# 5-YEAR REPLACEMENT 'BRIDGING CONSENTS' FOR THE ROTORUA WASTEWATER LAND TREATMENT SYSTEM – BACKGROUND AND SUMMARY DOCUMENT

**PREPARED FOR ROTORUA LAKES COUNCIL**

**November 2020**

# 1. Introduction and Background

The Rotorua Lakes Council (**RLC**) operates the Rotorua Wastewater Treatment Plant (**WWTP**) and the associated Land Treatment System (**LTS**) within the Whakarewarewa Forest, both of which service Rotorua city and surrounding communities. The WWTP and LTS are regionally significant infrastructure which provide an essential service in respect of managing the wastewater generated by the local community and businesses. The WWTP and LTS enable people and communities to provide for their social, economic well-being, and for their health and safety.

Treated wastewater is pumped from the WWTP to the Whakarewarewa Forest where it is spray irrigated to land within the LTS. The LTS was established in 1991 and has been operating since that time, however in 2009 the land on which the LTS is located was returned to Central North Island (**CNI**) iwi as part of the Crown's obligations under the Central North Island Forests Land Collective Settlement Act 2008.

In 2014 the RLC and CNI agreed that the discharge to the LTS should end and the RLC undertook extensive investigations and consultation with key stakeholders, including Te Arawa Lakes Trust (**TALT**), on alternative treatment and disposal options for Rotorua's wastewater which led to a 'Preferred Scheme' being selected. The Preferred Scheme consisted of a significant upgrade to the WWTP to improve the quality of the treated wastewater and its treatment capacity, together with a new discharge regime whereby the treated wastewater would be discharged to Te Arikiroa Thermal Stream, being a very small stream that flows directly into Lake Rotorua at Sulphur Bay. The RLC lodged applications for resource consents for the Preferred Scheme, however, there was significant opposition to the proposed discharge of treated wastewater to Lake Rotorua from the community and iwi (including TALT). The RLC had further discussions with CNI and TALT in an attempt to resolve TALT's opposition to the Preferred Scheme consent applications. During these discussions CNI also confirmed its agreement to allow the RLC to continue to use the LTS for up to five years to enable a medium-term solution to be investigated, designed, consented, and commissioned – this being referred to as the 'Sustainable Forest Approach'. The details of the Sustainable Forest Approach are not currently known but it is likely to involve treated wastewater being discharged to a series of ponds/wetlands within the Whakarewarewa Forest. The purpose of being able to use the Sustainable Forest Approach as a medium-term disposal option is to allow the RLC sufficient time to reconsider its longer-term wastewater management options. These considerations will include revisiting some of the options already considered as part of the optioneering that led up to the (former) Preferred Scheme being selected but will also include consideration of additional options following consultation with key stakeholders

The RLC holds three resource consents associated with the operation of the LTS and these consents are due to expire on 31 July 2021. The RLC is therefore applying for replacement resource consents under the Resource Management Act 1991 (**RMA**) to enable the ongoing use of the LTS for this five-year period, with these short-term consents being referred to as '**bridging consents**'.

The RLC is currently proposing a three-stage programme for management and discharge of treated wastewater from the WWTP as follows:

- Short-term: over the next five years treated wastewater is proposed to continue to be discharged at the LTS – this being the subject of this application and AEE for bridging consents. During this five-year period the RLC intends to:
    - Upgrade the WWTP, including obtaining all the necessary authorisations (i.e. outline plan and resource consents), so that the quality of the treated wastewater is improved to the same level as was proposed for the Preferred Scheme;
    - Develop an agreement with all stakeholders on the preferred option, location, and configuration of a Sustainable Forest Approach solution;
    - Undertake technical investigations to support the Sustainable Forest Approach design;
    - Secure resource consents for the Sustainable Forest Approach; and
    - Commission the Sustainable Forest Approach.
- Medium-term: once designed, consented, and commissioned, treated wastewater from the upgraded WWTP will be discharged to the Sustainable Forest Approach for not less than 10 years (2030) and no more than 23 years (2043).

- Long-term: the RLC will, during 10 to 23-year period that the Sustainable Forest Approach will be used to discharge treated wastewater, explore and pursue an alternative long-term option for the discharge of treated wastewater that does not require the use of CNI land within the Whakarewarewa Forest.

# 2. Description of Bridging Consent Activities

## 2.1 Description of the Wastewater Treatment

There have been many changes to the WWTP since its construction, with progressive improvements in the level of treatment, including improved removal of nitrogen (**N**) and phosphorus (**P**) compounds, together often referred to as 'nutrients'. The WWTP initially comprised secondary treatment with activated sludge and some chemical removal of P.

A major upgrade of the WWTP occurred in 1991, coinciding with the commissioning of the LTS, which comprised the addition of the Bardenpho biological nutrient removal system to improve the removal of N from treated wastewater prior to irrigation at the LTS. Chemical removal of P at the WWTP ceased at this time as the soils at the LTS were identified as having high P retention capacity.

In 2006 further N removal was achieved at the WWTP through the additional upgrades and carbon dosing, with minor flow balancing also being introduced.

In 2012 the WWTP throughput capacity was increased with the installation of a parallel (side-stream) membrane bioreactor (**MBR**) which treats approximately one third of the wastewater. The side-stream MBR system includes a combination of activated sludge biological treatment and membrane filtration.

The treated wastewater stream currently comprises the two secondary treatment processes in parallel (the Bardenpho system and MBR) with the streams combined prior to being pumped to the LTS. The existing WWTP is designed for a connected population equivalent (on a hydraulic basis) of approximately 75,000.

## 2.2 Treated Wastewater Quality

The quality of the treated wastewater has been relatively stable since the last WWTP upgrade in 2012. Table 2-1 presents the summary statistics for the quality the treated wastewater produced by the WWTP in terms of total P (**TP**), dissolved reactive phosphorus (**DRP**), total N (**TN**), nitrate+nitrite-N (**NNN**), organic-N (**Org-N**), total ammoniacal nitrogen (**TAN**), chloride (**Cl**), and *Escherichia coli* (**E coli**). The statistics presented are based on monthly means. The 8-year average concentrations of TN and TP in the treated wastewater to the end of July 2020 were 5.4 grams per cubic metre (**g/m$^3$**) and 2.3 g/m$^3$, respectively.

Table 2-1: Monthly Mean Concentration Statistics of Determinands in the Treated Wastewater Since 2012 (n=101)

| | TP | DRP | TN | NNN | Org-N | TAN | Cl | E coli |
|---|---|---|---|---|---|---|---|---|
| Mean | 2.3 | 2.0 | 5.4 | 3.1 | 1.9 | 0.5 | 45 | 6,954 |
| Minimum | 0.7 | 0.6 | 1.8 | 0.6 | 0.5 | 0.04 | 34 | 390 |
| Lower Quartile | 1.7 | 1.4 | 4.3 | 2.3 | 1.4 | 0.1 | 43 | 1,787 |
| Median | 2.3 | 2.0 | 5.3 | 2.9 | 1.6 | 0.3 | 45 | 3,675 |
| Upper Quartile | 2.9 | 2.5 | 6.4 | 3.6 | 2.0 | 0.5 | 47 | 9,763 |
| 95%ile | 3.9 | 3.6 | 8.0 | 3.9 | 3.7 | 1.8 | 51 | 21,676 |
| Maximum | 4.3 | 4.1 | 10.4 | 4.3 | 5.5 | 4.1 | 59 | 42,525 |

Note: all concentrations are in (g/m$^3$), excepted E coli which is colony forming units per 100 millilitres (**cfu/100 mL**).

## 2.3 Memorandum of Understanding and the Total Nitrogen Allocation

The BOPRC undertook 'benchmarking' over the period 2001-04 to determine the load of N to Lake Rotorua and this resulted in an estimated load to come, based on the then land uses, of 746 t/y. Policy WL 3B of the Bay of Plenty Regional Policy Statement (**RPS**) specifies the total sustainable load of N to Lake Rotorua must be reduced to 435 tonnes per year (**t/y**) by 2032. This reduction is required to achieve the water quality target trophic level index (**TLI**) of 4.2 specified in Objective 11 of the Bay of Plenty Regional Natural Resources Plan (**RNRP**).

In terms of N loads from the WWTP, the RNRP describes how the sustainable nutrient loads to Lake Rotorua will be achieved through targets and reductions. The 2032 wastewater-derived N target load from the WWTP is the load during 2001-2004 benchmarking (which was 30 t/y) plus any changes or transfers that have been accounted for since the benchmarking period. The 30 t/y consented limit was accepted as the 2001-2004 benchmarked load of wastewater-derived N in the Waipa Stream as measured at monitoring Site 5.

The BOPRC tracks the load of N discharging into Lake Rotorua from various sources as part of its Lakes Programme and, in 2017, a Memorandum of Understanding (**MoU**) between BOPRC, RLC, and TALT was signed which outlines how N allocations are to be dealt with as rural land is developed and reticulated into the future. The MoU identifies that changes have occurred (through development of rural land into residential land that is reticulated to the WWTP) between the 2001-2004 benchmarking period and 2017 which has resulted in an additional 2.4 t/y of N having effectively been transferred from rural land to the WWTP. This essentially means that the annual wastewater-derived N load in the Waipa Stream (as measured at monitoring Site 5 located downstream of the LTS) 'allocated'[1] to the RLC is actually 32.4 t/y, and not the 30 t/y[2] (measured at monitoring Site 5) which was previously imposed as a limit on resource consent 60739/1.

***Total Nitrogen Loads for the Bridging Consents***

The current consent authorises a discharge of up to 51 t/y of TN to the LTS, which is assumed to equate to 30 t/y of wastewater-derived N in the Waipa Stream as measured at monitoring Site 5 downstream of the LTS.

The bridging consents seek authorisation to discharge up to 55 t/y (compared to the currently authorised 51 t/y of TN) to the LTS, which is assumed to equate to the 32.4 t/y of wastewater-derived N in the Waipa Stream agreed to in the MoU.

It is important to emphasise that the "increase" (32.4 t/y cf. 30 t/y) in the wastewater-derived N loads in the Waipa Stream at monitoring Site 5 is not actually an increase in the total load of N to Lake Rotorua, but rather it reflects a transfer of N allocation associated with reticulating septic tank loads to the WWTP that occurred between 2004 and 2017 (i.e. since the benchmarking period).

## 2.4 Description of the Land Treatment System and Operation

Treated wastewater from the WWTP is irrigated to land in the north-west corner of the Whakarewarewa Forest[3]. The LTS is divided into 16 spray irrigation blocks (Figure 2-1), of which 14 blocks are normally sprayed at any one time (on a weekly basis until the end of 2001 and daily basis from 2002). Two blocks are generally excluded from irrigation scheduling for forest management purposes, such as harvesting or replanting.

Wastewater is applied using sprinklers equipped with pressure reducing regulators and the application rate to the spray block is 5 mm/h. The sprinklers are set ~1 m high on stands and set out on an approximate 20 m by 20 m grid.

[1] There is no formal 'allocation' of N to the WWTP, however the 32.2 t/y from the WWTP is an assumed allocation and is used by the BOPRC for accounting purposes for the catchment loads of N to Lake Rotorua.
[2] The consent limit was expressed in terms of a maximum TN load in any 12-month (rolling) period as measured at monitoring Site 5. In this report 't/y' has the equivalent meaning and does not necessarily equate to calendar year.
[3] The RLC has an easement over 433 ha of the forest but the installed LTS occupies a smaller area than the easement area.

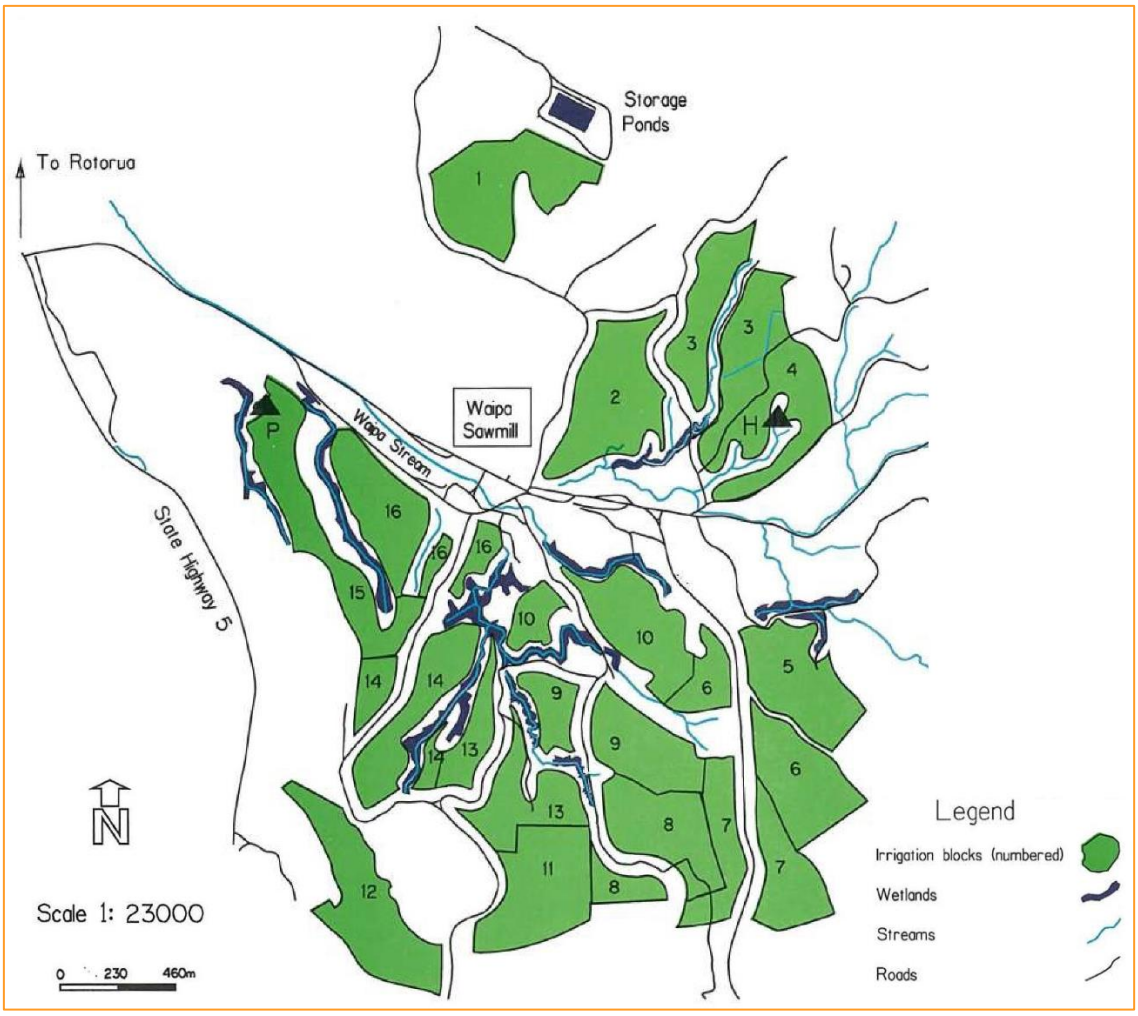


Figure 2-1: Layout Map of the Rotorua Land Treatment System

## 2.5 Weir Structure on the Bed of the Waipa Stream

The existing resource consents include authorisation for six structures on the beds of various streams within the LTS that have been used for monitoring purposes. However, only one of those structures is now used for monitoring purposes, this being a concrete structure located on the bed of the Waipa Stream downstream of the LTS at monitoring Site 5. This concrete structure is used to measure the flow rate of the Waipa Stream, the results of which are used together with water quality results to determine the mass load of N and P leaching from the LTS to Lake Rotorua via the Waipa Stream.

In terms of the other five structures, the RLC will be removing these as they are no longer required. Removal of such structures is a permitted activity under the rules of the RNRP.

## 2.6 Discharge of Contaminants to Air

The existing resource consents include authorisation to discharge contaminants, being odours and aerosols, to air within the LTS as a result of spray irrigation of the treated wastewater. No replacement consent is being sought for this activity as it is a permitted activity under the rules of the RNRP.

# 3. Assessment of Environmental Effects

## 3.1 Positive Effects

The ability to continue to use the LTS to discharge treated wastewater from the WWTP has a **significant** number of positive effects for the residential, business, and industrial areas it serves.

The key positive effect of the WWTP and the continued ability to discharge treated wastewater at the LTS over the next five years is the continued provision of a safe and reliable public health sanitation system for both existing and planned residential and business/industrial development in Rotorua's urban area and the outlying smaller communities connected to the WWTP. Provision of a safe and sanitary wastewater scheme eliminates the need for onsite or alternative sewage facilities for residential and business use in urban areas should such alternative approaches be permitted and sustainable in terms of protecting public health and the natural built environment.

Whilst the RLC is seeking replacement consents for a relatively short period of time (five years), there is currently a significant amount of residential growth occurring within the areas that are serviced by the WWTP. The population serviced by the WWTP is expected to grow in the order of 10% over the next five years so the granting of the bridging consents is critical to enable this growth to occur and will provide a positive effect for the community's social and economic wellbeing.

The continued ability to discharge treated wastewater at the LTS will provide significant benefits for the well-being of the community in terms of the "health and safety" requirements in Part 2, section 5 of the RMA.

## 3.2 Adverse Effects

### 3.2.1 Introduction

The actual and potential adverse effects associated with the activities for which resource consents are being sought relate to:

- Leaching of the nutrients applied to land within the LTS into groundwater, then into the receiving water bodies, thereby affecting water quality and aquatic ecology;
- Fish passage over the concrete structure on the bed of the Waipa Stream at monitoring Site 5;
- Public health and safety for users of the Whakarewarewa Forest; and
- Māori cultural values.

The following sections discuss these actual and potential adverse effects – in summary the effects associated with the ongoing use of the LTS for a further five years been assessed as being **less than minor**[4].

### 3.2.2 Leaching of Nutrients

The irrigation of treated wastewater at the LTS has the potential to result in changes to the soil chemical properties as well as the quality of groundwater beneath and downgradient of the LTS, including within the receiving surface water bodies, being the Waipa Stream, the Puarenga Stream, and Lake Rotorua.

The RLC has commissioned Scion[5] to review the monitoring results with the aim of determining potential effects of continuing to irrigate treated wastewater within the LTS for the next five years.

#### 3.2.2.1 Phosphorus

The soils within the LTS are derived from volcanic parent material and the top 2-3 m of soil contains a clay mineral called allophane which has an exceptional ability to adsorb P.

The P adsorption within soils of the LTS has resulted in very little TP leaching from the LTS to groundwater and then to the Waipa Stream. This can be seen in Figure 3-1 which plots the TP applied to the LTS compared to the wastewater-derived TP measured within the Waipa Stream downstream of the LTS at monitoring Site 5 (the compliance site).

---

[4] With the possible exception of effects on Maori cultural values, as that those effects have yet to be assessed (discussed in Section 3.2.7).

[5] Scion is a New Zealand Crown Research Institute (CRI), being a government-owned company that carries out scientific research for the benefit of New Zealand.

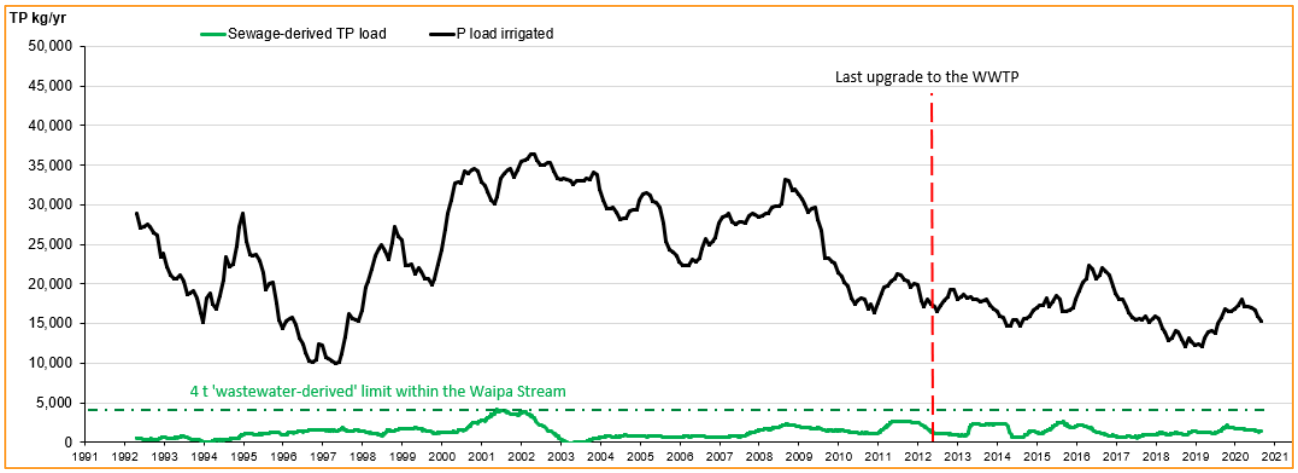


Figure 3-1: Total Phosphorus Applied to the Land Treatment System Compared to Downstream Total Phosphorus in the Waipa Stream

Scion predicts the average annual wastewater-derived mass load of TP at monitoring Site 5 during the next five years of use to be in the order of 0.92 t/y, this being well below the currently consented 4 t/y limit.

#### 3.2.2.2 Nitrogen

Unlike P, the soils at the LTS have a relatively low capacity to store N. The majority of the TN applied to the LTS is in the form of nitrate-N which is relatively unreactive and therefore able to readily move down the soil profile and leach to groundwater and from there to the Waipa Stream.

Figure 3-2 compares the TN mass load applied to the LTS to the wastewater-derived TN load measured within the Waipa Stream at monitoring Site 5. During the first ~10 years of irrigation the TN mass load within the Waipa Stream increased slowly as TN stocks within the soils built up due to the applied TN – it should be noted the TN applied when the LTS began included a greater proportion of TAN and organic-N.

Since the WWTP upgrade in 2012 the pattern of TN loads in the Waipa Stream has been similar to the TN load applied to the LTS, however the mass measured in the Waipa Stream and monitoring Site 5 is ~60% of the applied load.

The *average* 12-month rolling TN mass load to the Waipa Stream, as measured at monitoring Site 5, since the 2012 WWTP upgrade has been 21.3 t, the *maximum* 12-month rolling TN mass load has been 30.5 t, and the *90%ile* 12-month rolling TN mass load has been 29.2 t.

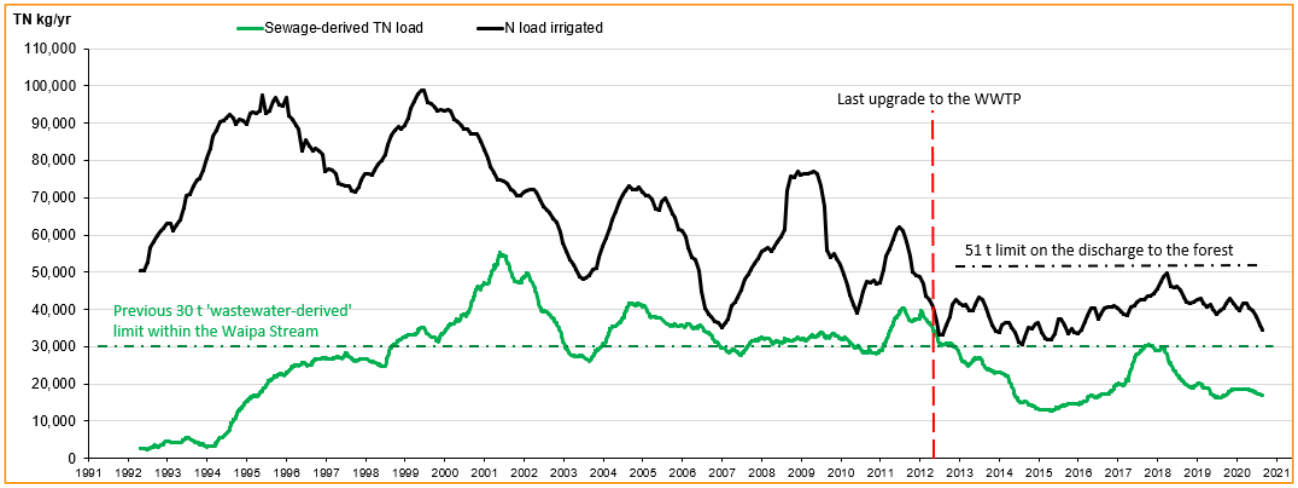


Figure 3-2: Total Nitrogen Loads to the Land Treatment System and Wastewater-derived Total Nitrogen Loads within the Waipa Stream

Scion predicts that the *average* annual wastewater-derived TN mass load in the Waipa Stream at monitoring Site 5 over the next five years will be below the 32.4 t/y outlined in the MoU.

### 3.2.3 Water Quality and Aquatic Ecosystems

As discussed in the previous sections, the irrigation of treated wastewater within the LTS results in leaching of N and P to groundwater and this groundwater then discharges into the Waipa Stream, which in turn discharges to the Puarenga Stream, and ultimately to Lake Rotorua. The irrigation of treated wastewater within the LTS therefore has the potential to affect the water quality within the Waipa Stream, the Puarenga Stream, and Lake Rotorua, including potential effects on the aquatic ecosystems within those receiving water bodies.

The RLC has engaged River Lake Limited to review the water quality monitoring data collected to date and to assess potential effects on aquatic ecosystems. The following sections summarise River Lake Limited's findings.

#### 3.2.3.1 Potential Toxicity Effects

Nitrate-N and TAN can be toxic to aquatic organisms. The water quality within the Waipa Stream upstream and downstream of the LTS is well above the national 'bottom-line' values set in the National Policy Statement for Freshwater Management 2020 (**NPS-FM**)[6]. The attributes of nitrate-N, TAN, and *Escherichia coli* bacteria all fall within either Band "A" or "B".

River Lake Limited considers the risk of chronic toxicity occurring in the Waipa Stream from nitrate-N or TAN sourced from the LTS to be 'very low' – a term equivalent to 'less than minor' using RMA terminology.

River Lake Limited states the projected 10% increase in flows and loads to the LTS over the next five years (due to the expected population increase) will result in a commensurate increase in nitrate-N and TAN in the Waipa and Puarenga Streams. However, a 10% increase in nitrate-N or TAN concentrations would be too small to change the current NPS-FM band and River Lake Limited states the risk of chronic toxicity effects will remain 'very low' (i.e. **less than minor**).

#### 3.2.3.2 Eutrophication Effects

##### 3.2.3.2.1 Waipa Stream and Puarenga Stream

Despite the high nutrient concentrations and relatively stable flow in the Waipa Stream, River Lake Limited notes the cover and biomass of periphyton is generally low except where there is occasional stable substrate in unshaded sections of the stream.

River Lake Limited states the concentration of soluble inorganic nitrogen (**SIN**)[7] and DRP, both of which can drive eutrophication, in the Waipa Stream are well in excess of concentrations required to control periphyton growth. Applying the regression model in Biggs (2000) to the mean concentrations in the Waipa Stream suggests that periphyton would exceed the guideline value of 200 mg/m$^2$ within 17 days at monitoring Site 5 downstream of the LTS (potentially controlled by DRP), and within 18 days at the monitoring site upstream of the LTS (potentially controlled by SIN).

Although nutrient concentrations in the Waipa Stream are high and the rate of periphyton growth within the stream is *potentially* high, the actual periphyton cover and biomass within the stream is limited by highly mobile pumice substrate and sections of riparian shading. The same limitations are restricting the cover of macrophytes in many sections. This same observation was noted by Scholes (2012) who said: "*nutrients [in the Waipa Stream and Puarenga Stream] are at levels that can increase nuisance biological growths; however due to the nature of moving bed load in this stream nuisance growths are not observed*."

The aquatic macroinvertebrate community surveys undertaken also indicate little effect from the LTS on the Waipa Stream and found little change in the overall ecology since pre-irrigation in 1988 and recent macroinvertebrate community index (MCI) scores indicate 'fair' to 'excellent' condition at sites downstream of the inputs from the LTS.

River Lake Limited considers the small increases in wastewater loading that might occur during the five-year period of continued use of the LTS will have a 'negligible marginal' effect on the periphyton, aquatic macroinvertebrate, or fish communities in the Waipa Stream – this level of adverse being '**less than minor**'.

---

[6] The NPS-FM includes a National Objectives Framework ("NOF") which sets compulsory national values for freshwater to protect 'human health for recreation' and 'ecosystem health'. The NOF ranks attributes into bands (A-D) to help communities make decisions on water quality. This includes setting minimum acceptable states called 'national bottom-lines'

[7] SIN is the sum of nitrate-N, nitrite-N, and TAN.

#### 3.2.3.2.2 Lake Rotorua

The discharge of treated wastewater to the LTS contributes to the load of TN and TP to Lake Rotorua, and this falls within the scope of being a 'cumulative' effect.

At a catchment level, sustainable annual N and P loads have been established for Rotorua catchment to ensure the lake water quality targets are achieved. The water quality in Lake Rotorua has dramatically improved over the last 20 years due to multiple interventions including removing the direct discharge of wastewater to the lake in 1991 and alum dosing of the Puarenga and Utuhina Streams between 2008-2010. Lake Rotorua is now tracking close to its Trophic Level Index (**TLI**) water quality target. Nevertheless, reducing catchment N and P loads remain important to achieve the water quality targets sustainably over the long term.

The effect of extending the life of the LTS by an additional five years on water quality in Lake Rotorua and the ability of Lake Rotorua to achieve its water quality targets is considered by River Lake Limited to be low for the following reasons:

- The contribution of leaching from the LTS on TN and TP loads to Lake Rotorua is small relative to other catchment loads;
- There is a trend of improving (decreasing) nitrogen and (to a lesser extent) phosphorus concentrations in the Waipa Stream attributable to improved management of the treated wastewater;
- There is a trend of improving water quality in Lake Rotorua and the lake is now tracking close to its target; and
- The proposed extension is short-term (five years).

In addition, the 32.4 t/y of wastewater-derived TN from the LTS has been allocated and accounted for in the 435 t/y total sustainable load to Lake Rotorua.

### 3.2.4 Wastewater-derived Nutrient Loads in the Waipa Stream after 2026

The RLC proposes to cease irrigation of treated wastewater at the LTS in 2026 after which there will be no further wastewater derived P or N additions to the LTS. Scion assessed the likely 'legacy' effects associated with the LTS in terms of ongoing leaching of P and N to the Waipa Stream. The LTS will receive only rainfall following cessation of irrigation, with the resultant hydraulic loading to the soils being in the order of three times lower than during irrigation.

Scion notes the applied DRP is strongly adsorbed onto the allophanic soil while organic-P will have been bound to the somewhat more mobile soil organic matter. Accordingly, Scion concludes that wastewater-derived P in the Waipa Stream following cessation of irrigation will be minimal.

Scion concludes that, after irrigation ceases, the nitrate-N leaching from the soil will continue as incident rainfall drives the nitrate-N downwards and out of the soil profile, however the leaching rate will decrease rapidly over time. Scion considers wastewater-derived nitrate-N concentrations within the Waipa Stream downstream of the LTS will reduce over time due to the reduction in nitrate-N leaching from the LTS, with concentrations in the stream reaching near 'background' concentrations in, at most, 185 days (around six months). It should be noted that nitrate-N will not reach pre-LTS (i.e. pre1991) concentrations because other changes have occurred in the catchment which has resulted in increased TN concentrations entering the stream, including from upstream of the LTS. The concentrations, as measured at monitoring Site 5 are expected to reduce to ear those currently observed upstream of the LTS at monitoring Site 10.

### 3.2.5 Effects of Structures on the Beds of Streams

The concrete structure located at monitoring Site 5 may inhibit the ability for fish to climb the structure and continue to the upstream reach of the Waipa Stream. However, River Lake Limited concludes the structure does not pose a significant barrier to the migration of brook trout, and a healthy population of this fish species exists upstream of the structure. Shortfin eel and kōura are also found upstream of the structure but their abundances appear to be low.

River Lake Limited has recommended that the potential for the structure to be a barrier to fish migration should be mitigated by installing a fish pass structure/device that is consistent with the New Zealand Fish Passage Guidelines (Franklin et al. 2018). One option considered appropriate would be the installation (retrofit) of a floating fish ramp, similar to that in Figure 3-3. A condition has been volunteered which would require a fish pass structure/device to be installed on the concrete structure at monitoring Site 5 within six months of the date of commencement of the new consents. The device would need to be designed by, and its installation supervised by, an aquatic ecologist experienced in designing such structures/devices.

Figure 3-3: Example of Floating Fish Ramp

### 3.2.6 Public Health and Safety for Users of the Whakarewarewa Forest

While no resource consent is needed to discharge treated wastewater to air (via the spray irrigators), the RLC has considered potential effects on air quality because parts of the LTS are used for recreational activities.

When the LTS was commissioned in 1991 there were few other users of the area of the forest where irrigation occurred. However, in the intervening period the forest has been developed such that there are now a multitude of uses, including mountain biking, walking, and equestrian activities, throughout the forest. Some of these uses occur in the areas used to irrigate treated wastewater.

Potential adverse effects on public health and safety primarily relate to the interaction between the members of the public and the wastewater being irrigated; specifically, the microbiological components within the treated wastewater (pathogenic bacteria and viruses) affecting the health of members of the public.

The RLC has placed signs at key entry points where the public access the network of tracks within those blocks of the LTS where such tracks are present. An example of signs placed by the RLC is shown in Figure 3-4.


Figure 3-4: Example of Signage at a Track Junction Area within Irrigation Block 1

The typical 'throw' of treated wastewater from a sprinkler under the normal pressure regime is a circle of approximately 15 m radius but that distance may be affected by wind speeds. The extensive presence of an understory of low-growth scrub and bushes in the LTS assists to minimise any adverse effects of spray drift since this scrub growth acts to trap droplets and remove them from the ambient air.

The RLC has reviewed the location of the various publicly accessible tracks within the LTS blocks and has disconnected and/or removed numerous sprinkler heads to ensure none are within 30 m of any track. This creates an appropriate buffer distance to minimise the likelihood of the public coming into contact with any treated wastewater.

Due to the significant distance (approximately 600 m) between the LTS irrigation blocks and neighbouring properties, no neighbours are affected by the operation of the LTS.

There is also potential for odour effects associated with the operation of the LTS. However, the wastewater has no discernible odour and no significant odour complaints has been reported to the Bay of Plenty Regional Council.

### 3.2.7 Effects on Māori Cultural Values

The RLC has commissioned a CIA which will identify the actual and potential adverse effects of the ongoing use of the LTS on Māori cultural values. This CIA will be provided to the BOPRC when it has been completed. The RLC may volunteer additional conditions following receipt of the CIA to deal with adverse effects on Māori, in particular mana whenua hapū.

# 4. Proposed Conditions of Consent

The RLC is not proposing any significant changes to the conditions of consent for the bridging consents. The maximum daily volume of treated wastewater discharged to the LTS will remain the same. The maximum mass load of TN discharged to the LTS is proposed to be increased from 51 to 55 t/y to reflect the 32.4 t/y wastewater-derived TN load outlined in the MoU. The wastewater-derived TP within the Waipa Stream is not proposed to be changed. The monitoring and reporting requirements set out in the existing consents will also remain the same.

A condition has been volunteered by the RLC which would require a fish pass structure/device to be installed within six months of the date of commencement of the new consents. The device would need to be designed by, and its installation supervised by, an aquatic ecologist experienced in designing such structures/devices.