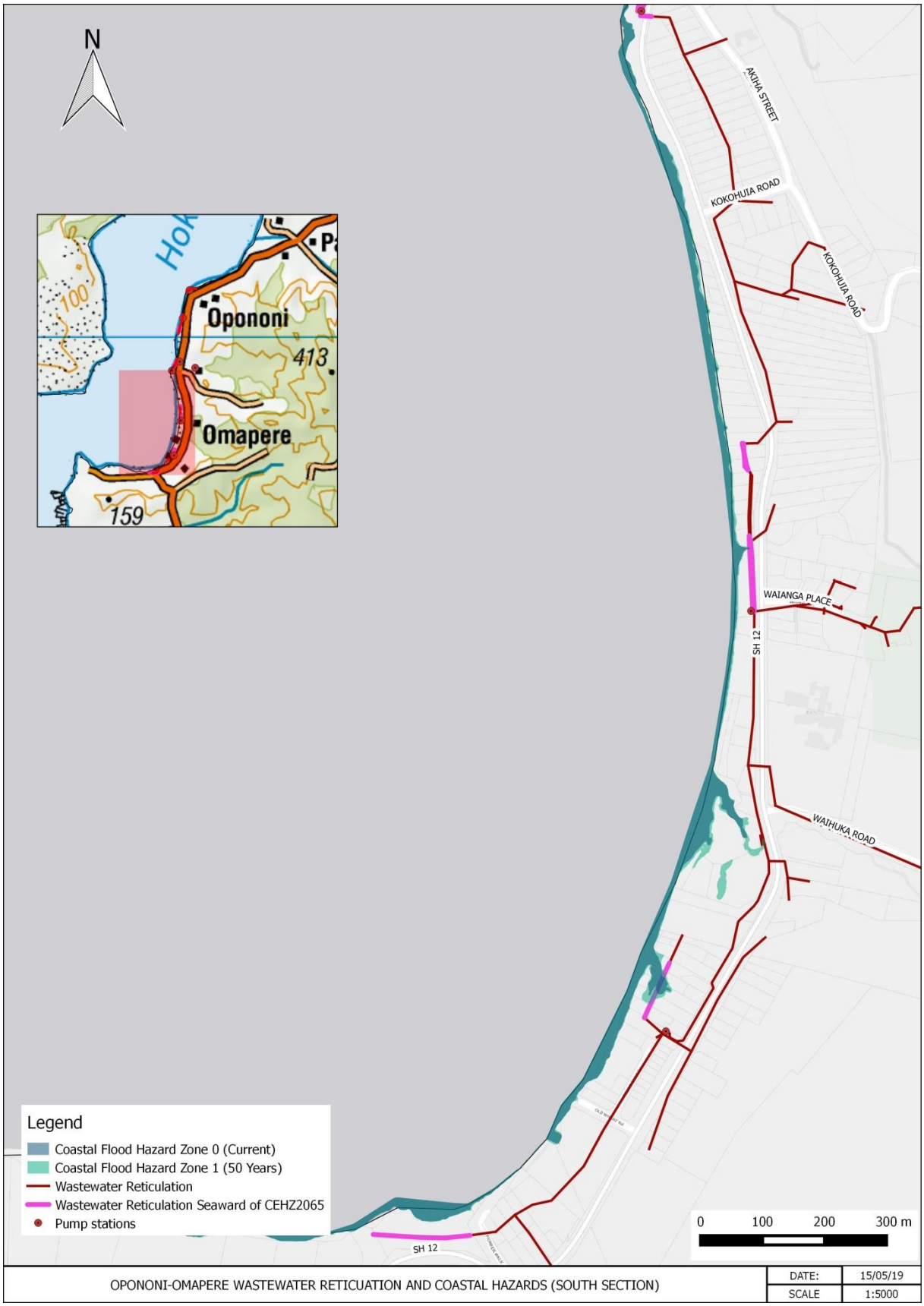
APPENDIX 4

COASTAL HAZARD EROSION ZONE MAPPING



OPONONI-OMAPERE WASTEWATER RETICUATION AND COASTAL HAZARDS (NORTH SECTION)

DATE:	15/05/19
SCALE	1:5000



OPONONI-OMAPERE WASTEWATER RETICUATION AND COASTAL HAZARDS (SOUTH SECTION)

DATE:	15/05/19
SCALE	1:5000