Kāeo Wastewater Treatment Plant

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

Assessment of Environmental Effects

27th July 2022

REPORT INFORMATION AND QUALITY CONTROL

Prepared for:	**Far North District Council**

Author:	**Martell Letica**	**Consultant Infrastructure Planner**
Reviewer:	**Mandy Wilson**	**Senior Infrastructure Planner**

Document Name:	**Kāeo Wastewater Treatment Plant, Assessment of Environmental Effects**

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ACRONYMS

Acronym/Term	Description
Act	Resource Management Act 1991
AEE	Assessment of Effects on the Environment
Amm-N	Ammoniacal Nitrogen
Applicant	Far North District Council (Infrastructure Asset Management)
BAF	Bioaccumulation Factors
CIA	Cultural Impact Assessment
CMA	Coastal Marine Area
CSEP	Community and Stakeholder Engagement Plan
CWL	Constructed Wetland
DOC	Department of Conservation
DMS	Downstream Monitoring Site (NRC Sample Site 100671)
EFF-MS	Outlet Pipe Monitoring Site (NRC Sample Site 110433)
ES Pond	Emergency Storage Pond
FNDC	Far North District Council
FNDP	Far North District Plan 2009
FNW	Far North Water
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
INF-MS	Influent Monitoring Site
LGA	Local Government Act 2002
MACA	Marine and Coastal Area (Takutai Moana) Act 2011
NES-AQ	National Environmental Standards for Air Quality 2004
NES-FM	Resource Management (National Environmental Standards for Freshwater Management) Regulations 2020
NES-CS	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NPSFM 2020	National Policy Statement for Freshwater Management 2020
NZCPS	New Zealand Coastal Policy Statement 2010
OPW	Outline Plan of Work
Project	Kāeo Wastewater Treatment Plant Resource Consent Replacement Project
PRPN	Proposed Regional Plan for Northland (Appeals Version, March 2022)
RC's	Resource Consents
Report	Assessment of Environmental Effects of the Kāeo Wastewater Treatment Plant Discharges
SH10	State Highway 10
UMS	Upstream Monitoring Site (NRC Sample Site 100052)
WQO	Water Quality Objectives
WWTP	Kāeo Wastewater Treatment Plant

1 Applicant and Property Details

Applicant:	Far North District Council Infrastructure and Asset Management (IAM) Attn: Martell Letica (Martell.Letica@fndc.govt.nz)
Address for Service:	Far North District Council Memorial Avenue Private Bag 752 Kaikohe 0440
Legal Description:	Lot 1 Deposited Plan 100604
Record of Title:	NA55C/372
Owner of Site:	Whangaroa County Council
Occupiers of Site:	Far North District Council
WWTP Map Reference:	NZTM 1669780E 6115580N
Discharge Map Reference:	NZTM 1669840E 6116425N

2 Information Requirements

The Applicant is applying to NRC to replace current resource consents authorising the discharge of treated wastewater to land (AUT.007205.02.02) and to water (AUT.007205.01.03) as well as incidental discharges of odour to air (AUT.007205.03.02) which will expire on 31 October 2022.

The application is made more than three months prior to the expiry of the current consents and therefore the NRC has discretion as to whether the Applicant may continue to rely on the current resource consents past their expiries should a decision on this application not be made by that time pursuant to Section 124(3) of the Resource Management Act 1991 (the Act). The Applicant is unaware of any reason why the NRC would not allow the exercise of the current consents past their expiries should a decision not be made by that date and is committed to ensuring that no unreasonable delays occur in the processing of the application.

This application has been prepared in accordance with the requirements of Schedule 4 of the Act having regard to relevant matters in the following documents;

- National Policy Statement for Freshwater Management 2020 (**NPSFM 2020**);
- New Zealand Coastal Policy Statement 2010 (**NZCPS**);
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (**NES-FM**);
- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2010 (**NES-CS**);
- Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007 (**NES-DW**);
- Regional Policy Statement for Northland 2016 (Updated 2018) (**RPS**);
- Proposed Regional Plan for Northland 2017(Appeals Version, March 2022) (**PRPN**);
- Regional Water and Soil Plan for Northland 2004 – Updated 2016 (**RWSP**); and
- Far North District Plan 2009 (**FNDP**).

The application is supported by the technical reports appended and listed as follows;

Appendix A: Prescribed Application Forms

Appendix B: Records of Title

Appendix C:	Relevant Title Instruments
Appendix D:	Flood Hazard Mapping
Appendix E:	Compliance History
Appendix F:	Kāeo Wastewater Treatment Plant Performance Review by Jacobs Consultants Ltd (herein referred to as **'Jacobs (2021)'**)
Appendix G:	Risk Assessment of Kāeo WWTP discharges to the Kāeo River (herein referred to as **'Jacobs (2022a)'**)
Appendix H:	**E**conomic and practicability assessment for discharge of treated wastewater to land from Kāeo wastewater treatment plant
Appendix I:	Request for Proposal for Cultural Impact Assessment
Appendix J:	Kāeo WWTP Flood Hazard Assessment (herein referred to as Jacobs, **(2022b)**).
Appendix K:	Hydrodynamic Modelling Study (herein referred to as **'the MetOcean Study'**)
Appendix L:	Screening Quantitative Microbial Risk Assessment (QMRA): Kaeo Wastewater Treatment Plant (herein referred to as **'the QMRA'**)
Appendix M:	Copy of Current Resource Consents
Appendix N:	Relevant Objectives and Policies

3 Background

Kāeo is a small community in the Far North. It consists of a small residential population supported by a small service centre straddling State Highway 10 and two schools – Whangaroa College and Kāeo Primary School.

Figure 1: Locality of Kāeo township in the Far North district (red circle).

Parts of the community, along with parts of Whangaroa, are serviced with reticulated wastewater provided by the Far North District Council (FNDC).

Wastewater collected from serviced properties is conveyed[1] to the Kāeo Wastewater Treatment Plant (WWTP) located off of Omaunu Road for treatment prior to discharging to the Kāeo River.

3.1 History of the Kāeo WWTP

3.1.1 Treatment Process

The Kāeo WWTP was constructed in the mid-1980s and originally consisted of two waste-stabilisation (facultative and maturation) ponds and a surface flow constructed wetland (CWL).

[1] Wastewater from Whangaroa is trucked and discharged to a manhole within the Kāeo reticulated network for conveyance to the WWTP.

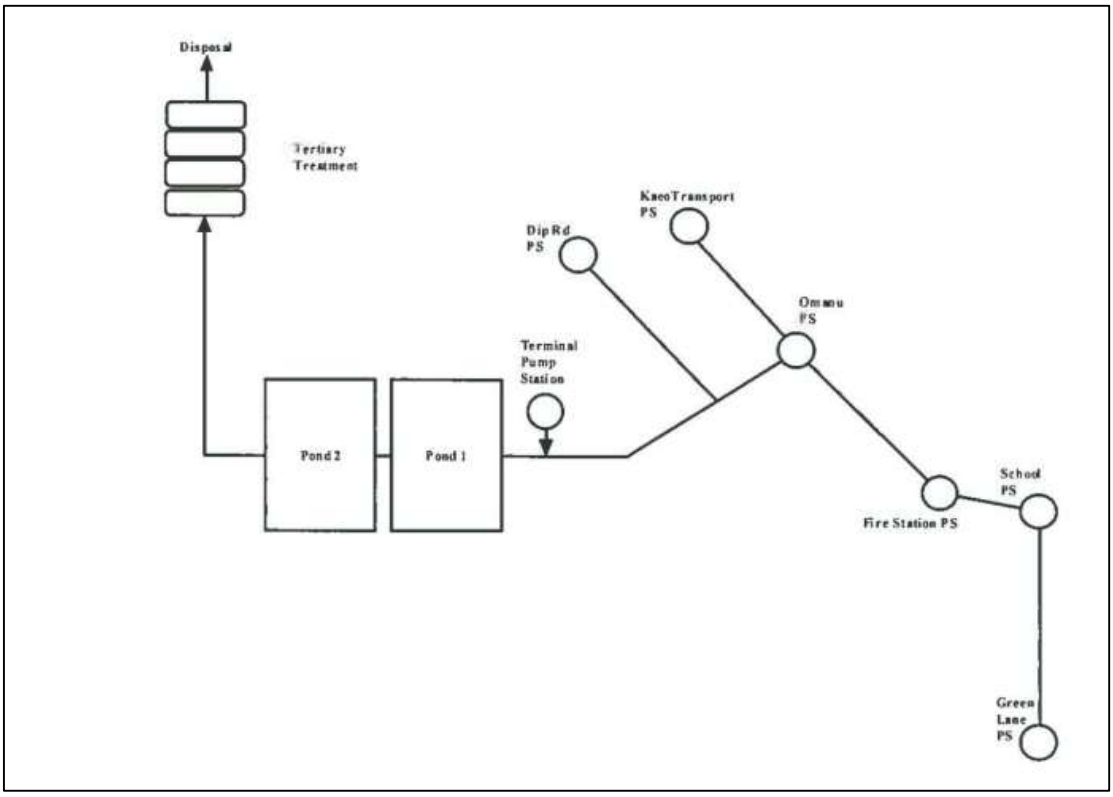

Figure 2: Schematic of historical WWTP.

On 23 February 2007, the WWTP was granted a suite of consents (AUT.007205.01.01-AUT.007205.05.01) for the discharge of contaminants to water, land and to air by NRC. Amongst other things, the resource consent for effluent discharge to the Kāeo River was granted subject to a condition that the WWTP would be upgraded to achieve a 4-log reduction in F-specific bacteriophage[2].

To support the disinfection expected through the CWL, an upstream algae removal system was deemed necessary and a variation to the resource consent was sought to allow this. The Applicant chose to install a vermifiltration[3] process after consulting with the community and tangata whenua[4]. The concept for the vermifilter was that primary treated wastewater from the oxidation pond would be distributed on top of the vermifilter through four sprinkler lanes and aerated drainage coils underneath would collect the filtrate to be treated in the CWL prior to discharging to the river. The maturation pond was divided to create the vermifilter system along with an Emergency Storage Pond (ES Pond).

Monitoring between 2012 and 2014 confirmed that the system was consistently not achieving the 4-log reduction of F-specific bacteriophage with these facilities alone and so a UV disinfection chamber was

[2] F-specific bacteriophage is a virus type that infects and replicates bacteria (such as *E.coli)* that are known to reside in the enteric system (our stomachs). They are measured because their numbers are likely to correlate the number of a range of stomach bacteria present in the wastewater. These enteric bacteria can be harmful to human health.
[3] The vermifiltration process is similar to that of a BTF – i.e., wastewater passes through the rock bed and pollutants are removed by biological mechanism due to the presence of a biofilm that grows on the media surface. However, in a vermifilter composting worms are added to digest organic solids (such as algae) and excrete microbial-rich worm castings. Worm burrows also reduced clogging potential and aid in aeration.
[4] Annon. (2012, September 13). '40,000 new council staff wallow in their work'. *Northern Advocate*. Pg 6.

installed downstream of the vermifilter which improved compliance. The worms were also being washed out of the filter during this time and were not being replenished as their castings were adding to the solids content in the effluent making UV disinfection less effective. A rotating distribution arm and upstream break tank were also added to the system in lieu of the sprinkler lanes during this time, although one lane manifold has been retained to allow additional flow to the filter in high rainfall events.

There have been three attempts to get the CWL to a state where it performs as needed for the effective treatment of wastewater. The Applicant worked with Wai Care Consultants and members of the community in 2014 to re-plant the CWL with locally sourced plants. However, due to the shallow nature of the CWL, a large population of bird life, including pukeko, accessed the CWL and pulled out many of the plants. After some trial and error, preferential effluent quality immediately after UV disinfection was occurring and so the CWL was bypassed with discharge to the Kāeo River occurring immediately after UV disinfection and this treatment process is what currently takes place[5].

3.1.2 Reticulation

Infiltration into the Kāeo WWTP reticulation network has been an issue for some years. This is particularly a problem during wet, winter months with significant surface water entering the network. Previous investigations have identified the farmland around Omaunu Road as a particular problem area with surface water entering the reticulation via the manholes on the gravity pipelines. Works undertaken in late 2010 partially remedied this issue. These works included the sealing of the manhole covers along the line from Omaunu Road to the final pump station which included a total of 4 manholes across the paddocks.

3.2 Consent Compliance

Review of the resource consent monitoring reports from 2007 to 2021 shows that there were often significant non-compliance events (Appendix E). However, after the amendments to the treatment plant facilities in mid-2012, only low to moderate non-compliance events have been logged.

The following provides specific information on consent compliance.

3.2.1 Treatment Plant Monitoring

3.2.1.1 Influent & Effluent Quantity

Although not a condition of consent, pumped wastewater from the Kāeo township is measured by an inlet flowmeter between the final pump station and the oxidation pond inlet.

Using data from the WWTP logbook, influent flows for the three-year period between September 2018 to September 2021[6] were calculated by Jacobs (2021) as follows.

[5] As diagrammatically shown in Appendix A of Jacobs (2021).
[6] Jacobs considered this data to be more relevant to the current operating parameters of the WWTP.

Table 1: Influent inflow to WWTP.

Basis	Value (m^3/day)
Kaeo Community Reticulation Influent	
Average	111
Median	82
Peak (90th Percentile)	212
Maximum	2,061
Average Dry Weather Flow (ADWF)	70
Average Wet Weather Flow (AWWF)	144
Peak (90th Percentile) Wet Weather Flow (PWWF)	259
Tankered Sewage	
Average (Based on 2 x 20 m^3 deliveries per week.)	6

An effluent flowmeter is installed immediately upstream of the UV system to monitor effluent discharge flows in accordance with the monitoring schedule of the resource consent. The consented discharge limit is 360 m^3/day based on average dry weather flows[7]. Data from the WWTP's logbook was used by Jacobs (2021) to characterise the effluent flows for the three-year period between September 2018 and September 2021 as follows (Table 2).

Table 2: Effluent discharge values from WWTP.

Basis	Value (m^3/day)
Effluent Flow	
Average	149
Median	76
90th Percentile	428
Maximum	3,855
Average Dry Weather Discharge	49
Average 30-day Dry Weather Discharge	41

As is evident, the resource consent limit of 360 m^3/day (based on average dry weather flows) is not being exceeded. However, it is acknowledged that according to the logbook, 90% of the flows are below 428 m^3/day. This indicates that discharges above 360 m^3/day are occurring but that many of these values are excluded for compliance purposes as they do not meet the "dry weather discharge day" definition.

[7] A "dry weather discharge day" is defined in the resource consent as any day on which there is less than 1 mm of rainfall, occurring after three consecutive days each with no or less than 1 mm of rainfall.

3.2.1.2 Influent & Effluent Quality

The resource consent requires that, after the upgrade to the treatment system has been commissioned, easy and safe access is to be maintained to enable the collection of wastewater samples at the following locations;

a) A point prior to the inlet screen;

b) Outlet pipe from the upgraded WWTP; and

c) The discharge pipeline as close as possible to the discharge point into the Kāeo River.

Composite samples are to be collected at the discharge from the CWL (NRC Sample Site 105622), however, as the CWL is not being used, only samples of the wastewater immediately after disinfection at NRC Sample Site 110433 (EFF-MS) and influent (INF-MS) are taken and analysed on a weekly basis.

Additionally, receiving water quality is required to be monitored from points approximately 10 metres upstream at NRC Sample Site 100052 (US-MS) and 15 metres downstream of the discharge point at NRC Sample Site 100671 (DS-MS).

While there are a number of analytes that are measured in the wastewater and the waters of the Kāeo River, only certain analytes have specific limits on them in the consent, and these limits are briefly summarised as follows;

- A four order of magnitude reduction in the concentration of F-specific bacteriophage within the wastewater, as measured at EFF-MS when compared to the sample taken immediately prior to the INF-MS;

- The microcystin concentration, expressed as microcystin-LR toxicity equivalents, shall not exceed 2.3 micrograms per litre and/or cell counts of Microcystis shall not exceed 11,500 cells per millilitre at the DS-MS;

- The four-day average concentration of total ammoniacal nitrogen [(NH_3 + NH_4)-N] at the DS-MS shall not exceed the following;

Total Ammoniacal Nitrogen, [(NH_3 + NH_4)-N] g/m³					
pH	*10°C*	*15°C*	*20°C*	*25°C*	*30°C*
6.50	*1.81*	*1.81*	*1.22*	*0.86*	*0.60*
6.75	*1.81*	*1.81*	*1.22*	*0.86*	*0.60*
7.00	*1.81*	*1.81*	*1.22*	*0.86*	*0.61*
7.25	*1.81*	*1.81*	*1.23*	*0.86*	*0.61*
7.50	*1.81*	*1.81*	*1.23*	*0.86*	*0.61*
7.75	*1.73*	*1.64*	*1.15*	*0.81*	*0.58*
8.00	*1.13*	*1.09*	*0.76*	*0.54*	*0.39*

8.25	*0.64*	*0.62*	*0.44*	*0.32*	*0.23*
8.50	*0.37*	*0.36*	*0.26*	*0.19*	*0.14*

- For determining significant adverse effects attributable to the discharge at the DS-MS, the error of the analytical method, or measuring instrument at the 95%ile confidence level shall be taken into account when comparing results for temperature, pH, Dissolved Oxygen (DO), Faecal coliform concentration, and Escherichia coli (E.coli) concentrations with samples taken from the US-MS.

Table 3 provides a summary of the historic performance of the WWTP with respect of these limits by showing the number of times the consent limit was exceeded and the frequency of that exceedance as a percentage of the total number of measurements taken throughout a 3-year period[8] ending October 2021.

Table 3: Analytes monitored and compliance with consented limits for 3-year period ending October 2021.

Analytes	Exceedances	Frequency
Discharge volume (effluent)	0	0%
Cyanotoxins (downstream)	Insufficient data	
Blue-Green Algae9 (downstream)	3	N/A
F-Specific Bacteriophage[10] (influent & effluent)	12	35%
pH (downstream)	6	15%
Dissolved Oxygen (upstream & downstream)	0	0%
Faecal Coliform (upstream & downstream)	1	3%
E.coli (upstream & downstream)	0	0%
Ammoniacal Nitrogen (downstream)	2	5%

[8] Although the operator logbook had measurements available from 2010 to 2021, only sample data for the period 2018-2021 was used for analysis as it was most representative of the current and recent WWTP performance.
[9] Blue-green algae is not measured unless a cyanotoxin measurement of more than 8 µg/L is first obtained. There were only 3 data points available in the logbook for blue-green algae cell count between 2018-2021.
[10] F-specific bacteriophage are microorganisms which can be used to predict concentrations of bacteria or viruses that are known to reside in the enteric system (i.e., our stomachs) like E.coli.

4 The Proposal

The Applicant seeks to replace the current consents which will expire on 31 October 2022 with new consents for the continued discharge of treated wastewater to land, including a CWL, and water and associated discharge to air (odour).

The Proposal remains fairly consistent with the current operation, subject to a few minor amendments. The following sections describe the Proposal in detail.

4.1 Wastewater Catchment and Network

The Kāeo WWTP services the Kāeo urban drainage area and a public sewer network in Whangaroa (Figure 3).

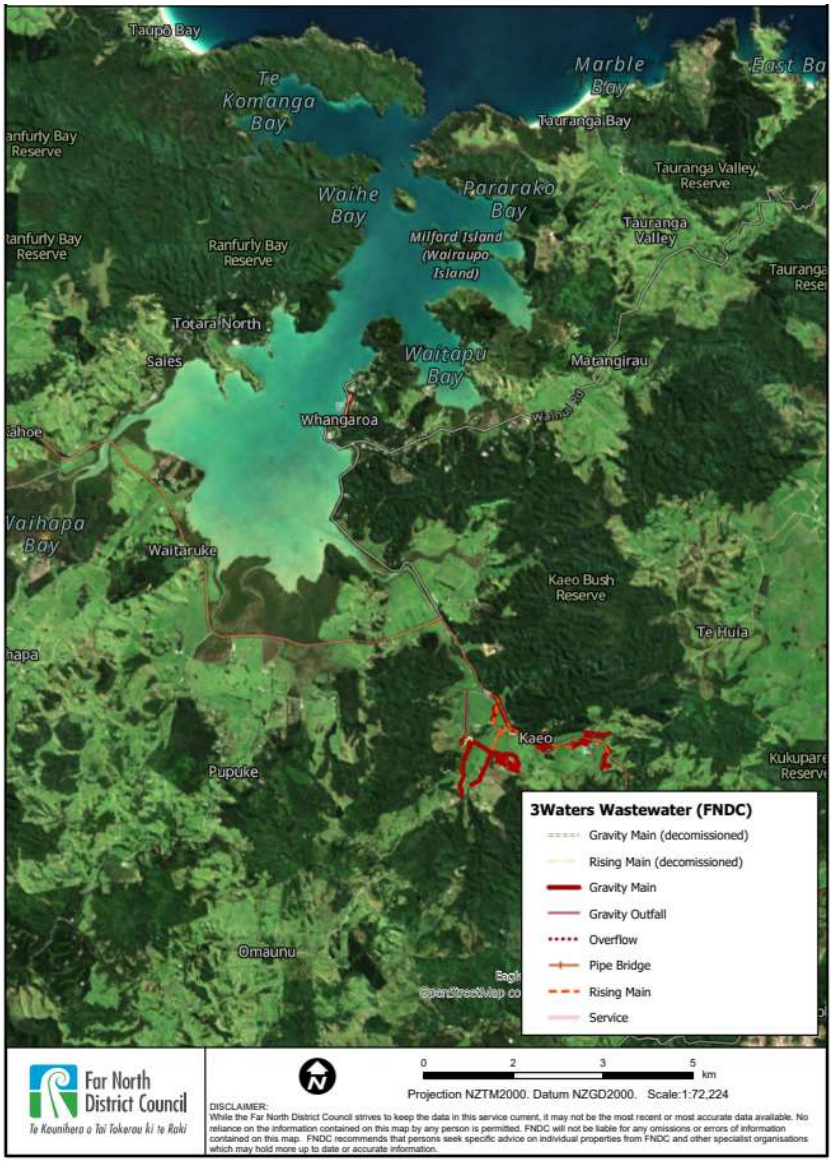

Figure 3: Reticulation networks served by the WWTP.

Wastewater from Kāeo is pumped to the WWTP by 6 main pumpstations located within the township and a 7th final pump station located immediately upstream of the WWTP.

At present, the WWTP services 250 wastewater connections in Kāeo including the Whangaroa Health Services Trust Hospital which has a GP clinic, oral health clinic and the Kauri Lodge Rest Home. The Whangaroa College and Kaeo Primary School are also connected to the Kāeo WWTP, each with a roll of approximately 130 and 150, respectively.

The public sewer network in Whangaroa has 26 connections which all discharge to a holding tank. This includes the Whangaroa Big Game fishing club and a vacuum system connected to the marina. When the holding tank reaches alarm level, it is trucked out and discharged into a manhole in the Kāeo reticulation but there is no monitoring data for this process. The average rate of sewage transfer to the Kāeo WWTP is reportedly twice per week and each transfer is approximately 20m^3.

The reticulation activity will remain generally the same as it currently is. However, the Applicant proposes to seal the remainder of the manholes on the second gravity reticulation line from Kāeo Hospital to the final pump station. While there are a number of methods to achieve sealing of manhole covers, the most effective in both short and long term is to remove the existing ring and cover and install a proprietary manhole system in its entirety. For the previous work in 2010, this was achieved using self-closing covers and it is likely that these be used for the completion of the sealing exercise. This work is planned to take place within the next 3 years (i.e., completed by the end of the 2024 financial year).

4.2 The Wastewater Treatment Plant

The Kāeo WWTP will continue to be configured as described above at Section 3.1 and as visually depicted in Figure 4 below.

The main oxidation pond sits just over 6m above mean sea level while the overflow pond, biofilter, and CWL all reside at an elevation of between 5.06m to 5.5m.

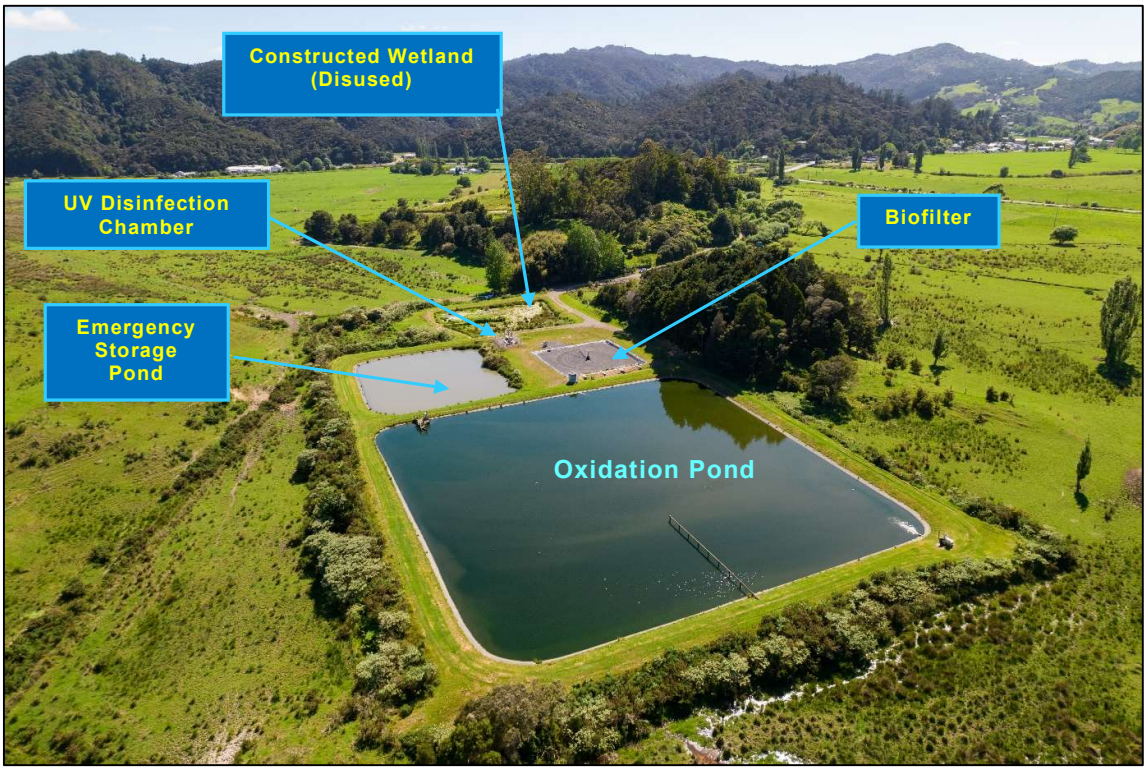

Figure 4: Photo of Kāeo WWTP (Source: Aerial Vision Ltd, 28 November 2021).

4.2.1 Treatment Process

4.2.1.1 The Oxidation Pond

The oxidation pond has a surface area of 7,225m^2 and is normally 1.2m deep with an additional 0.5m of freeboard. In 2018 Conhur estimated the total volume of the pond was 7,610m^3. Accounting for the 150m^3 of sludge accumulated since 2018, the total working volume of the pond is assumed to be 7,460m^3 (Jacobs, 2021). This equates to a retention time of 64 days at an average influent flow rate of 111m^3/day, which is much larger than the original design retention time of 40 days (FNDC, 2006). The retention time will decrease over time as sludge accumulates within the pond, which has a direct impact to performance.

Algal blooms are reported during summer months causing high solids content in the wastewater and poor hydraulic flow. This in turn affects the treatment capability of the downstream facilities (i.e., the bed filter and UV disinfection). However, this is a transitory effect with no permanent surface growth which indicates that, for the most part, the oxidation pond is functioning as designed with relatively low sludge content. As such, no major upgrades are proposed to the oxidation pond. The Applicant acknowledges that amendments to the step screen and re-positioning of the level transducer would assist with improving the treatment achieved within the oxidation pond through better management of the liquid content (i.e., solids removal to avoid accumulation of sludge). The investment outlook for

such work has been given a 10-year horizon[11], however, earlier implementation of these improvements would be initiated based upon the decision-making framework for investment addressed through consent conditions.

Wastewater from the oxidation pond is pumped to a break tank by two ABS submerged pumps (duty/standby) controlled by pond level for dispersal over the biofilter.

4.2.1.2 Emergency Storage Pond

During high rainfall events, influent to the main oxidation pond often exceeds the pumped flow to the bed filter. As such, overflow to the ES Pond occurs via a gravity overflow pipe.

A mobile “trash” pump is manually placed in the ES Pond to pump its contents back up to the main oxidation pond from time to time. The timing and frequency of this activity is dependent on operator and plant availability to do so; the deployment of the pump requires at least two people so is deemed to be resource intensive on the operator.

However, if the ES Pond is not emptied in this way and it reaches critical levels, it will empty effluent directly to the discharge pipe to the river, bypassing further treatment. This effluent flow rate from the ES Pond is not monitored as the effluent flowmeter is positioned upstream before the UV disinfection chamber. When there is not sufficient time for the ES Pond level to recover between rain events this can exacerbate the problem.

The Applicant is investigating options for automated pumping back to the main oxidation pond to manage the levels in the ES Pond more consistently. By maintaining the ES Pond more consistently at low levels, there is greater storage capacity during high-rainfall events which in-turn creates a buffer effect allowing the main oxidation pond to recover thereby allowing for return of untreated effluent to the main pond for appropriate treatment. The investment outlook for such work has been given a 5-year horizon , however, earlier implementation of these improvements would be initiated based upon the decision-making framework for investment addressed through consent conditions.

4.2.1.3 Biofilter

Wastewater is gravity fed from the break tank to the filter distribution arm. The hydraulic head in the system limits the flow of wastewater to the distribution arm, however, one of the original sprinkler lane manifolds has been retained with a manual isolation valve to allow additional flow to the biofilter in high rainfall events. The maximum volume of wastewater able to be applied to the biofilter through both the rotating distribution arm and sprinkler lane is estimated at 550m^3/day.

[11] Pers. conv. Asset Managers, 19 July 2022.

The operator has not reported any major issues with the operation of the biofilter facility. However, there are some design issues which impact on the effectiveness of the treatment process.

The biofilter is achieving some removal of BOD_5 and Ammoniacal Nitrogen (NH_4-N) but Jacobs advise that the removal is not to the extent that a more conventional bio-trickling filter (BTF) system would achieve. The barriers to achieving more conventional treatment outcomes with the biofilter were identified by Jacobs (2021), as;

- Uneven application of effluent to the filter bed media due to issues with the distributor arm leading to a significant reduction in the effective area and volume of the biofilter as poor media wetting leads to dry media pockets and ineffective treatment zones.

- Likely inadequate aeration due to neutral temperature gradients not inducing air movement (i.e., ambient temperatures are often similar to the water temp (e.g., 20 deg) in Kāeo). Aeration is crucial to maintain aerobic zones within the biofilter and allow heterotrophic and nitrifying bacteria digestion.

- There is no subsequent liquid-solid separation stage downstream of the biofilter. As such, detached biofilm and other entrained solids are not removed prior to UV treatment impacting on the effectiveness of disinfection.

- Loading of the biofilter is dependent on upstream factors as there is no effluent recycle system to balance out the influent. Low pollutant loading and high flow rates due to high rainfall may contribute to biofilm washout. High solids content in the pond effluent can contribute to plugging.

The Applicant is proposing to undertake routine maintenance of the rotating distribution arm and will replace the gravel media before the end of the 2023 financial year.

Extension of the rotating distribution arm would allow unused areas of the biofilter to become effective in the treatment process. However, rudimentary extension of the rotating arm is not possible at this stage as any extension will affect the rate of rotation and therefore the rate of application.

Jacobs (2021) have recommended a number of other infrastructure improvements including use of the mechanical blowers to aerate the biofilter and adding an additional solids separation process prior to UV disinfection. These amendments would assist with improving the UV disinfection process (including consistency) as well as nutrient removal. Given the current discharge issues are mostly associated with consistency of treatment capability, the Applicant will focus on maintenance to improve the current treatment process. The investment outlook for this work has been given a 5-year horizon. However, should monitoring demonstrate that there is statistically poor treatment outcomes from the plant, improvements would be initiated based upon the decision-making framework for investment addressed through consent conditions.

4.2.1.4 UV Disinfection

Filter bed under-drains lead to a sump where effluent is pumped to a UV disinfection chamber.

The Kāeo WWTP has a Trojan Model UV3000Plus installed which was relocated from the Awanui WWTP in 2014. The unit consists of 1 stainless steel channel with one bank, two modules (8 lamps per module) and automatic wipers.

The original design scope for the Kāeo UV unit is given in Table 4 alongside the actual value of design parameters monitored.

Table 4: Trojan UV3000Plus design scope (source: Jacobs, 2021).

Parameter		Design Limit	Kaeo Performance
Performance		3-log reduction Faecal Coliform (Specific Bacteriophage)	1-log reduction of F-Specific Bacteriophage
Lamp Hours		12,000	11,955[1]
TSS			
Average	g/m^3	-	50
50th percentile	g/m^3	5	42
90th percentile	g/m^3	10	93
Flow			
Average	m^3/day	~112	117
Maximum	m^3/day	~650	550
UVT	%		
Minimum	%	34	1
Average	%	-	32

1. As of 23rd July 2021.

The average UV Transmissivity[12] (UVT) appears acceptable, however Trojan has said that UV treatment performance will be significantly impacted at all values less than this, especially when combined with the high TSS levels currently being seen by the unit. As such, TSS removal is an integral consideration for the Applicant at prior treatment stages.

The lamp hours indicate that replacement is due, and this will be undertaken within the next financial year. Other than this, routine maintenance of the component parts of the UV chamber, such as the lamps, wiper system, hydraulic pump, UV sensor and fouling sleeves, will be undertaken to ensure that system failures are minimised.

[12] UVT is related to the quantity of organics and solids in the water which absorb and scatter UV light. If the UVT is of the water is too low, then UV light cannot penetrate the water and the effective UV dose is reduced.

4.2.1.5 Constructed Wetland

No work is proposed to upgrade the CWL at this stage and therefore effluent will continue to be conveyed to the pipeline for discharge immediately after UV disinfection. However, the Applicant is still seeking to retain this component of the treatment process as a consented activity should it be necessary or desirable to reinstate the CWL during the term of the consent. Its reinstatement will be subject to design and guidance by wastewater treatment experts and, should it be desired by tangata whenua, Mātauranga Māori expertise.

4.2.2 Discharge to the Kaeo River

Wastewater from the UV chamber is conveyed to a manhole and gravity piped to a screened outlet on the true left-hand side of the Kāeo River as generally indicated in Figure 5 below.

Figure 5: Kāeo River looking toward the downstream true right-hand bank opposite the discharge point on the true left-hand bank (Source: Aerial Vision Ltd, 28 November 2021).

The pipe outlet is generally underwater but can be exposed during very low flows that coincide with low tide.

No warning signage to advise the public of the presence of a wastewater outfall in the area was observable during the site visit. The length of the Kāeo River at this site is accessible from Dip Road and there is a dwelling on the true right-hand bank opposite the discharge. Given that there will be an area of mixing of wastewater with river water, signage is proposed to advise the public of this and will be installed by the end of this financial year (2022-2023).

The operator advises that the discharge does not run on a tidal clock but is usually discharged on the outgoing tide. A tidal clock can be installed, however, it is not currently proposed.

4.3 Alternatives Considered

Clause 6(1)(a) of Schedule 4 of the Act states that if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity must be included in the assessment of the activity's effects on the environment.

From August 2021 to February 2022, the Applicant prepared a feasibility assessment to investigate methods of wastewater discharge to land (Appendix H). This investigation was part of a wider FNDC programme to determine the feasibility of utilising wastewater disposal to land schemes across the district as either replacement systems or supplementary systems to the existing 15 municipal WWTP. The Kāeo discharge to land investigation was a desktop assessment that identified potential sites within a certain proximity to the existing WWTP that met certain criteria, such as appropriate topography, geology, and existing land uses. Several discharge techniques are utilised in such schemes, and the assessment considered 4 different methods:

- Soil Aquifer Treatment (SAT);
- Soil Moisture Discharge Methods (SM);
- Slow Rate Irrigation (SR); and
- Combined Land and Water Discharge (CLWD).

An average hydraulic loading rate of 1.14 – 4.14 mm/day was determined based on the soil drainage classes present in Kāeo and the indicative permeability rate associated with clay loam soils. Based on these assumptions, a minimum total area of 7.1ha of land is required for disposal to land which includes a 50% buffer to allow for future growth, adequate distance from surroundings, and a storage pond. However, due to high levels of rainfall and resulting stormwater infiltration into the Kāeo reticulation network, the maximum flow from the WWTP is much larger than the average flow. To deal with high flows it is recommended that 28ha be used for discharge to land options which includes a buffer allowance.

A preliminary cost estimate for this option was determined at $6.2 million[13] which would place high-cost implications to a low ratepayer base. The option of discharging treated wastewater from the Kāeo WWTP to land was assessed as being not economically viable and therefore it is not an option

[13] Within an uncertainty range of $4.4M – $9.3M.

that is being pursued as part of this application to replace the resource consents authorising discharge of wastewater from the WWTP to the Kāeo River.

However, the Applicant has committed to continuing investigations, to engage with landowners and tangata whenua around site selection to progress a preliminary design to enable a refined cost estimate. These investigations are ongoing, the progress of which will be revisited before June 2023.

Given the requirement to continue the operation of the WWTP to provide for the community of Kāeo, it is proposed to continue to discharge treated wastewater to the Kāeo River as this activity can be carried out without significant adverse effect subject to the same or similar current conditions of consent.

4.4 Duration of Consent

The Applicant is seeking a 25-year consent term in recognition of the need for a WWTP facility to service the needs of the community. Further analysis of the appropriateness of the proposed consent duration can be found in Section 10.9 of this Report.

4.5 Other Related Activities

There is a low-lying area immediately abutting the stormwater pond bund which is proposed to be raised to support 500mm freeboard for the entire site should a survey confirm the bund crest levels are below the 1% AEP (plus Climate Change) flood level. This activity will require the importation of a very minor amount of cleanfill (<5m^3) and sediment control measures.

There are no other related activities to the matters which are the subject of this resource consent application which have not already been addressed elsewhere in this report.

5 The Site and Surrounding Environment

5.1 The Treatment Plant Site

The WWTP is located on largely flat terrain at the terminus of a valley floor surrounded by moderately steep surrounding hillsides.

The WWTP is completely contained within land legally described as Lot 1 Deposited Plan 100604 held in freehold Record of Title (ROT) NA55C/372 (Appendix B). The parcel of land has no road frontage however is accessible from Dip Road via a right of way and there are easements for services to the site as well (Appendix C).

The WWTP is situated amongst farmland used for pastoral grazing. All land surrounding the WWTP is zoned Rural Production while the lot that the WWTP is located within is designated at Appendix 5 of the FNDP (FN166, Kāeo/Whangaroa - Sewage Treatment & Disposal Purposes).

The nearest residences to the WWTP site are approximately 200m and 240m to the east-northeast (measured from the edge of the CWL). These residences reside on land owned by Belinda Ehrlenbach (Lot 4 Deposited Plan 126692) and Christine Van Der Veen (Lot 3 Deposited Plan 126692).

5.2 The Receiving Waters

5.2.1 Characteristics

The WWTP discharges into the Kāeo River, which flows into the Whangaroa harbour. While the discharge is not to the CMA, the point of discharge is tidally influenced.

The Kāeo River begins north of Waipapa and flows in a northerly direction into the Whangaroa Harbour. The Waiare and Waionepu streams and Mangaiti Creek are the main contributing streams to the Kāeo River. MetOcean have used Mean Flow of 2.280 m3/s and Mean Annual Low Flow (MALF) of 0.328 m3/s as the discharge for the Kāeo River (at upstream NIWA site ID1004381).

Approximately half of the catchment is native forest and scrub, with the remainder in pine forestry or pastoral farming and lifestyle blocks. Only a small proportion of the catchment is urban cover (<1%). The catchment geology is highly erodible consisting of soft sandstone and mudstone deposits atop steep hill country terrain of Waipapa Group greywacke.

The Whangaroa Harbour is approximately 2,600ha in area and occupies a drowned valley system surrounded by andesitic tuff breccia, lava flows and intrusion outcrops. There are extensive Holocene estuarine and alluvial flats at the head of Whangaroa Harbour, and perched basins alluvial deposits in hill country to the northwest and southeast of the harbour. The waters of the outer harbour have been recognised as being of high natural character while the extensive area of mangrove and the Pupuke saltmarsh to the south are recognised as respectively having Outstanding and High Natural Character.

5.2.2 Physical Habitat and Ecology

The Kāeo River is a soft bottomed bed at the point of discharge, largely consisting of silts and mud. The waterbody is relatively confined to its primary channel in this area with little evidence of avulsion, however, overtopping of the riverbanks onto the surrounding farmland is frequent along the valley floor.

Historical freshwater fish surveys of the Kāeo River by NIWA and DOC have confirmed the presence of an abundance of fish species such as Longfin eel, Common smelt, Redfin bully, Common bully, Shortfin eel, Banded kokopu, Inanga, Bluegill bully, and Torrentfish.

Riparian vegetation of significance to aquatic habitats is low consisting of rank grasses and a few willow trees in the vicinity of the discharge. Riparian margin vegetation becomes richer as the indigenous forest tract of Barrons Bush extends down to the river approximately 200m downstream. Additionally, larger riparian buffers are present downstream of the discharge and these buffers have induced wetland-like conditions allowing for a variety of vegetation to flourish providing habitat for threatened bird species such as the Australasian bittern.

The Whangaroa Harbour contains indigenous algal cover and infauna on both reefs and sediments while the rocky outcrops of headland features provide an abundance of habitat for Pacific rock Oyster. Mangroves are present on the intertidal flats.

5.2.3 Water Quality

NRC undertakes long term state of the environment (SoE) monitoring at a site ('Kāeo River at Dip Rd') approximately 1km upstream of the WWTP discharge location but downstream of the township (Figure 6). This site is approximately 3.1km upstream of the Coastal Marine Area (CMA) Cross-River Boundary demarcation, just before the influence of salt water.

Current state assessment for the SoE site indicates that for most physio-chemical stressors, NPSFM attribute Band of A and B[14] are being achieved.

Benthic macroinvertebrate community health is benchmarked as degraded, (Band C and D) with a '*likely degrading*' trend assigned.

[14] 'Attributes' in the NPSFM 2020 are characteristics of the water that need to be managed and are the equivalent of LAWA's 'indicators'. LAWA evaluates conditions (state) from river sites nationwide against attribute bands described in the NPS-FM 2020, from A (good) to D or E (poor).

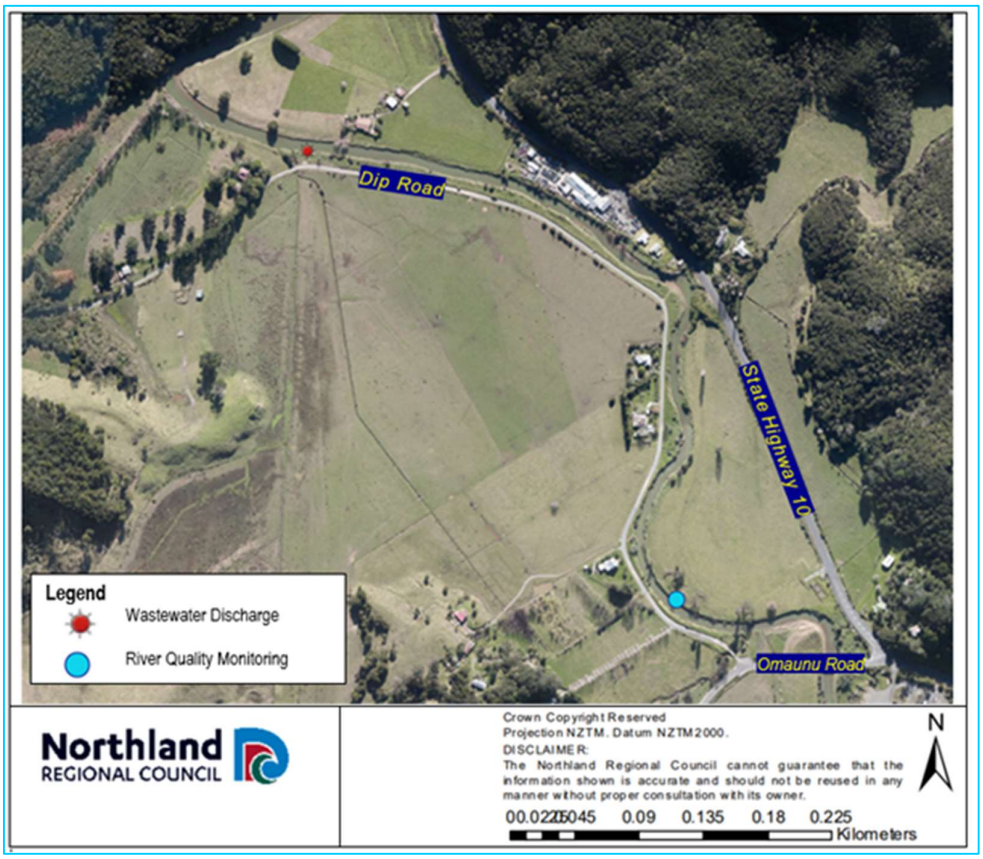

Figure 6: SoE monitoring site relative to WWTP discharge to the Kāeo River.

The SoE data are listed on LAWA and are summarised in Table 5 below – the full summary of parameters is contained in Table 4.2 of the Risk Assessment by Jacobs (2022a).

Table 5: Data summary based on data collected between Jan 2015 and December 2019 relative to PRPN standards (Policy H.3.1, Table 22).

Parameter	Numerical Value	NRC Standard
NH_4 mg/L (annual median)	0.008	≤0.24
NH_4 mg/L (annual max)	0.051	≤0.4
NO_3 mg/L (annual median)	0.018	<1.0
NO_3 mg/L (95th percentile)	0.15	≤1.5
Visual clarity (Black disk distance m)[1]	1.38	≤30% Not more than 30% decrease in black disc or equivalent measurement
E.coli % exceedance over 540 MPN/100 ml	36.7	≤ 20%
E.coli % exceedance over 260 MPN/100 ml	63.3	≤ 34%
E.coli MPN/100 ml (annual median)	403.5	≤ 130

E.coli MPN/100 ml (95th percentile)	6,571.8	≤ 1200
Chlorophyll a mg/m2 (92nd percentile)	26.8	≤200 Exceeded by no more than 8% of samples (default class rivers). Exceeded by no more than 17% of samples in productive class rivers. Based on monthly samples collected over three years

[1] Turbidity and clarity are closely and inversely related. The 80th percentile for turbidity is consistent with the 20th percentile for clarity and vice versa.

There is no long-term programme for monitoring coastal water and/or sediments operative in the Whangaroa Harbour. The stocktake of available information carried out by Jacobs (2022a) found that the available water and sediment quality data that was available for the Whangaroa Harbour lacked validity due to its age and frequency (often one-off sample events).

5.2.4 Human Use Values

Both the Kāeo River and Whangaroa Harbour possess high human use value.

During consultation with the community, it was highlighted that there are popular swimming holes along the Kāeo River. However, the two main swimming holes are located upstream of the discharge.

The Kāeo River is used for mahinga kai including eeling while gathering of Watercress and Taro occurs where these plants grow in lower flow areas of the river.

The Kāeo River can be navigated by small non-motorised boats and motorised craft can be used along much of the river extent at high tide.

There are two consented[15] oyster farms located within the Whangaroa Harbour. The harbour is also well used by the community and visitors for collecting kai moana as well as for boat sports such as Waka Ama and Dragon Boating. The Harbour is a popular anchorage for boats seeking refuge from the open seas and there are designated mooring sites within the inner and outer harbour waters.

5.2.5 Flooding

The Kāeo township is built on a flood plain at about the limit of tidal influence. Flooding is a regular occurrence for the township with the flood hazard over the Kāeo locality depicted in Appendix D.

[15] AUT.036551.01.01-12.01, and AUT.012926.01.01.

The WWTP site is within the mapped flood hazard, however, the analysis by Jacobs (2022b) of the maximum modelled[16] water level of 5.43m above mean sea level (msl) for the 1% Annual Event Probability (AEP) event with climate change will be lower than much of the bund height surrounding the WWTP which sits at a height of 5.5m above msl as shown in Figure 7 below.

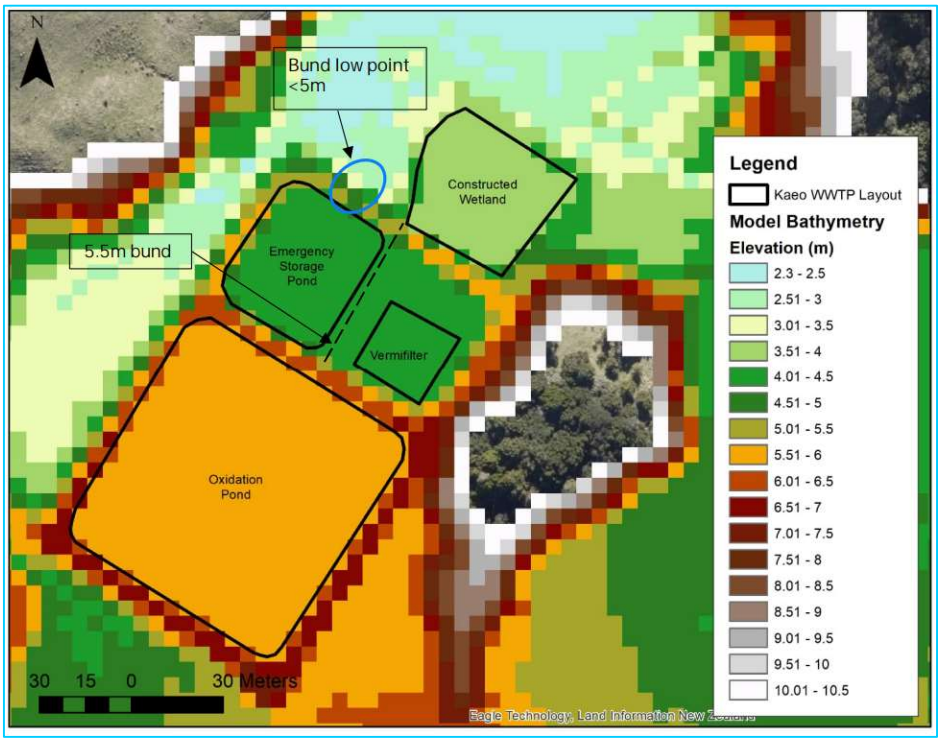

Figure 7: Model bathymetry showing bund heights around the WWTP (Source: Jacobs, 2022b).

There is some uncertainty about the bund level immediately to the north-northeast of the Emergency Storage Pond.

5.3 Historic Heritage

Historic Heritage means those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities:

- archaeological:
- architectural:
- cultural:
- historic:

[16] Kāeo River MIKE Flood Model, Flood Model Results, and Build Report.

- scientific:
- technological;

and may include;

- historic sites, structures, places, and areas; and
- archaeological sites; and
- sites of significance to Māori, including wāhi tapu; and
- surroundings associated with the natural and physical resources.

The nearest mapped historic site is 850m to the east-southeast of the WWTP and is the Wesleyan Cairn (Site 236, Appendix 1E FNDP).

A waahi tapu site is mapped in the FNDP (Place No. MS06-21, Appendix 1F FNDP) immediately to the east of the WWTP site. It is located on Māori Freehold title legally described as Te Mangaiti No 4D Block.

5.3.1 Cultural Values

A Cultural Impact Assessment (CIA) has been commissioned and was due to be submitted to the Applicant for use in the application (see Section 7.1 below for further detail).

At the time of finalising this Report, the CIA had not been received. Rather than provide an improper description of the cultural values of the affected resources, the Applicant will be submitting the CIA as an addendum to this Report once it is received and in accordance with tikanga as prescribed by tangata whenua.

6 Reasons for Application

6.1 Resource Management Act 1991

The Act contains duties and restrictions on persons seeking to use and develop natural and physical resources.

For the Kāeo WWTP, duties and restrictions are set out at Sections 9, 15, and 16 of the Act. These provisions, with the exception of Section 16 of the Act, apply a hierarchy that restricts use and development according to a national environmental standard, followed by rules in a plan and any proposed plan. These restrictions are discussed in further detail in this same hierarchy as follows.

6.2 National Environmental Standards

The Kāeo WWTP is designated in the FNDP with no designation conditions.

Section 43D of the Act prescribes the circumstances where a designation prevails over a national environmental standard as –

> *(1) A designation that exists when a national environmental standard is made prevails over the standard until the earlier of the following:*
>
> *(a) the designation lapses:*
>
> *(b) the designation is altered under section 181 by the alteration of conditions in it to which the standard is relevant.*

Additionally –

> *(5) A use is not required to comply with a national environmental standard if—*
>
> *(a) the use was lawfully established by way of a designation that has lapsed; and*
>
> *(b) the effects of the use, in character, intensity, and scale, are the same as or similar to those that existed before the designation lapsed; and*
>
> *(c) the standard is made—*
>
> *(i) after the designation was made; and*
>
> *(ii) before or after it lapses.*

6.2.1 Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2010

The NES-CS came into effect on 1 January 2012 and sets out nationally consistent planning controls appropriate to district and city councils for assessing potential human health effects related to contaminants in soil. The regulation applies to specific activities on land where an activity included on

the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) has occurred and where activities covered by the NES-CS (i.e., soil disturbance, land use change, subdivision) are proposed.

Minor earthworks may be required to form a suitable foundation for placement of cleanfill to increase the height of the bund around the Emergency Storage Pond. With respect of the land occupied by the reticulation network and discharge pipeline, no soil disturbance or change in land use is proposed in or around these land uses therefore the NES-CS does not apply to these activities.

While the NES-CS relates to matters restricted under Section 9 of the Act, it does not prevail over the designation because the designation existed before the NES-CS was made and the designation has not lapsed nor is it proposed to be altered.

6.2.2 Resource Management (National Environmental Standards for Freshwater) Regulations 2020

The NES-FM deals with functions of regional councils under Section 30 of the Act therefore the designation has no effect over the NES-FM. While the current resource consents prevail over the NES-FM up to their expiries[17], there is no power in the Act to distinguish between applications based on whether they replace an earlier consent or not[18].

The NES-FM contains Regulations for farming activities (Part 2) and for other activities that relate to freshwater (Part 3). Part 2 of the NES-FM as relates to farming is not relevant to the Proposal. Part 3 is separated into three sub-parts; sub-part 1 regulates activities affecting natural wetlands, sub-part 2 regulates reclamations of rivers, and sub-part 3 regulates structures which affect the passage of fish. Only sub-part 1 of Part 3 of the NES-FM is considered relevant to the Proposal and is assessed as follows.

A natural wetland is defined in the NPSFM 2020 as a wetland (as defined in the Act) that is not:

> *(a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or*
>
> *(b) a geothermal wetland; or*
>
> *(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.*

The CWL associated with the WTTP is excluded from examination as per (a) of the NPSFM 2020 definition.

[17] Pursuant to Section 43B(6) of the Act.
[18] *Minister of Conservation v Otago Regional Council*. Environment Court, Christchurch, 25/2/2002, C28/2002, Smith Judge, at [226].

The Kāeo WWTP is specified infrastructure[19] that is surrounded by farmland containing improved pastures, however, there are low-lying areas which are unlikely to be dominated by exotic pasture species, particularly at the southern extent of the WWTP site where ephemeral waterways exit valley confines. For this reason, regulations under Part 3 sub-part 1 of the NES-FM have been assessed as follows.

Table 6: Assessment of activities against regulations of the NES-FM.

Regulation	Activities	Classification
38 & 39	The proposal does not involve restoration of a natural wetland.	Not applicable
40 & 41	The proposal does not involve scientific research which requires vegetation clearance; earthworks or land disturbance; or taking, using, damming, diverting or discharging water.	Not applicable
42, 43, & 44	No wetland utility structures are proposed to be constructed or maintained as part of this proposal.	Not applicable
45	The earthworks associated with the raising of the bund will be set back more than 10m from the nearest extent of natural wetland and, due to their very minor, would not likely require stormwater diversions. As such, this Regulation is not expected to be triggered.	Not applicable
46	Mowing, trimming, and spraying of agrichemicals are included in the definition of vegetation clearance, and these activities may be required within a 10m setback from a natural wetland, this regulation is assumed to apply to these activities which would be carried out under routine maintenance at the WWTP. Such maintenance activity can comply with the general conditions in Regulation 55 and does not contravene any of the remaining performance standards ((b)-(e)) of this Regulation. Wastewater is not included in the definition of 'water' at Section 2 of the Act and furthermore, '*water is not water when it is in a pipe, tank or cistern'* under the definition either. As such, the movement of wastewater throughout the WWTP does not need to be assessed as a diversion or discharge activity under Regulation 46(3) of the NES-FM.	Permitted
51	Flooding of the accessway to the WWTP may leave debris that needs to be cleared, and require earthworks to reinstate it, within a 10m setback of a natural wetland. These activities can be carried out in accordance with the Conditions in Regulation 51(5).	Permitted

[19] District council wastewater trunk lines and treatment plants are identified as Regionally Significant Infrastructure at Appendix 3 of the RPS.

52 & 53	No earthworks, taking, use, damming, diversion, or discharge of water that would result in or would likely result in the complete or partial drainage of all or part of a natural wetland are proposed.	Not applicable
54	All activities associated with the operation and maintenance of the Kāeo WWTP have status' under sub-part 2.	Not applicable

6.2.3 Regional Plans

Table 7 below sets out rules in the PRPN, and the RWSP where a rule is under appeal for activities that are associated with the proposal.

Table 7: Assessment of the activities against rules of the PRPN and RWSP.

Rule	Activity	Classification
C.6.2.2 PRPN	The discharge of treated wastewater from a wastewater treatment plant into water or onto or into land, and any associated discharge of odour into air resulting from the discharge.	**Discretionary**
C.8.3.1 PRPN 34.01.03, 22.01.01 RWSP	Earthworks and any associated damming and diversion of stormwater and discharge of stormwater onto or into land where it may enter water within 20m of a natural wetland are permitted activities in the PRPN subject to thresholds limiting the area of earth exposed and volume placed, and performance standards. Earthworks that are not in a riparian management zone are permitted subject to thresholds limiting the volume of earth moved or disturbed and the Environmental Standards in Section 32 of the RWSP. Separate stormwater diversion and discharge rule applies for land disturbance activities and are permitted subject to performance standards. Minimal placement of cleanfill would be required to increase the height of the bund surrounding the ES-Pond and will comply with the requirements of all relevant rules specified.	**Permitted**
C.2.1.4 PRPN	The use of the outfall structure located within the bank but over the bed of the Kāeo River complies with the performance standards of this rule.	**Permitted**

6.2.4 District Plan

As noted above at Section 5.1, the use of the land for WWTP purposes is designated and there are no conditions attached to the designation as set out in Appendix 5 of the FNDP.

No other land use is required for the continued discharge of wastewater as currently proposed.

An Outline Plan of Works may[20] be required for any work to be constructed on the designated land including any additions to the stormwater bund height or upgrades to the facilities. Consideration of an Outline Plan will be made at the time of any planned work.

6.3 Overall Status of Application

Overall, the proposal is assessed as being a **Discretionary** activity.

[20] Subject to the exceptions at Section 176A(2) of the Act.

7 Consultation

Schedule 4 of the Act requires that an assessment of environmental effects identifies persons affected by an activity, any consultation undertaken, and any response to the views of any person consulted. However, in the same vein, it states that this does not obligate an applicant to consult.

Engagement on the consent replacement application began around the same time that New Zealand went into Level 4 COVID-19 lockdown in August of 2021. Due to uncertainty with constantly shifting COVID-19 restriction levels for Northland[21], the engagement approach adopted by the Applicant was an online format to avoid event cancellations or participant restrictions.

Engagement with tangata whenua began in November 2021 with initial approaches to engage on the consent replacement application made via email and phone calls. A hui was scheduled for 7 December 2021 at the Whangaroa Memorial Hall as per the preferences of those consulted[22]. However, tangata whenua from Te Wakameninga o nga Hapū o Ngāpuhi (TWonHoN) were unable to attend due to other unforeseen kaitiaki commitments that morning and that they had also received news of a COVID-19 case in the community. Matua Pari Rush was however able to join FNDC staff for a brief korero on the matter at the Hall and he provided the team with valuable feedback to consider, including;

- The Rūnanga wants the necessary infrastructure put in place to support the growth anticipated for Kāeo which is different from previous projections due to changes to society from the pandemic (i.e., working from home, moving away from city centres (Auckland)).
- All septage collected should go to the Kāeo plant and not be dumped at private facilities. Coastal communities should be able to connect up to Kāeo WWTP also.
- The Rūnanga/community is trying to keep 'stuff' out of the harbour.
- Discharge to land investigation shows forethought for the future and any new infrastructure of this nature would be supported.

Following this initial hui, three further hui were held with tangata whenua with attendance at these by TWonHoN on 16 December 2021 and Te Rūnanga o Whaingaroa (TRoW) on 24 January 2022 and 14 March 2022. Minutes of meetings were circulated as and when requested to kaitiaki whanau who were unable to attend hui.

For wider community engagement, stakeholders were emailed summary information of the consent replacement application progress on 4th February. Links to the consent replacement webpage and

[21] Particularly during the period August to November 2021 (see https://covid19.govt.nz/about-our-covid-19-response/history-of-the-covid-19-alert-system/).
[22] Te Wakameninga o nga Hapū o Ngāpuhi and Te Rūnanga o Whaingaroa.

key staff contact details were included in the email. The webpage has subscription and feedback portal options but to date there have been no subscribers and no feedback has been placed.

Additionally, stakeholders[23] were sent email invites to a webinar held 16 March 2022 while social media posts and website updates were used to inform the community of the webinar.

The webinar itself was not well attended by stakeholders or members of the wider community, and so FNDC staff undertook the following remedial measures to maintain communications with the Kāeo community, tangata whenua, and stakeholders;

- emailed stakeholders and tangata whenua with a link to the recorded webinar on YouTube; and
- updated the webpage to include a 'Frequently Asked Questions' (FAQ's) for people to read in their own time; and
- emailed the link to the FAQ webpage to stakeholder and tangata whenua contacts.

The WWTP webpage will continue to be used as the main communication tool for the community while stakeholders will be emailed of key application dates and details alongside links to the WWTP webpage.

7.1 Cultural Impact Assessment

TRoW were asked by the Applicant whether they would be willing to prepare a Cultural Impact Assessment (CIA) for the activity subject to support and partnership by the Applicant to which they have agreed. The Applicant informed TRoW that TWonHoN had not been engaged directly to prepare a CIA but that they would support a collaboration of TRoW with TWonHoN should this be deemed appropriate by TRoW.

A copy of the request for proposal is attached at Appendix I with the initial timing of the CIA due on or before 25 June 2022. As at the date of finalising this Report, the CIA had not been received but is understood to be forthcoming by the end of July 2022. The Applicant will be submitting the CIA as an addendum to this Report when it is received and agrees to an extension of time should the NRC require this while awaiting its submission. This procedural request has been communicated to TRoW who were agreeable to this as an appropriate next-step[24].

[23] Including those on the NRC's River Liaison mailing list.
[24] E. Fitzgerald "email message to" M. Letica, 20 July 2022.

8 Notification Assessment – Sections 95A to 95G of the Act

8.1 Public Notification Assessment

Section 95A requires a consenting authority to follow specific steps to determine whether to publicly notify an application. The following is an assessment of the subject application against these steps:

8.1.1 Step 1: Mandatory Public Notification in Certain Circumstances

An application must be notified if:

a) the applicant has requested that the application be publicly notified:

b) public notification is required under section 95C:

c) *the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.*

The Applicant requests public notification of the application therefore mandatory public notification of the application is required. Consideration of all remaining steps to decide on notification need not be given.

9 Assessment of Environmental Effects

Pursuant to Section 104(1)(a) of the Act, when considering an application for resource consent the consent authority must, subject to Part 2, have regard to any actual or potential effects on the environment.

In accordance with the Section 88(2) and Clause 7(2) of Schedule 4 of the Act, the requirement to address a matter in the assessment of environmental effects (AEE) is subject to the provisions of any policy statement or plan, and that the level of detail corresponds to the scale and significance of the effects on the environment. Overall, resource consent is required as a discretionary activity in accordance with the rules of the PRPN. No standards or assessment criteria are directed in these documents for activities of a discretionary nature.

The following is an assessment of any actual or potential environmental effects from the proposed continuation of the existing discharge on the receiving waters of the Kāeo River and associated environs.

A description of the mitigation measures to be undertaken to minimise or remedy the actual or potential effects is also provided.

9.1 Positive Effects

In the Act, unless the context otherwise required, the term 'effect' includes any 'positive effect'.

The continued operation of a WWTP servicing the Kāeo community is beneficial as it collects and treats wastewater from domestic and commercial premises in a resource efficient manner with minimal energy inputs.

The community and tangata whenua have expressed concerns that there are adverse impacts on the environment caused by poor performing individual onsite domestic wastewater treatment and disposal systems within the catchment. The WWTP is preferred by the community and tangata whenua as a more sustainable means of managing effluent from the township as it is subject to strict maintenance and operational controls to achieve strict discharge standards. Furthermore, with the data transparency improvements expected under the NPSFM, the community and tangata whenua will have greater access to compliance information as relates to the WWTP's performance and potential effect on the receiving environment than they would with private systems.

A series of improvements are proposed to primarily reduce solids and nutrients throughout the treatment process in order to at least maintain receiving water quality. The Applicant is also committed to engaging with tangata whenua, stakeholders, and the community on catchment management issues and measures that may seek to address the cumulative impacts of resource use and development in the catchment.

Alternative discharge options, while deemed unaffordable, are still being investigated by the Applicant as, should the affordability of the alternative discharge options be resolved, then this would likely be pursued as the preferred option for managing wastewater for Kāeo.

Overall, the proposal achieves a sustainable balance in enabling the community to provide for its wellbeing to meet the reasonably foreseeable needs of current and future generations while maintaining the environment.

9.2 Potential Effects on Receiving Water Quality

Water quality is affected by past and present land use and development, while baseline water quality conditions are influenced by catchment geology, soils, and landcover. The water quality of an aquatic environment can affect the ability for the water resource to support life, ecosystem processes, provide resources for human activities and uphold social and cultural values. Water quality effects can be both acute and chronic and may be caused by both point source and non-point source origins from within a catchment. All these variables need to be appropriately accounted for to assess the impact or potential impact of a specific discharge activity and how compliance with relevant environmental standards can be achieved.

An Environmental Risk Assessment (ERA) approach has been adopted to assess the actual or potential effects of the discharge on the receiving waters of the Kāeo River. The ERA is a simplified process, focusing on the compliance monitoring for the upstream and downstream receiving environments. The adopted approach is consistent with the *'Guidelines for Risk Assessment of Wastewater Discharges to Waterways*' (EPA Victoria, 2009).

9.2.1 Environmental Risk Assessment

The process for the ERA comprised four main, sequential steps:

Step 1: Characterising the nature of the discharge.

Step 2: Characterise the receiving environment, including 'bottom lines' for the assessment of risk.

Step 3: Analysis of discharge quality and ambient monitoring data.

Step 4: Environmental risk assessment.

For the environmental risk assessment, sensitivity and exposure were combined in a risk assessment matrix to provide a rating of the residual risk that can be attributed to the discharge. The risk assessment matrix is shown in Table 8. The residual risk description is provided in Table 9.

Table 8: Risk assessment matrix (Source: Table 2-1, Jacobs (2022a)).

		Sensitivity of community value		
		Low	Moderate	High
Exposure	Short (days)	Low	Low	High
	Medium (weeks)	Low	Medium	High
	Long (months)	Low	Medium	High

Table 9: Residual risk description (Source: Table 2-2, Jacobs (2022a)).

Risk	Consequence
Low	Minor, short-term stress on the environment with rapid recovery.
Medium	Environment stress observed, short term disruption to breeding cycles and ecological processes; minor disruption to recreation and the aesthetics of the waterway.
High	Significant damage to the environment observed, including impact on threatened species, animal and public health risk and shift in underlying ecosystem processes.

The full ERA is contained in Jacobs (2022a), however, in summary, risk assessment profiles indicated the following:

- There is MEDIUM risk of acute and chronic toxicity associated with elevated concentrations of ammoniacal-N in the effluent discharging to the Kāeo River within the zone of reasonable mixing. There is some indication of a source of contamination between the upper SoE site and the upstream consent monitoring site however.

- There is a generally LOW risk posed by low dissolved oxygen in the effluent discharged to the Kāeo River. Effects are expected to be short, intermittent, and last for a period of days, rather than any long-term effects.

- Data were not available for other water quality parameters (e.g., broader nutrient suite, metals/metalloids/organic toxicants).

The overall risk to the freshwater receiving environment has been graded as 'MEDIUM' in the ERA, driven largely by the acute and chronic toxicity risk of ammoniacal-nitrogen in the effluent. This is regarded as precautionary, given the small subset of water quality parameters for which receiving environment monitoring data associated with the WWTP was available.

9.2.2 Potential Effects on Ecology

9.2.2.1 Dissolved Oxygen

Wastewater contains elevated levels of organic matter, which in itself can affect DO of receiving waters, but can also contribute to excessive aquatic plant growth and algae growth.

Dissolved oxygen (DO) is measured at the outlet pipe while comparative samples are to be taken of the US and DS sites.

A breach of the WQO for the downstream site occurred during a summer sampling round (January 2021). However, subsequent monitoring data indicates dissolved oxygen was within the acceptable range (>4 mg/L for a 1-day minimum level).

The risk to receiving environment health due to reduced DO concentrations is mitigated by the infrequent occurrence of low DO, likely mitigation in the receiving environment of any effluent discharges that have low DO, and the immediate return to ambient DO in subsequent sampling rounds. This suggests the risk is short-lived, most likely for a number of days, rather than for an extended period of time.

9.2.2.2 Nutrient Loading

The concentration of nutrients in the wastewater discharge could potentially result in eutrophication of downstream environments, resulting in in decreased aquatic habitat values for fish and macroinvertebrates. These effects are primarily the result of;

- reduction in dissolved oxygen (DO) levels
- high concentrations of total nitrogen, total phosphorous, and ammoniacal nitrogen in a discharge
- variations to the discharge pH; and
- temperature

Only ammoniacal nitrogen is measured in the treated wastewater and receiving environment as part of the current conditions of consent and therefore the following assessment is focused primarily on ammonia (toxicity).

9.2.2.2.1 Ammoniacal Nitrogen

Human waste is a major source of ammoniacal nitrogen (Amm-N) in New Zealand waterways, alongside animal waste. If Amm-N reaches very high concentrations it can become toxic under certain temperature and pH conditions. Acute toxicity due to Amm-N, as per the attribute definitions in the NPSFM 2020, could be expected if in-stream concentrations exceed 2.2 mg/L associated with acute impact levels (mortality) for sensitive species. Concentrations between 0.4 to 2.2 mg/L Amm-N pose a risk to more sensitive species, associated with reduced survival.

Concentrations of Amm-N downstream of the effluent discharge location are up to an order of magnitude higher than the corresponding upstream consent monitoring location, and two orders of magnitude higher than the SoE median state further upstream. When comparing the profile of Amm-N

within the receiving waters (upstream to downstream) against the WQO's, the following was concluded (Jacobs, 2022);

- Of the 19 monitoring samples of treated effluent (Ex-UV) for the 2020/21 period, only two were at or below the acute toxicity threshold of 2.2 mg/L. Given the annual Amm-N maximums reported[25] in the effluent (ex-UV), this would represent an acutely toxic concentration for biota in the immediate receiving environment of the Kāeo River at the point of discharge. For the annual maximum concentration of Amm-N recorded at the DS site in 2020 to 2021, this poses a probable risk to survival of more sensitive species.

- The median concentration of Amm-N in the upstream consent monitoring site is an order of magnitude higher than the upstream SoE site, suggesting a contaminating source(s) in close proximity to the upstream site that may exacerbate the elevated concentrations further downstream. Despite this apparent elevation in median Amm-N from the SoE site to the consented US monitoring site, both meet the WQO for Amm-N in PRPN Policy H.3.1 (Table 22 PRPN);

- For annual maximum of Amm-N, however, both the US and DS consent sites are in breach of PRPN Policy H.3.1 (Table 22 PRPN) for Amm-N for the 2020 monitoring periods, and the DS site was in breach for the 2021 monitoring period. There were no breaches of the annual maximum reported for the SoE site for the monitoring years 2019 to 2020 (2021 data was not available). These occasional breaches at the US consent site suggests a contaminating source downstream of the SoE site, but upstream of the WWTP discharge location.

Site specific toxicity of Amm-N is influenced by temperature and pH variation. However, given the significant exceedance of the WQO at the US and DS sites (by orders of magnitude), any resulting influence of pH and/or temperature fluctuations on Amm-N toxicity is considered marginal.

Current state assessment for the SoE site indicates that for most physio-chemical stressors, such as Amm-N, NPSFM attribute bands of A and B are being achieved. However, this is paired with an overall habitat state that is *likely degrading*. Given the moderate sensitivity of the receiving environment[26] to nutrient enrichment, the risk of toxicity due to elevated concentrations of Amm-N in the effluent discharged to the Kāeo River is assessed as 'MEDIUM'. Consequently, improvements are needed within the treatment process to minimise ecological risk from toxicity due to elevated concentrations of Amm-N in the effluent.

9.2.2.2.2 Phosphorus

Phosphorus is not currently monitored in the wastewater or receiving environment as part of the current resource consent, however, high levels of total phosphorus in river waters can come from

[25] 28 and 58 mg/L for 2020 and 2021 (Jacobs, 2022; pg 19).
[26] As evidenced from the taxonomic richness at the SoE site.

wastewater as well as run-off from agricultural land. Too much phosphorus in waterways can encourage the growth of nuisance plants such as algal blooms.

The 5-year median for Dissolved Reactive Phosphorus (DRP) and Total Phosphorus (TP) measured at the SoE monitoring site indicates that these physio-chemical stressors can have slight impacts[27] on sensitive ecological communities if other conditions also favour eutrophication.

9.2.2.3 Mitigation of Adverse Effects on Ecology

Contaminants such as Amm-N are removed from wastewater by promoting conditions where bacteria present in the wastewater can achieve targeted nitrification. Additionally, any improvement to remove solids and aerate the effluent will assist with balancing DO in the discharge.

Jacobs (2021) have recommended minor upgrades necessary to improve the WWTP's nitrification processes to reduce Amm-N concentrations in the effluent at the point of discharge. These are primarily focused on reducing biosolids content and enhancing aeration to provide oxygen to the bacteria.

The Applicant is proposing to replace the gravels and undertake routine maintenance to the rotating distribution arm to encourage a larger application area in the next financial year (2022-2023).

A solids separation stage between the biofilter and UV chamber has also been recommended as has amendments to the oxidation pond step screen. These solids treatment upgrades will be implemented if the 'in-pipe' monitoring demonstrates it is a necessary step to achieving the gradual improvements expected under the water quality provisions of the PRPN and NPSFM 2020 acknowledging that the proposed maintenance activities may provide the effluent quality outcomes necessary to at least maintain the quality of the Kāeo River.

MfE (2021) reports that *'Phosphorus is comparatively easily removed from pond effluent via the use of coagulation (with a metal salt such as Alum) and a settlement or floatation process stage*'. While such removal is available, the risk to the receiving environment is not of a magnitude which would require such mitigations to be applied.

9.3 Potential Effects on Public Health

The presence of pathogenic micro-organisms in waters used for recreational activities and the collection of shellfish can pose a health hazard for humans, and lead to restriction of access for recreational purposes. Discharges of wastewater are known to have a residual active pathogen load, and this can potentially affect human health. While the WWTP disinfects all wastewater prior to discharge, there remains a small residual pathogen load that can increase the risk of infection for users of the receiving water.

[27] Such as eutrophication, algal and plant growth.

ESR were commissioned to undertake a screening Quantitative Microbial Risk Assessment (QMRA) which is a technical assessment of the likely risk of the WWTP discharge to public health from pathogenic organisms. The QMRA has considered the risks associated with *norovirus* in discharged wastewater as norovirus has consistently been the pathogen representing the greatest human health risks in recent QMRAs. The assessment includes two components:

- Review of available information on norovirus removal by the processes in place at the Kāeo WWTP.

- Estimation of the risk of illness due to norovirus from primary contact recreation (swimming) and consumption of raw kaimoana (shellfish) at locations within the Kāeo River and Whangaroa Harbour at selected sites.

Viral removal through the treatment process is evident through consent monitoring of F-specific bacteriophage[28] in the influent (INF) and effluent (CWL). Monitoring in grab samples from different points in the treatment train for F-specific bacteriophage was also carried out by Jacobs (2021) in undertaking the review of the performance of the WWTP. Treatment performance with respect to bacteriophage removal was reported to be 3.3 $\log_{10}$ for the 14-day sample round that Jacobs (2021) undertook whereas the average removal from consent monitoring was stated as 4.41 $\log_{10}$[29]. Due to the uncertainty on the degree of removal of enteric viruses by the WWTP, the model was run for four viral reduction levels (1, 2, 3 or 4 $\log_{10}$), to determine what level of viral reduction is required to achieve an acceptable level of risk to human health.

Dilution data are presented as concentrations of a putative contaminant, constantly discharged at a concentration of 1 mg/L. The MetOcean Study generated dilution data as a time series (20-minute intervals) over one full month (neap-spring tide cycle). Within the QMRA model dilutions are applied as multipliers to the discharge concentration of viruses, to give the predicted concentration of viruses at the assessed locations as shown in Figure 8.

[28] F-specific bacteriophage, also known as F-RNA bacteriophage, is a culturable virus, commonly present at high concentrations in human effluent. F-specific bacteriophage infects and replicates bacteria (such as E.coli) that are known to reside in the enteric system (our stomachs).
[29] Table 4 of Jacobs (2021), pg 13.

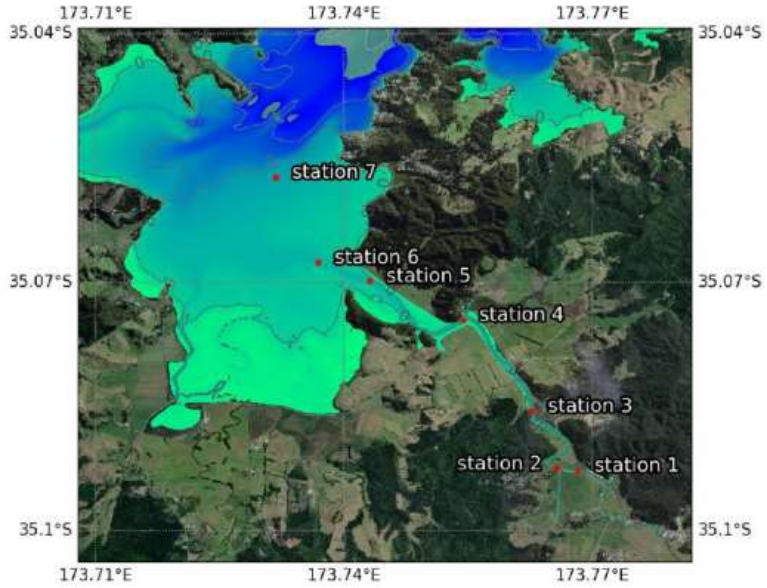

Figure 8: Seven locations used to extract timeseries tracer concentration dilution predictive values (Source: MetOcean Study, 2022).

The QMRA takes a conservative approach at a number of points and it is expected that risks, for the majority of the time, will be lower than those estimated.

9.3.1 Contact Recreation

Children spend more time in the water during contact recreation and ingest water at a higher mean rate than adults. Therefore, the current QMRA conservatively based risk estimates on children swimming at specified points within the Kāeo River-Whangaroa Harbour system.

According to the QMRA, risks of illness due to swimming in the affected environment would equate to recreational water classification of '*Good'* or '*Excellent'* at all assessed sites with the '*Good'* quality achieved in the immediate vicinity of the discharge.

Given the locations and level of contact recreation occurring within the receiving environment the effect of the WWTP discharge on public health during such activity is considered to be minor.

9.3.2 Consumptive Uses

Commercial oyster farming operations are present in the Whangaroa Harbour, approximately 700 m from the mouth of the Kaeo River while recreational shellfish gathering is known to take place in the harbour.

Bivalve molluscan shellfish feed by filtering large volumes of seawater. This means that they may bioaccumulate contaminants, including viral pathogens. However, the viral content of shellfish is the product of processes of accumulation, retention and depuration. Therefore, to accommodate this approach to viral accumulation, the virus content of shellfish at the identified sites was estimated from the mean water virus concentration at that site over the full simulated time series and the bioaccumulation factors (BAF). Fish are not known to accumulate viral pathogens and so are not

used in assessment of risk to human health. As such, risks associated with consumption of shellfish from the affected area were only assessed for estuarine and seawater sites, near the mouth of the Kāeo River and within the Whangaroa Harbour.

The risk of illness from consumption of raw shellfish harvested from the downstream affected environment[30] was ≥1% and frequently ≥5% at a 3 $\log_{10}$ removal in the consented discharge volume at mean river flow conditions. Under conditions of river MALF, risks of illness from consumption of raw shellfish harvested from the affected locations were generally mostly <1% at 3 $\log_{10}$. At 4 $\log_{10}$ reduction, the risk was <2.5% at mean flow for the consented volume and <1% for all other flow and volume scenarios.

Modelling of concentrations of these microbial species at the oyster farm site, due to the Kāeo WWTP discharge, suggests that the discharge is unlikely to be a single cause of the microbial limits being exceeded. However, the cumulative impact of the WWTP alongside other point and non-point sources that contribute to the microbiological quality of the Whangaroa Harbour may be adverse on the oyster farms.

9.3.3 Mitigation of Potential Effects on Public Health

The WWTP discharge is expected to have only a minor influence on overall public health risk with poor microbiological water quality evident in the upper catchment, particularly during high rainfall events.

Faecal indicator bacteria (FIB) data from the effluent monitoring suggests that despite high 95th percentiles for FIB, annual average loads are not significantly exacerbating the poor state of the currently impacted microbiological water quality. Despite this, the Applicant is proposing the following improvements in order to maximise reductions of FIB within the effluent prior to discharge.

9.3.3.1 Timing of Discharge

As would be expected, risks were maximal at the point at which the effluent discharges to the Kāeo River and decrease with distance from this point. Risks were greater under river mean flow conditions than under mean annual low flows. While this might appear paradoxical, it seems that low river flow conditions allow greater tidal flushing in the Kāeo River, while greater river flow volumes may 'hold back' the inflow of seawater. The hydraulic characteristics of the receiving waterbody are therefore important considerations to make when operating the WWTP.

Automation within the WWTP can assist to time the discharge to occur under optimum receiving environment conditions and can also enhance buffer storage available within the WWTP to enable temporary cessation of discharge during high risk periods (i.e., during high rainfall events).

[30] Sites S4, S5, and S6.

The Applicant currently manually times the discharge to occur on the outgoing tide and is not proposing to install and use a tidal clock to automate discharge on the outgoing tide at this stage.

Automation to reintroduce ES-Pond contents back to the Oxidation Pond for treatment and discharge will minimise the likelihood of untreated effluent entering the Kāeo River which currently occurs during high rainfall events.

Should the in-pipe and DS-MS suggest that automation would benefit effluent quality beyond the zone of reasonable mixing, then this type of automation will be implemented. The adaptive management decision-making framework provides for this upgrade pathway.

9.3.3.2 UV Treatment

The F-specific bacteriophage and *E. coli* concentrations in the logbook and sample effluent are significantly higher than the system is designed for. It appears that the WWTP process is struggling to achieve an additional 2-$\log_{10}$ reduction of these faecal indicators. Low performance of the UV unit may be attributed to the high solids content within the WWTP effluent, and it has been recommended by Jacobs (2021) that maintenance work on the unit would assist with its performance. However, the ability or UV treatment to effectively disinfect the wastewater is also affected by high[31] TSS levels.

The Applicant is proposing to replace the gravels in the next financial year (2022-2023) with other minor adjustments in operation to take place to reduce the solids content of the effluent prior to UV treatment. These improvements in the design and maintenance of the WWTP are deemed adequate to achieve consistent reductions of pathogenic micro-organisms in the effluent to levels safe enough for discharge to the Kāeo River.

9.3.3.3 Monitoring

F-specific bacteriophage are currently monitored in the influent (INF) and effluent (CWL) as a surrogate indicator of pathogenic micro-organisms, likely due to the fact that it is culturable which makes it easier to measure than enteric viruses such as norovirus. They are measured because their numbers are likely to correlate the number of a range of stomach bacteria present in the wastewater.

There is an ongoing narrative amongst experts on the use of F-specific bacteriophage as an indicator of pathogenic micro-organisms. ESR have advised that its use would not be inappropriate based on the study of Palfrey et al. (2011), while Jacobs (2021) have advised that viral faecal indicators such as bacteriophage are more resistant to disinfection than more conventionally used indicators, such as *E. coli*.

In-line with other wastewater discharges within the region, it is proposed that *E.coli*, are monitored and limited through consent conditions.

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[31] Above 30 g/m^3 as stated in Jacobs (2021), pg 26.

9.4 Potential Physical Effects on the Locality

Wastewater discharges can result in physical effects on a locality including visual (aesthetic) effects (discolouration, foaming, scums and growths) and accessibility issues.

9.4.1 Aesthetic Effects

The Kāeo River has relatively high turbidity due to catchment influences and a muddy bed substrate which becomes more dominant in the lower reaches of the catchment and is especially so at the discharge point.

Although the River is murky, at the time of making both site visits[32], an algal film could be seen (Figure 9) commencing at the point of discharge and extending approximately 15m downstream which, due to its visible difference to the receiving environment, is an adverse effect on the aesthetic of the Kāeo River but may also be impacting on visual quality and benthic conditions for ecosystem values.

Figure 9: Algal film visible commencing from the discharge point (Source: Aerial Vision Ltd, 28 November 2021)

Appropriate treatment of the physio-chemical and physical contents of the wastewater prior to discharge is therefore necessary to avoid the adverse visual and amenity effects of algal growths that were evident in the Kāeo River below the point of discharge.

9.4.2 Accessibility Effects

Discharges of wastewater to river environments can adversely affect the accessibility of people to the resource due to risks to human health, and physical effects of the presence of infrastructure.

Property information[33] shows that the Kāeo River is essentially 'landlocked' for up to 600m downstream of the discharge meaning that the general public would only be able to access the river

[32] 16 August 2021 and 28 November 2021.
[33] Quickmap, May 2022 update.

by permission of the landowner. However, at and for about 15m downstream of the point of discharge, the river is accessible to the public via Dip Road.

The community have informed the Applicant that the Kāeo River has great recreational value to them, highlighting two popular swimming holes upstream of the discharge especially. However, no swimming or recreational activity was noted at or downstream of the discharge by members of the community that participated in engagement. The Whangaroa Harbour is used for recreational purposes, particularly boating, fishing, and shellfish gathering. Primary contact activities like swimming tends to occur in the deeper harbour waters as there are not many places favourable for shore swimming.

With the exception of the river area that is accessible at the point of discharge from Dip Road, no adverse accessibility effects are likely from the discharge. Accessibility to the River at Dip Road should be managed, if not restricted, due to risks to health and safety of people engaging in primary contact recreation at this location. The outfall is recessed sufficiently within the bank that it should not pose a physical impediment to access to the river.

9.4.3 Mitigation of Physical Effects on the Locality

The reduction of biosolids content and enhancement of aeration through maintenance of the biofilter are key aspects to achieving the outcome of avoiding adverse effects on the aesthetics of the river environment as it will assist with reducing nutrients and TSS in the discharge prior to discharging – both of which are factors in the cause of algal growths. A solids separation stage between the biofilter and UV chamber has also been recommended but has not currently been adopted by the Applicant as part of their programme of upgrades for the WWTP. However, this measure would also assist in improving the consistency of the nitrification process while also reducing TSS in the wastewater. This is an upgrade option that is identified in the adaptive management approach proposed as conditions of consent.

Access to the River at the point of discharge is not proposed to be restricted to the general public. Instead, signage has been proposed to be installed warning the general public of the presence of a discharge outfall. The signage will also state the expected extent of the zone that the discharge requires for reasonable mixing for health and safety reasons.

9.5 Potential Effects on Air Quality

The Kāeo WWTP utilises the biological processes promoted within the pond and biofilter to breakdown effluent, removing harmful bacteria and viruses and reducing nutrient levels through microbial metabolization.

As with any metabolic process, chemical compounds are broken down by living organisms, resulting in new and different compounds that lead to the generation of gaseous compounds and their associated odours.

When a plant is operating as designed, odours are not readily noticeable unless immediately adjacent to raw effluent. Objectionable odours are exacerbated during periods when the treatment ponds become anaerobic, meaning the dissolved oxygen levels within the pond fall, typically after a large die-off of an organism population within the pond. This can occur after a sudden change in influent concentrations (for example increased wastewater, or decreased dilution due to a lack of rainwater), as the aerobic organisms that have increased in population to digest wastewater will not be able to survive in anaerobic environments.

As the dead organisms (usually algae or bacteria) decompose, sulphur compounds, ammonia, and amines can be released to the air. Conditions usually persist until oxygen levels within ponds can be restored, typically a few days depending on the original cause for the population die off. When anaerobic conditions occur within the vicinity of receivers, obnoxious odours can cause nuisance effects on neighbouring properties where prevailing winds carry these compounds across a site boundary.

The Kāeo WWTP is located within a rural environment with minimal development and few neighbouring dwellings.

A record of compliance from 2003 – 2021 was supplied to the Applicant by NRC. It contains no evidence of odour complaints from persons beyond the boundary of the WWTP while all inspection notes confirm that although blue/green algae was present within the main pond at times, no significant odour was consequently being discharged. This indicates that the plant as currently operated has not resulted in obnoxious odours beyond the boundary of the site and it is considered that the odour effects resulting from the plant operation will be less than minor. A complaints register will continue to be maintained and the plant operators will be able to respond to complaints when they arise.

9.6 Potential Effects on Cultural Values

The provisions of the Act require substantive and procedural recognition of Māori values including the mandatory provisions at Schedule 4 of the Act which require resource consent applications to include an assessment of the effects of a proposed activity on, for example:

- the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other tāonga[34];
- cultural and spiritual values[35]

Policy D.1.1 of the PRPN directs resource applicants to include an assessment of the effects of the proposed activity on cultural values that is commensurate with the scale of potential impacts of that

[34] Section 6(e), Part 2, RMA. Clause 2(1)(f), Schedule 4, requires an assessment of the activity against the matters set out in Part 2.
[35] Clause 7(1)(d), Schedule 4.

activity. In this instance, the scale of the potential impacts of the activities requires an analysis of its effects on tangata whenua and their tāonga which can only be provided by way of consultation.

Through consultation, the Applicant understands that TRoW have chosen to prepare a CIA in order to outline the cultural values, beliefs, traditions and taonga that may be affected by the proposal and to provide an assessment about the way in which these matters will or will potentially be affected. As this information itself can be a tāonga, the Applicant will continue to consult with TRoW, hapū and whānau to ensure its use is in accordance with tikanga.

As noted in Section 7.1 above, a CIA has been commissioned but was not available at the time of finalising this Report. It will be submitted to the NRC as an addendum to this Report and under the guidance and instructions of TRoW.

In the absence of a CIA, it is assessed that there are likely to be more than minor adverse effects on cultural values.

9.7 Proposed Monitoring and Mitigation

Given the state of the Kāeo River water at the point of the discharge, the ongoing operation of the Kāeo WWTP must be subject to consent conditions that require the quality of the discharge to be improved over the term of the consent[36] to reduce the contribution of the discharge to the exceedance of water quality standards stated in the PRPN (Appendix H.3).

It is considered that the current conditions (see Appendix L), subject to amendments, contain an appropriate monitoring, mitigation, review and reporting process by which compliance against the relevant WQO's can be achieved. The monitoring conditions and limits contained in the current consent are proposed to be maintained while the adaptive management regime is established, as described below.

9.7.1 Adaptive Management Regime

The existing resource consent predominantly focuses on monitoring of changes to the quality of the Kāeo River. However, as is evident from the ERA, environmental factors, such as periods of heavy rain or drought, result in significant difficulties in monitoring data that can be used to attribute effects to the discharge on the receiving environment to ensure adverse effects of the discharge are avoided, or minimised.

Therefore, it is proposed that an adaptive management plan is prepared as a condition of consent to enable adaptation of the activity during the consent term should monitoring demonstrate that monitored parameters are being exceeded to the point where the quality of the receiving water is not being (at least) maintained.

[36] In accordance with Policy D.4.1 PRPN in particular.

Monitoring will focus on three key areas; being the WWTP's effluent quality at the 'end of-pipe', alongside appropriate instream sites for the parameters set out below in Table 10[37].

Table 10: Proposed effluent quality monitoring and consent limit basis.

Value	Parameter	Consent Limit Basis	Location
Ecotoxicity	Ammoniacal nitrogen (NH4 +N)	Maximum concentration	at the UV outlet pipe (or CWL outlet if operable)
			Kāeo River US
			Kāeo River DS
Water Quality	Total Nitrogen	Maximum concentration	at the UV outlet pipe (or CWL outlet if operable)
	Total Phosphorous		Kāeo River US
	TSS		Kāeo River DS
Public Health Risk	Enterococci	Cell count	From influent pipe to UV outlet pipe (or CWL outlet of operable)
		Maximum concentration	at the UV outlet pipe (or CWL outlet if operable)
			Kāeo US
			Kāeo DS

A minimum of 6-months of monitoring will be used to inform a series of limits that will be added to the adaptive management plan to ensure that the discharge does not continue to contribute to the exceedance of a water quality standard below the zone of reasonable mixing, or in the case of acute ecotoxicity, within the zone of reasonable mixing.

To ensure the method of monitoring remains consistent and that it is not subject to change 'outside of the law', Schedule 1 of the current consent will need to be updated to ensure there is clarity on sample timing, number of samples required for setting of consent limit, consent limit compliance, sample sites, and reporting requirements.

The Adaptive Management Plan to be prepared as a consent condition shall at minimum contain the following details;

1. Limits for the parameters to be monitored in accordance with conditions of consent;

[37] Table 10 is proposed as a condition of consent while the monitoring regime and limit setting will be a part of the adaptive management plan.

2. A WWTP Improvement Plan that shall include (but is not limited to) the following information;

    a) An assessment tool containing a decision-making process to address statistically significant consent limit exceedances which;

        I. Uses investment mapping to determine the best practicable option to implement to address the statistically significant consent limit exceedances experienced;

        II. Uses the Jacobs (2021) recommended improvements/upgrades as the first measure to address the consent limit exceedances; and

        III. Enables additional or alternative improvements/upgrades to be identified and commissioned should the Jacobs (2021) recommendations be insufficient to address the consent limit exceedances.

    b) Procedure for notifying the NRC of the upgrade to the treatment and/or discharge system identified through (a) above and how progress reporting of the construction and commissioning will be made to the NRC.

3. A procedure for review of the Adaptive Management Plan.

9.7.2 Annual Reporting

In order for adaptation to occur, an Annual Report is proposed as a condition of consent and shall contain at minimum;

1. summary information of the performance against resource consent conditions; and

2. an analysis of the monitoring data in respect of anticipated effects on the environment compared to the assumptions and predictions made in the ERA and QMRA; and

3. summary of maintenance activities which would likely have an effect on the performance of the activity when compared against conditions of the consents.

4. summary of upgrades made to the wastewater reticulation, treatment or discharge system since the commencement of consent that would likely have an effect on the performance of the activity when compared against conditions of consent.

The report shall be prepared in a manner which enables its submission to the NRC for certification no later than 30 November every year.

The annual report requires the Applicant to proactively review the performance of the WWTP against resource consent conditions and any gives a succinct record of activities which are likely to have affected the WWTP or reticulation performance. The timing of the submission of the report recognises

that any maintenance or upgrades made are likely to be costed within or across a financial year as opposed to a calendar year.

9.7.3 Operations and Maintenance Plans

Operations and maintenance plans can be valuable tools in assisting the consent holder and authority to pinpoint areas of improvement before significant non-compliance events occur. The Applicant is not opposed to these matters being imposed as conditions of consent.

10 Statutory Considerations

10.1 Part 2 of the Act

The purpose of the Act is to promote the sustainable management of natural and physical resources, which is defined in Section 5(2) as:

> *(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while —*
>
> *(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

As pointed out in *Environmental Defence Society Inc. v The New Zealand King Salmon Company Ltd* [2014] NZSC 38, the term sustainable management is "*broadly framed*", and the language is "*necessarily general and flexible*.[38] The Court also stated that:[39]

> *… the RMA envisages the formulation and promulgation of a cascade of planning documents, each intended, ultimately, to give effect to s 5, and to pt 2 more generally. These documents form an integral part of the legislative framework of the RMA and give substance to its purpose by identifying objectives, policies, methods and rules with increasing particularity both as to substantive content and locality.*

Sections 6, 7, and 8 of the Act set out principles of varying importance to give guidance on the way that the purpose of the Act is to be achieved.

Section 6 states the following matters of national importance that must be recognised and provided for by all persons exercising functions and powers under the Act:

> *(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 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:*

[38] *Environmental Defence Society Inc. v The New Zealand King Salmon Company Ltd* [2014], para 24.
[39] Ibid, para 40.

(c) 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:

(d) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

(e) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(f) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

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

(h) the protection of historic heritage from inappropriate subdivision, use, and development:

(i) the protection of protected customary rights:

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

Section 7 states the following other matters that particular regard must be had to by all persons exercising functions and powers under the Act:

(a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(ba) the efficiency of the end use of energy:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(e) [Repealed]

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

(h) the protection of the habitat of trout and salmon:

(i) the effects of climate change:

(j) the benefits to be derived from the use and development of renewable energy.

Section 8 requires all persons exercising functions and powers under the Act to take into account the principles of the Treaty of Waitangi.

As demonstrated in the assessment of the activity against relevant planning provisions (Section **Error! Reference source not found.**) and the activity's effects on the environment (Section 9), that subject to conditions of consent, the activity will promote the sustainable management of natural and physical resources in accordance with Part 2 of the Act.

10.2 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'.

Part 2 has been had regard to in Section 10.1 above.

The actual and potential effects on the environment of allowing the activity were assessed above in Section 9 and considered to be no more than minor subject to compliance with conditions of consent, with the exception of effects on spiritual or cultural values.

10.3 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—

(i) a national environmental standard:

(ii) other regulations:

(iii) national policy statement:

(iv) a New Zealand coastal policy statement:

(v) a regional policy statement or proposed regional policy statement:

(vi) a plan or proposed plan; and

An assessment of the relevant statutory documents that corresponds with the scale and significance of the effects that activity may have on the environment has been provided below.

10.3.1 National Environmental Standards

10.3.1.1 NES-CS

The designation prevails over the NES-CS as the designation has not lapsed and no alteration to the designation to which the NES-CS is relevant is sought to be notified by the Applicant as the requiring authority.

No activities regulated under the NES-CS are proposed elsewhere in relation to the ongoing operation and maintenance of the Kāeo WWTP.

10.3.1.2 NES-FM

The NES-FM deals with functions of regional councils under Section 30 of the Act, therefore, the designation has no effect on the prevalence of the NES-FM over it.

All relevant provisions of the NES-FM have been addressed at Section 6.2.2 above.

10.3.1.3 NES-DW

The NES-DW deals with functions of regional councils under Section 30 of the Act, therefore, the designation has no effect on the prevalence of the NES-DW over it.

The NES-DW commenced on 20 June 2008 and requires that a regional council must not grant a water or discharge permit for an activity that will occur upstream of a registered drinking water abstraction point if specific criteria at the point of abstraction are exceeded. The matters to be considered as part of an assessment are dependent on the permit being sought and the level of effects on any drinking water supplier located downstream or down gradient of the activity.

According to the Taumata Arowai Register of Drinking Water Supplies, there are no registered drinking water abstraction points downstream of the WWTP discharge to the Kāeo River. As such, there is no obligation on the NRC to consider the NES-DW in determining this application.

10.3.2 Other Regulations

There are no other relevant regulations to this activity.

10.3.3 National Policy Statement

The NPSFM 2020 directs local authorities on how they are to manage freshwater under the Act through their planning documents. It also contains an objective and several policies that are relevant to considering applications for resource consents in an integrated manner.

It contains one Objective (at Clause 2.1) and 15 Policies (at Clause 2.2), which are preceded by an in-depth description of the fundamental concept of 'Te Mana o te Wai' that underpins freshwater management in New Zealand, including six principles relating to the roles of tangata whenua and other New Zealanders in the management of freshwater.

Te Mana o Te Wai is the fundamental concept of the NPS FW and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It is about restoring and preserving the balance between the water, the wider environment, and the community. The hierarchy of obligations outlined in Objective 1 of the NPS FW prioritises this fundamental concept as follows:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic, and cultural wellbeing, now and in the future

The policies of relevance to this proposal which set the course of action to achieve the objective are as follows;

Policy 1:	*Freshwater is managed in a way that gives effect to Te Mana o te Wai.*
Policy 2:	*Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.*
Policy 3:	*Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.*
Policy 5:	*Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.*
Policy 6:	*There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.*
Policy 9:	*The habitats of indigenous freshwater species are protected.*
Policy 12:	*The national target (as set out in Appendix 3) for water quality improvement is achieved.*
Policy 13:	*The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.*
Policy 14:	*Information (including monitoring data) about the state of water bodies and freshwater ecosystems, and the challenges to their health and well-being, is regularly reported on and published.*
Policy 15:	*Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.*

The 15 policies and implementation framework of the NPSFM 2020 which follow this Objective have now largely been given effect to within the PRPN, in particular, specific policies that direct decision-makers to prioritise the health and wellbeing of the water body through consent conditions for

applications seeking to replace expiring discharge consents. Therefore, an in-depth analysis against the NPSFM is unnecessary due to the more specific provisions contained in the PRPN that guides applicants and decision-makers to best give effect to Te Mana o Te Wai at a regional and local level.

As detailed in the sections above, the proposed operational improvements and maintenance will improve the capability of the WWTP to treat the wastewater to reduce the concentration of nutrients (ammonia, nitrogen and phosphorous) as well as pathogenic microorganisms. While these improvements will have a marked difference on the discharge quality itself, it is unclear whether the receiving Kāeo River will be enhanced as a result recognising that there are deteriorating trends in the upstream environment that the improvements of the WWTP may not offset. However, for reasons as detailed in Section 10.3.5 below and subject to conditions of consent, the proposal is not contrary to the NPSFM 2020, and in particular is consistent with Policies 1, 2, 3, 5, 6, 9, 12, 13, 14, and 15.

10.3.4 New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement (NZCPS) took effect on 3 December 2010 and provides national direction for the management of coastal resources and the coastal environment in New Zealand. The purpose of the NZCPS is set out in section 56 of the Act, which states:

> *The purpose of a New Zealand coastal policy statement is to state objectives and policies in order to achieve the purpose of this Act in relation to the coastal environment of New Zealand.*

While the WWTP activities and discharge are not located in the CMA, the NZCPS is still considered relevant to this application due to the potential for effect within the coastal environment.

Similarly to the NPSFM, the PRPN gives regional and local effect to the NZCPS in a full manner. As such, an in-depth analysis of the NZCPS has not been carried out and instead the analysis at Section 10.3.5 can be relied upon. The conclusions at Section 10.3.5 confirm the activity is not contrary to the NZCPS subject to conditions of consent, in particular it is consistent with Objective 1, 3, 5, and 6, and Policies 2, 11, 13, 21, and 23.

10.3.5 Regional Policy Statement and Plans

Most provisions of the RPS were made operative on 9 May 2016 with remaining exceptions made operative on 14 June 2018. The RPS aims to promote the sustainable management of Northland's natural and physical resources, with policies and methods focused on key management issues such as water quantity and quality, biodiversity, economic potential and social wellbeing, infrastructure, natural hazard risk and natural character. The RPS contains clear statements of resource management objectives for the region, the policies and methods of which have directly influenced the content of the PRPN.

In September 2017, NRC notified the PRPN. The PRPN replaces three existing regional plans. In April 2019, NRC accepted and adopted the recommendations of an independent hearing panel of decisions on provisions and matters raised in submissions. Several provisions in the PRPN remain the

subject of appeals to the Environment Court, however, many matters of relevance to this proposal have been resolved and these are contained in the PRPN version released March 2022 (used in this assessment).

The Act does not distinguish between weights to be given to an operative plan and a proposed plan. Case law has established that relevant factors in determining weight include the extent to which the proposed measure has been subject to independent decision-making, possible injustice to the applicant or others, and the extent to which a new measure, or absence of one, may implement a coherent pattern of objectives and policies in a plan. The PRPN contains a coherent policy framework with respect of discharges to land and to water with few relevant matters remaining the subject of appeal. As such, no additional reference has been made to the provisions of an operative plan due to the risk of hindering decision-making by adding an unnecessary layer of objectives and policies that may differ, albeit even slightly.

The RPS and PRPN are very much aligned in their policy direction and as noted earlier, the PRPN also aligns well with the higher order policies contained in the NPSFM and NZCPS which have guided resolution of appeals. Consequently, resource management issues have been grouped and assessed against relevant statutory provisions as follows, with a full complement of all matters contained in Appendix M.

10.3.5.1 Regionally Significant Infrastructure

Objective 3.7 of the RPS provides that, through the use of natural and physical resources, significant enhancement to Northland's economic, cultural, environmental, and social wellbeing can be achieved and that these benefits of regionally significant infrastructure shall be recognised and promoted. Objective 3.5 RPS is related in that it recognises specifically that management of infrastructure is important to the economy. Objective F.1.6 of the PRPN is worded similarly to Objective 3.7 RPS.

Objective 3.8 of the RPS recognises that the use of existing infrastructure shall be optimised, and that any new infrastructure shall be informed by demand management tools. Optimisation includes being flexible, adaptable, and resilient to meet the reasonably foreseeable needs of future generations that will inherit the infrastructure.

Policy 5.2.2 RPS recognises that a long-term outlook shall be taken when considering infrastructure proposals to ensure efficient an uninterrupted planning of its maintenance and upgrading. Policy 5.3.1 of the RPS is about recognising activities that are regionally significant infrastructure[40]. Policies 5.3.2 and 5.3.3 then go onto confirm that the benefits of regionally significant infrastructure can be used in making an overall judgement in terms of Section 5 of the Act while directing how adverse effect arising from regionally significant infrastructure shall be managed. Policies D.2.5 and D.2.7 of the PRPN are worded similarly to Policy 5.3.2 and 5.3.3 RPS. However, Policy D.2.7 PRPN is relative to activities

[40] Appendix 3 of the RPS.

with minor adverse effects only and is not as specific as Policy 5.3.3 RPS with respect of exceedance of a water quality limit.

Policy D.2.8 PRPN provides a framework for enabling the maintenance and upgrading of established regionally significant infrastructure where adverse effects are significant, or they are temporary or transitory and they do not continue in a manner that is not the same or similar to those arising before the maintenance or upgrade was undertaken.

Policy D.2.9 PRPN requires that when considering the appropriateness of regionally significant infrastructure, regard and appropriate weight to certain parameters should be given where adverse effects are greater than those envisaged in Policies D.2.6 and D.2.7 PRPN.

Assessment

The Kāeo WWTP and its reticulated network are regionally significant infrastructure in accordance with (1)(h) of Appendix 3 of the RPS and is recognised in Schedule 1 of the Civil Defence Emergency Management Act 2002 as a *lifeline utility*.

It is anticipated that maintenance activities will not result in increased adverse effects during their implementation, and that the resulting effects of implementing the maintenance will be much improved. The maintenance improvements are of such a minor nature that no disruption to the plant's treatment capacity would occur during their implementation.

The serviced communities of Kāeo and Whangaroa rely on the WWTP to treat and dispose of collected wastes in a cost-effective and sustainable manner. The wastewater produced would otherwise need to be managed onsite which would have a number of adverse impacts to the social, cultural, and environmental wellbeing of people, the community, and tangata whenua. The utility is therefore considered to be critical for the health and wellbeing serviced communities and the environment.

Adverse environmental effects on water quality, ecosystem health, and the natural character of the Kāeo River can be avoided, remedied, or mitigated subject to compliance with conditions of consent which will include the practical and implementable improvements recommended by Jacobs (2021). The receiving environment is dynamic and therefore an adaptive management consent regime using monitoring and a trigger response has been proposed which can respond to change, including through modification to the consented activity, to achieve sustainable resource management.

The Proposal promotes the benefits anticipated through providing for Regionally Significant Infrastructure while avoiding significant adverse effects on certain values while otherwise avoiding, remedying, or mitigating adverse effects on the environment generally.

10.3.5.2 Water Quality

Objective 3.2 of the RPS seeks an overall improvement in the quality of Northland's fresh and coastal water. The achievement of an overall improvement is indicated through five specific outcomes focusing on main contaminants of concern. Objective F.1.2 PRPN sets out outcomes to be achieved through the management of the use of land and discharges of contaminants to land and water. These outcomes generally align with Objective 3.2 RPS.

Policy 4.1.1 and 4.2.1 RPS recognise that water quality improvement objectives are usually best addressed by catchment-specific objectives and limits to provide the basis for regulatory controls on discharges. Additionally, active management to enhance riparian margins and wetlands are to be promoted and supported to achieve water quality improvements.

Policy D.4.1 PRPN directs that when considering an application for a resource consent to discharge a contaminant into water or onto or into land where it may enter water, the consent authority shall do so using criteria set out at (1)-(7) of the policy.

Policy D.4.3 PRPN pre-determines that an application for resource consent to discharge municipal wastewater to water will generally not be granted unless recognised industry management practices are incorporated into the activity and that a discharge to land has been considered and found not to be environmentally, economically, or practicably viable.

The PRPN requires that all discharges must, after reasonable mixing, comply with the receiving water quality standards. Policy D.4.4 PRPN provides guidance to practitioners as to what constitutes the zone of reasonable mixing within this context.

<u>Assessment</u>

Regarding Policy D.4.1 PRPN, WQO's stated in Appendix H.3 are currently being exceeded, however, the quality of fresh and coastal water can at least be maintained while continuing to discharge treated wastewater to the Kāeo River subject to the conditions of consent. The discharge will exacerbate the current exceedance of the WQO's that occur at the upstream site, particularly of faecal microbes, and therefore consent conditions that seek to improve the quality of the discharge over the term of the consent to reduce the contribution of the discharge to the exceedance of the water quality standard in Appendix H.3 are necessary.

As was indicated through the ERA, the discharge has the potential to cause an acute toxic adverse effect to aquatic life from Amm-N within the zone of reasonable mixing. However, the monitoring suggests the exceedance of Amm-N in the wastewater after treatment is transitory, associated with particular climatic and operational circumstances. It is expected that, subject to conditions of consent which set appropriate practical improvements and adaptation at the WWTP, the discharge can be provided for while still achieving Objective F.1.2 PRPN.

Historic monitoring records from targeted/one-off studies conducted in the Whangaroa Harbour suggest that metals/metalloids/organic toxicants have not historically been recorded at concentrations which would exceed the guidelines in Appendix H.3.4. Furthermore, given that future land use development in the catchment is not expected to change significantly from the current land use, emergence of these toxicants in coastal sediments is unlikely.

There is information available on the existing quality of the Kāeo River upstream of the discharge while current consent monitoring provides a good record of the discharge quality to proceed on the basis of conditions of consent.

Regarding Policy D.4.3 PRPN, a discharge to land has been considered and will continue to be considered for future upgrades. It is not feasible to implement this prior to the expiry of the existing discharge consent however. The proposed treatment methods are in accordance with good management practices.

Regarding Policy D.4.4 PRPN, a distance equal to seven times the bed width of the Kāeo River is approximately 110m from the point of discharge[41]. Subject to the conditions of consent, the assessment above confirms that the nature and scale of the discharge would not in itself result in an exceedance of required water quality in the receiving waters and furthermore, in accumulation with catchment inputs, would at least maintain the quality of fresh and coastal receiving waters.

The Proposal is therefore not contrary to the water quality provisions of the RPS and PRPN.

10.3.5.3 Indigenous Biodiversity

The RPS seeks to at least maintain the extent and diversity of indigenous ecosystems and habitats in the region through Objective 3.4. Objective 3.1 RPS reinforces this through recognition of the need to integrate the management of freshwater dependent ecosystems on a catchment-wide basis while Objective 3.15 recognises that areas of significant indigenous vegetation and habitats of indigenous fauna (including those within estuaries and harbours) can be maintained and/or improved through enablement of active management arising from efforts of resource users, the community, Iwi, and hapū.

Objective F.1.2 PRPN sets out outcomes to be achieved through the management of discharges of contaminants to land and water on indigenous species and their associated ecosystems. These outcomes generally align with Objective 3.4 RPS.

For safeguarding water and its ecosystems from adverse effects of discharges, Policies 4.1.1, 4.2.1, 4.4.1, 4.4.2 RPS direct that the level of protection will be determined on a catchment-by-catchment basis, by establishing freshwater objectives and coastal water quality classifications.

[41] As per the PRPN definition of '*zone of reasonable mixing*' [Page 33].

Policy D.2.18 PRPN contains strong protection of indigenous biodiversity in the coastal environment through avoidance provisions, while activities which avoid, remedy, or mitigate adverse effects on indigenous biodiversity outside of the coastal environment are acceptable. The policy recognises damage or loss of connections, life-supporting capacity, and natural processes or systems that contribute to an area of indigenous biodiversity as potential adverse effects.

Policy D.2.20 PRPN requires decision-makers to adopt a precautionary approach where the adverse effects of proposed activities on indigenous biodiversity outside of the coastal environment are uncertain, unknown, or not well understood.

Assessment

The existing discharge from the WWTP has been assessed as having minor adverse effects on aquatic habitats arising from acute and chronic toxicity risk of Amm-N in the effluent to ecosystem health. This was regarded as precautionary, given the small subset of water quality parameters for which receiving environment monitoring data associated with the WWTP was available.

The proposal includes a range of improvements in the short term as well as a set of “end-of-pipe” numerical limits on Amm-N which should ensure the discharge at least maintains the ecosystem health of the receiving waters. The Adaptive Management Regime also proposes the implementation of TL’s

Although a discharge to land option was found to be currently economically unfeasible, it will continue to be investigated in case it becomes feasible as an option in the foreseeable future.

A consent duration of 25 years is sought, balancing the regional importance of the discharge with the potential for minor adverse effects on indigenous aquatic biodiversity.

The Proposal is not contrary to the indigenous biodiversity provisions of the RPS or PRPN.

10.3.5.4 Natural Character

Northland’s natural features and landscapes are a source of cultural and social identity, providing a unique ‘sense of place’ and a source of intrinsic public value. They can also provide tangible economic benefits and contribute to the attractiveness of this region as a place to live and visit.

Objective 3.14 RPS proposes ‘value-dependent’ protections over the qualities and character of freshwater bodies and their margins that are central to the sustainability objectives of the RMA. Policies 4.5.1 and 4.5.2 RPS confirms that the RPS Maps should be used to identify the areas of the region where a more cautious approach to development and use of resources is required to ensure it is appropriate for the receiving environment.

Objective F.1.2, F.1.3, F.1.11, and F.1.12 PRPN describe outcomes to be achieved through the management of discharges of contaminants to land and water on elements which make up the

qualities and character of rivers and their margins such as water quality, ecosystem health, visual clarity, human use values, and cultural and spiritual values.

Policy D.2.1 PRPN seeks to strike a balance where use and development are enabled through rules which seek to protect natural and physical resources that complies with the RPS objectives.

D.2.17 PRPN states that significant adverse effects on the characteristics, qualities and values that contribute to the natural character of freshwater bodies shall be avoided while adverse effects may be avoided, remedied, or mitigated by;

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

…

c) *in fresh water, minimising to the extent practicable modification (disturbance, structures, extraction of water and discharge of contaminants).*

Assessment

As assessed above, there are minor adverse effects on both physical and qualitative elements of the character of the Kāeo River and its margins as a result of the discharge.

The discharge was observably having an adverse effect on the aesthetic amenity of the river environment at the time of both site visits (see Figure 9). The dark green film is described as a transitory effect as it is 'flushed' during spring tides and flooding. Despite its transitory nature, the proposed improvements to the WWTP should reduce solids and nutrient concentrations within the effluent and therefore minimise the frequency of such films developing in the first place.

Public access to rivers is a quality that is expected by New Zealanders and is characteristic of their contribution to the health and wellbeing of people and communities. As the discharge is located in an area accessible to the public, there are certain activities that would need to be limited within its vicinity to protect the health and wellbeing of people and this is considered to be a minor adverse effect. However, the discharge is downstream of known preferred community swimming holes and is upstream of more popular kai moana gathering places so risk from contact recreation or consumption is minimised. Additionally, the improvements and numerical "end-of-pipe" limits should ensure that the discharge quality is improved to minimise the extent of the river environment which the public should avoid due to its ability to mix and assimilate with the receiving waters.

Lastly, the outfall is recessed sufficiently into the bank that it does not adversely affect the navigability of the river which is a characteristic expected of a waterbody of this width.

Subject to the mitigations proposed, the Proposal is not contrary to the provisions which seek to protect the natural character of rivers and their margins from inappropriate use and development such as discharges.

10.3.5.5 Air Quality

The RPS has no specific air quality provisions. There is direction to district councils at Policies 5.1.1 and 5.1.3 of the RPS to avoid incompatible land uses from being sited in close proximity (such as odourous activities near a residential area) in order to achieve the wider economic outcomes anticipated at Objective 3.6.

Objective F.1.13 is to be given effect to through the general course of action indicated in Policies D.3.1, D.3.2, and D.3.4 of the PRPN with respect of discharges of odour to air.

Assessment

The words 'objectionable and offensive' feature quite widely in relation to the management of the cross-boundary effects of air within the PRPN policies. Information on the effects of odour is obtainable from information gathered through complaints and Council Officer investigations. To date, it is understood that there has possibly been one odour complaint early on in the operation of the WWTP. However, this complaint has not been included in the Compliance Record and therefore must be taken as anecdotal unless proven by Council to be otherwise.

Given the lack of verifiable complaints of odour, it is expected that Objective F.1.13 of the PRPN is met for reasons as assessed above.

10.3.5.6 Tangata Whenua

Objective 3.12, and Policies 8.1.1, 8.1.2, 8.1.3, and 8.1.4 of the RPS reinforce the principles of the Act at Sections 6, 7, and 8 with respect of the recognition of the relationship of tangata whenua with the natural and physical environment by providing opportunities for their input into the resource management processes.

Policies D.1.1, D.1.2, D.1.4, and D.1.5 PRPN provide guidance for resource consent preparation and processing with respect to tangata whenua values in order to achieve Objective F.1.9 PRPN. Without guidance there is uncertainty as to the priority of specific tangata whenua values and hence the extent to which there is a need for analysis, and this can result in tangata whenua values being overlooked.

An analysis of the effects of the proposed activity on tangata whenua and their taonga has been commissioned by the Applicant with TRoW. Evidence and guidance from hapū, whānau, kuia, and kaumātua into this analysis was left to TRoW to include. However, this does not exclude whānau from having additional or further input into the resource management process relating to these applications for resource consent as the Applicant has proposed that they be publicly notified.

10.3.5.7 Climate Change and Natural Hazards

Objective 3.13 RPS seeks to minimise the risks and impacts of natural hazard events by, amongst other things, not compromising the effectiveness of existing defences (natural and man-made) and avoiding inappropriate development in hazard-prone areas. Climate change is explicitly included within this objective because under Section 7 of the Act, Councils must have particular regard to the effects of a changing climate on their communities. Objective F.1.10 PRPN is a direct replication of Objective 3.13 RPS with the exception of (8) which refers to landward migration of coastal biodiversity affected by sea level rise and natural hazard events.

Policies 6.1.2, 7.1.1 and 7.1.6 RPS recognise that the effects of climate change on the environment are likely to be significant but scientifically uncertain and therefore a precautionary approach using the most up to date information is necessary when managing development proposals in Northland.

Policy 7.1.4 RPS acknowledges that existing development has already occurred within known hazard-prone areas and that the risk to people and property from natural hazard events should be reduced to provide for community safety and wellbeing in these situations.

Policy D.2.3 PRPN requires that particular regard is had to the potential effects of climate change on proposals for resource consent, and shall take into account the scale, type and design-life of the proposal with reference to the latest national guidance and best available climate change projections.

Policy D.6.4 PRPN recognises that flood defences can have significant benefits in reducing flood hazard risks to people, property, and the environment while Policy D.6.5 PRPN seeks to manage the potential for increased risk to property where development occurs in flood hazard areas.

Assessment

The predicted effects of climate change in Northland include higher temperatures, a decrease in annual rainfall, and more frequent droughts and heavy rain events. Given the adverse impacts of high rainfall events currently experienced in the Kāeo locality, this is a crucial matter which has been assessed and mitigation proposed in the areas of stormwater inflows, storage balancing within the WWTP, and flood defences (Jacobs (2021) and Jacobs (2022b)).

Increased resiliency of the community WWTP to the effects of natural hazard events and the exacerbation of these by climate change are anticipated subject to the design and operational mitigations proposed. Consistency with the anticipated outcomes of the RPS and PRPN on these matters is therefore achieved.

10.3.6 Far North District Plan

The FNDP contains objectives, policies and rules regulating the use and development of land to achieve sustainable management of the natural and physical resources of the Far North District.

The site is designated for wastewater treatment purposes and will continue to be used for such purposes. The permanence and importance of the WWTP in the context of the Kāeo community is therefore recognised through the FNDP and should be given regard to in deciding on the application.

10.4 Section 104(1)(c) of the Act – Other Matters

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."*

Consideration of documents of local relevance to the proposal has been given in the following sections.

10.4.1 Te Ūkaipō 2022-2027

Planning documents, or environmental management plans, recognised by Iwi authorities are a tool that may be developed by tangata whenua to provide an articulation of their values pertaining to a specific natural resource area or areas. These documents provide a platform for interaction between local authorities and Iwi/hapū, including guiding decision-making. And, while they are valuable to the conceptualisation, design and preparation of resource consent applications, their implementation is best attempted under the guidance of the authors or their representatives, if at all.

TRoW are preparing a CIA for this Proposal and therefore the following only gives recognition of the declarations that Iwi/hapū have made concerning the environments affected by the Proposal as recognised in Te Ūkaipō 2022-2027.

ENVIRONMENTAL POSITION STATEMENTS

Whangaroa Harbour

- *Te Rūnanga o Whaingaroa declares the Whangaroa Harbour to be a **tino taonga** of all iwi and hapū of Whangaroa.*
- *Te Rūnanga o Whaingaroa are opposed to contamination of any kind deliberately or accidentally being introduced into the harbour. This includes the impact of any development or activity including forestry, agriculture, horticulture, farming, commercial aquaculture, mining, pest control, domestic and commercial sewerage, stormwater run-off, marine commercial and recreational craft discharge and any other development or activity that may introduce harmful foreign bodies into the Whangaroa harbour.*

Freshwater in Whangaroa

- *Te Rūnanga o Whaingaroa asserts that local, regional and national authorities should ensure that hapū and iwi of Whangaroa will have:*
- *Access to good quality freshwater for domestic use as a basic human right.*
- *Reasonable access to good quality/quantity freshwater in Whangaroa for recreational purposes.*

- *Confidence that the quality/quantity of freshwater in Whangaroa is guaranteed for future generations.*

Te Rūnanga o Whaingaroa expects relevant local government agencies and authorities to work collaboratively with Ngā Hapū o Whangaroa and the Rūnanga to enforce laws and regulations designed to protect the quantity and quality of freshwater in Whangaroa and freshwater tributaries that feed into the Whangaroa Harbour. The protection and utilisation of riparian water rights to filter freshwater must be enforced to this end.

The Management Plan for the Environments within Whangaroa

THE MARINE AND COASTAL ENVIRONMENT

Issues

- *Water quality in many marine and coastal environments is unfit for recreational activity and gathering of food*

Outcomes

- *Interventions are being implemented to help restore the mauri of the Whangaroa marine and coastal environment.*
- *Marine and coastal environments are fit for recreational use and the gathering of kaimoana.*
- *Improved knowledge and understanding of kaitiakitanga.*

Strategic Objectives

- *To establish a positive collaborative working relationship with NRC and other local authorities and agencies to address the issues listed above*
- *To complete work that contributes towards restoring a natural and sustainable environment in Whangaroa for our descendants.*
- *To encourage an understanding and appreciation of the natural environment of Whangaroa and the heritage value of this taonga*
- *To ensure local, regional and national organisations, commercial enterprises, recreational users, residents and visitors to Whangaroa recognise their responsibilities to our natural environments*
- *To ensure local, regional and national organisations actively engage with Ngā Hapū o Whangaroa and Te Rūnanga o Whaingaroa in a timely fashion, allowing for on-going participation from beginning to end, concerning any proposed activities that may impact on these environments*
- *To engage with national, regional and local government to develop and implement strategies, policies, regulations and standards that meet and address the outcomes, issues, and policies in relation to the marine and coastal environment*
- *To ensure the water quality of the marine and coastal environment of Whangaroa is of a standard fit for recreational activity and the gathering of food for human consumption*

- *To actively enhance the capacity and capability of people within Ngā Hapū o Whangaroa and Te Rūnanga o Whaingaroa to implement kaitiakitanga*

THE FRESHWATER, RIVER, STREAMS AND ESTUARY ENVIRONMENTS

Issues

- *Point discharge from milking shed, commercial operations and residential developments*

Outcomes

- *Positively contribute to restoring the mauri and life supporting capacity of water in the puna, rivers, streams and estuaries in Whangaroa.*
- *Direct discharges to freshwater, river, stream and estuary environments are nil or significantly reduced.*
- *There is an acceptable level of access to good quality freshwater for domestic use.*
- *There is reasonable access to good quality freshwater in Whangaroa for recreational purposes.*
- *There is confidence that the quality of freshwater in Whangaroa is guaranteed for future generations.*
- *Improved knowledge and understanding of kaitiakitanga.*

Strategic Objectives

- *To encourage an understanding and appreciation of the natural environment of Whangaroa and the heritage value of this taonga.*
- *To ensure local and regional authorities are operating effectively to monitor and enforce regulations and rules concerning point discharge from milking sheds, commercial operations and residential developments, non-point discharges from farming, forestry and horticultural activities involving stock waste and the application of fertilisers, herbicides and insecticides to ensure that these activities do not negatively impact on the freshwater, river, stream and estuary environments of Whangaroa.*

THE AIR, SOUND, LIGHT AND VISUAL ENVIRONMENT

Issues

- *Smells from landfills, treatment plants, effluent ponds, industrial and/or commercial activities.*
- *Noise levels should not exceed acceptable standards*

Outcomes

- *There are effective controls, monitoring and regulating to address the issues above.*
- *There is a mutually respectful relationship with authorities involved with the issues above and positive outcomes are being achieved.*

Strategic Objectives

- *Positive and helpful relationships are formed with key stakeholders related to the issues above in order that the desired outcomes are achieved.*
- *A record of the issues and how these are addressed in collaboration with various organisations and those involved, is developed and maintained as reference material for future concerns.*

POLITICAL ENVIRONMENT

- *Te Rūnanga o Whaingaroa expect to participate, in a timely manner, in the development, review and discussion that may lead to a 'change' in any FNDC strategy, policy, programme or project that may impact on the natural resources, lifestyles, cultural, social and/or economy of Whangaroa and its people.*

The proposed activity is a discharge of treated wastewater including UV disinfection to remove pathogens. The WWTP is 200m and 400m away from the nearest residence and public place therefore odour has not been an issue to date.

As such, it is considered the activity goes some way to meeting the intent of the policies set out in Te Ūkaipō. However, a full assessment of the Proposal against these declarations is left to tangata whenua to advise through their CIA.

10.4.2 Marine and Coastal Area (Takutai Moana) Act 2011

The MCAA replaced the Foreshore and Seabed Act 2004 and establishes an opportunity for groups to apply for Customary Marine Rights or Customary Marine Title (CMT) over the CMA. Customary Marine Title recognises the relationship of an iwi, hapū or whānau with a part of the Common Marine and Coastal Area and establishes various rights over this area.

The discharge of treated wastewater occurs approximately 1.7km upstream of the CMA and coastal area demarcation, therefore, MCAA is not deemed to be an immediately relevant consideration for this proposal given the limitation stated in Section 62(2) MCAA that it only applies to a resource consent, permit, or approval in relation to a part of the common marine area and coastal area. Notwithstanding this exception, invitations to consult with whānau and hapū have been made and engagement with TRoW is ongoing.

10.4.3 Local Government Act 2002

The Local Government Act 2002 (LGA), which sets out the general powers of councils, and planning and accountability requirements.

Section 101B of the LGA requires that FNDC prepares an Infrastructure Strategy as part of the Long-Term Plan (LTP) process. The strategy identifies the significant infrastructure issues for the FNDC alongside the principal options for managing those issues.

The FNDC's Infrastructure Strategy acknowledges that there are significant challenges in meeting consent compliance for many of its wastewater discharges, particularly with respect to anticipated

future consent standards. The Financial Strategy, also required to be prepared under the LGA, supports the options to invest substantial capital expenditure on the District's wastewater schemes in order to meet legal obligations relating to wastewater treatment quality. These commitments in the LTP provide surety that the WWTP maintenance and improvements as proposed are achievable.

10.5 Section 104(2A) – Value of Investment

Clause 3(b) of Schedule 4 of the Act requires that an assessment of the value of the investment of the existing consent holder be included in an application where an application is affected by Section 124 of the Act (for the purposes of Section 104(2A) of the Act). This application is being made to replace an existing resource consent due to expire on 31 October 2022 and is therefore affected by Section 124 of the Act.

The monetary replacement value of the Kāeo WWTP was last assessed 2 years old as being just under $6 million[42]. Indications from valuers (who are undertaking the next assessment now) is that there will be a substantial increase in the Replacement cost (possibly about 20%) however.

The non-monetary value of the investment to the Applicant as the consent holder is the value to the community of retaining the existing asset. This community WWTP provides for the well-being and health of the current and future businesses and residents of the Kāeo reticulated area. The economic and social value of the asset is significant in that it provides critical infrastructure associated with continued operation of both businesses and households whilst upholding a high level of sanitation.

As discussed in Section 4.3, a land discharge alternative has been considered. At this time, continuing with the existing WWTP and discharge to the Kāeo River is considered the only cost-effective option. However, discharge to land will continue to be investigated and should it become economically viable, would be pursued as a preferred discharge option for the treated wastewater.

10.6 Section 105 – Matters Relevant to Certain Activities

Section 105(1) of the Act sets out the matters that a consent authority must have regard to when considering a resource consent for a discharge permit. In addition to the matters set out in section 104, the NRC must have regard to –

(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and

(b) the applicant's reasons for the proposed choice; and

(c) any possible alternative methods of discharge, including discharge into any other receiving environment.

[42] $5,994,018.42 exactly.

The nature of the wastewater discharges and the sensitivity of the receiving environment is described in Sections 4 and 5 of this report.

The need to maintain the wastewater treatment facility and continue the discharge to the Kāeo River has been discussed throughout this report, while alternative methods of managing the discharge have been identified and discussed in Section 4.3 of this report, including the reuse of treated wastewater for irrigation purposes.

10.7 Section 107 of the Act – Restrictions on Discharge Permits

Section 107(1) of the Act places restrictions on the grant of certain discharge permits to water, if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters –

(c) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

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

(e) Any emission of objectionable odour;

(f) The rendering of fresh water unsuitable for consumption by farm animals;

(g) Any significant adverse effects on aquatic life.

Based on the information presented in Section 4 and assessment given in Section 9, the discharge of treated wastewater as proposed is unlikely to give rise to any of the effects described in s107(c) - (g) beyond the zone of reasonable mixing.

Sections 107(2) and 107(3) of the Act are not considered relevant as these provisions are intended to provide avenues to grant consent where the activity is in contravention of Section 107(1).

10.8 Section 108 – Conditions

The current conditions of consent (see Appendix L) alongside the improvements recommended by Jacobs (2021) adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment of the discharge.

Monitoring, analysis, and reporting is required under the current conditions of consent, and it is proposed that these continue. However, an ‘end-of-pipe’ monitoring focus is implied in this application with instream monitoring only used to confirm whether the discharge has contributed to a WQO exceedance alone or in combination with other inputs affecting receiving river water quality.

10.9 Sections 123 and 125 – Consent Duration and Lapse

Pursuant to Section 123(d) of the Act, the period for which a resource consent is granted is the period not exceeding 35 years, and if no period is specified, is 5 years from the date of commencement of the consent.

Policy D.2.14 PRPN sets out the matters for which particular regard must be had when determining the expiry date for a resource consent, however, it remains the subject of appeal. Royal Forest & Bird Protection Society (NZ ENV-2019-AKL-000127) have appealed that matter (5) of Policy D.2.14 is unreasonable given that transfer of consents is available under the Act. The appeal by F&B is not considered of consequence to the matter at hand and therefore the matters set out at Procedure 37.5 of the RWSP have not been had regard to in the following assessment.

Table 11: Policy D.2.14 PRPN Consent Duration Analysis.

Policy D.2.14 PRPN	Assessment
(1) security of tenure for investment (the larger the investment, then generally the longer the consent duration), and	The WWTP is an essential activity for the serviced community and is a facility that the community would expect has permanence. Financially, the operation and maintenance of the WWTP is a significant investment for the rate-payer base. Capital rates are set on the Kāeo WWTP as the basis to fund the interest and depreciation of costs associated with the provision of sewerage services to connected and capable rating units. A charge is applied on every rating unit in the district for the public good associated with public toilets connected to the WWTP.
(2) the administrative benefits of aligning the expiry date with other resource consents for the same activity in the surrounding area or catchment, and	There are no other similar activities within the surrounding area or catchment that the expiry of this consent would need to align with to gain administrative benefit. It is acknowledged that there are other WWTP's operating under the authorisation of resource consents in the District which could have administrative benefit of aligning expiries of consents but is not essential.
(3) certainty of effects (the less certain the effects, the shorter the consent duration), and	There is a reasonable level of baseline information with regard to the state of the receiving waters and quality of effluent being discharged from historic monitoring. While improvements to the type, and timing of monitoring could be made to give more robust understanding of the receiving water and discharge

	qualities, it is not so fatal that there is uncertainty as to effects.
(4) whether the activity is associated with regionally significant infrastructure (generally longer consent durations for regionally significant infrastructure), and	The WWTP is Regionally Significant Infrastructure.
(5) the following additional matters where the resource consent application is to re-consent an activity: *(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).*	As discussed at Section 3.2 above, past non-compliance with conditions of consent has been graded by NRC as 'low to moderate risk' since the upgrades to the WWTP were made in 2012. The moderate risks non-compliances were predominantly associated with the inability to achieve a 4 order of magnitude reduction in the concentration of F-specific bacteriophage within the wastewater. The current consent conditions are considered suitable however, it is preferred that F-specific bacteriophage conditions are phased out and that specific numerical limits for E.coli be included as conditions of consent instead. According to MfE (2021) 45% of New Zealand WWTP's discharge to river environments and that typically, these discharges are treated using pond-based systems similar to the facilities used to treat wastewater at Kāeo. MfE (2021) goes on to report that retrofit upgrades to pond-based systems have occurred to improve the quality of wastewater and these are similar to those that have been recommended by Jacobs (2021). While more modern treatment options are available, such as activated sludge processes, the performance of the WWTP can be improved to minimise adverse environmental effects through the recommended maintenance and upgrade work (Jacobs (2021)).

Drawing from the assessment above in Table 11, and noting the review provisions available to NRC, the proposed consent duration of 25-years is considered reasonable.

Section 125 of the Act sets out the lapsing provisions which apply to resource consents that have not been exercised. Its purpose is to ensure that resource consents are given effect to within a reasonable timeframe given that they form part of the existing environment upon which future resource use and development would need to consider. Where they are not given effect to, they will lapse, unless an application is made, and the consenting authority decides to grant an extension to the lapse date.

Given this application is for replacement resource consents, and that the WWTP must continue to operate to provide the community with sanitation services, a specific lapsing condition is not required as the resource consents would immediately be given effect to.

10.10 Section 128 – Review

Pursuant to Section 128 of the Act, a consent authority may review the conditions of a resource consent.

Unlike Water Permits, there is no specific policy direction contained in the RPS, PRP or the RWSP for discharge permits regarding approaches to review conditions.

The review conditions contained in the current consent are considered to be suitably robust and appropriate for the activity proposed now as they provide for annual review capability in the month of June for any one or more of the following purposes;

- To deal with any adverse effects on the environment that may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or to deal with any such effects following assessment of the results of the monitoring of the consent and/or as a result of the NRC's monitoring of the SoE in the area;
- To require the adoption of the best practicable option to remove or reduce any adverse effect on the environment;
- To provide for compliance with rules in any regional plan that has been made operative since the commencement of the consent;
- To deal with any inadequacies or inconsistencies the NRC considers there to be in the conditions of the consent, following the establishment of the activity the subject of the consent;
- To change existing, or impose new limits on conditions relating to the quality of the discharge and the receiving waters;
- To change a monitoring programme required by conditions of consent; and
- At any time, notice will be served to review the consent to deal with any material inaccuracies that may in future be found in the information made available with the application.

All reasonable costs of any such review would be recoverable by NRC from the Applicant.

11 Conclusion

The Applicant is seeking resource consent for the relevant discharges under Sections 15(1) and 15(2) of the Act from NRC to continue the operation of the Kāeo WWTP. A duration of 25 years is proposed for these consents. The Applicant requests that the application be publicly notified in accordance with Section 95(3)(a) of the Act which requires the NRC to publicly notify the application in accordance with Section 95(2)(a) of the Act.

Environmental effects of the activities for which resource consents are sought have been assessed in Section 9 of this Report. The WWTP is a regionally significant piece of infrastructure that provides for the social and economic wellbeing and the health and safety of Kāeo and its surrounds. It is recognised that consent conditions as they relate to FIB are regularly breached and that on occasion Amm-N has also exceeded consent condition limits. The Applicant has therefore proposed to implement improvements at the WWTP alongside maintenance to achieve improved water quality outcomes.

It is considered, given the proposed operational process improvements and maintenance to the existing WWTP, that the actual or potential adverse effects on aquatic ecology, human health, and natural character will be mitigated over time to be no more than minor. The effects of odour were assessed to be less than minor and unlikely to manifest beyond the boundary of the WWTP site.

Consultation with tangata whenua is ongoing to determine the potential for adverse effects on cultural values. At present, it is considered that adverse effects on cultural values are more than minor.

Assessment of the Proposal against the relevant provisions of documents referred to in Section 104(1)(b) of the Act has been made given and is found to be consistent with all those assessed, noting that cultural aspects of the proposal have not yet been assessed.

Subject to conditions of consent which recognise the improvements to be made at the WWTP and which impose end-of-pipe limits to contaminants, the Kāeo WWTP is consistent with the purpose and principles of the Act as contained at Part 2.

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