REPORT

File: 2007.090
Application No.: 2007.090, 2007.091

Report No.: 2008/412
Prepared for: Hearing Panel
Prepared by: Selva Selvarajah, Director Resource Management and Annica Lindgren, ex Senior Resource Officer
Date: 18 August 2008

Subject: **Discharge Permit Applications 2007.090 and 2007.091 by the Clutha District Council, to discharge treated wastewater to water and odorous contaminants to air from the Milton Wastewater Treatment Plant, Milton**

---

1. Purpose

To report and make recommendations on the determination of the above resource consent applications under the notified provisions of section 93 of the Resource Management Act 1991 (the Act).

2. Background

Applicant: Clutha District Council (CDC).
Activity: To discharge up to 1,625 cubic metres per day (nv/d) of treated wastewater to water and to discharge odorous contaminants to air.
Location: Tokomairiro River, true left bank, approximately 170 metres (m) south-west of the intersection of Bruce Street, Scott Street and Hogg Street, Milton.
Reason: The increased wastewater flow resulting from the new Otago Corrections Facility (OCF) and future population growth of Milton, upgrade of the Milton Wastewater Treatment Plant (WWTP), to seek a 35 year consent reflecting investment in the plant and to provide certainty in to the future.

CDC (the applicant) has applied to the Otago Regional Council (ORC) for resource consents to discharge treated wastewater to water and odorous contaminants to air, from the Milton WWTP. The Milton WWTP is located on the true left bank of the Tokomairiro River, approximately 800 m southwest of the centre of Milton Township (see Figure 1).

The applicant is proposing to upgrade the existing WWTP, to provide for the future wastewater management for Milton Township, including the recently commissioned OCF at Milburn. The applicant proposes that the upgraded WWTP will continue to discharge the treated wastewater to the Tokomairiro River, via the existing, constructed wetlands.

Application 2007.090, to discharge up to 1,625 m^3/d of treated wastewater to the Tokomairiro River, seeks to replace Discharge Permit 2001.755 VI, which authorises the discharge of up to 1,050 m^3/d of treated wastewater to the Tokomairiro River and expires on 31 December 2017.

Application 2007.091 is for a new discharge permit to discharge odorous contaminants to air, associated with the continued operation of the Milton WWTP.

Figure 1: Location of the Milton Wastewater Treatment Plant

The applicant also holds Discharge Permit 2002.369, to discharge up to 9,150 nr/d of untreated wastewater and stormwater to the Tokomairiro River during wet weather, which expires on 31 December 2017. No changes to this permit are proposed as part of the above applications.

2.1 Discharge to Water

Current Discharge Permit 2001.755 V1 is a variation to the original Discharge Permit 2001.755, which was issued on 28 March 2003 and allowed a discharge volume of 850 nr/d. In March 2006, the applicant applied for a variation to conditions of consent, to allow for an increased discharge volume, due to the then pending opening of the OCF in April 2007. The additional maximum flow from the OCF has been estimated as 200 m^3/d, although the average flow is expected to be in the order of 135 m^3/day.

The ORC granted the variation to the original consent on 20 September 2006, on the basis that the applicant would lodge an application for a long-term solution, which would significantly improve long-term effluent quality and end long-term noncompliance with, in particular, faecal coliform concentrations in the effluent, by no later than 1 March 2007.

2.1.1 Existing Wastewater Treatment Plant

Raw wastewater from Milton Township is conveyed via sewage pipes to the Milton Reticulation System, located approximately 400 m from the Milton WWTP.

Milton WWTP also accepts pre-treated wastewater from the recently commissioned OCF. The OCF WWTP comprises a combined macerator and screening system, raw wastewater pump

station, facultative pond, 3-stage maturation pond and level control outlet weir to the flow controlled gravity pipeline to the Milton WWTP.

The existing Milton WWTP comprises an inlet pumping station, two Imhoff tanks, two trickling filters, two re-circulating humus tanks and three constructed surface-flow wetland cells. Each wetland cell covers an area of approximately 2,240 square metres (nf) (14 m wide by 160 m long). The site plan lay-out is presented in Figure 2 below:

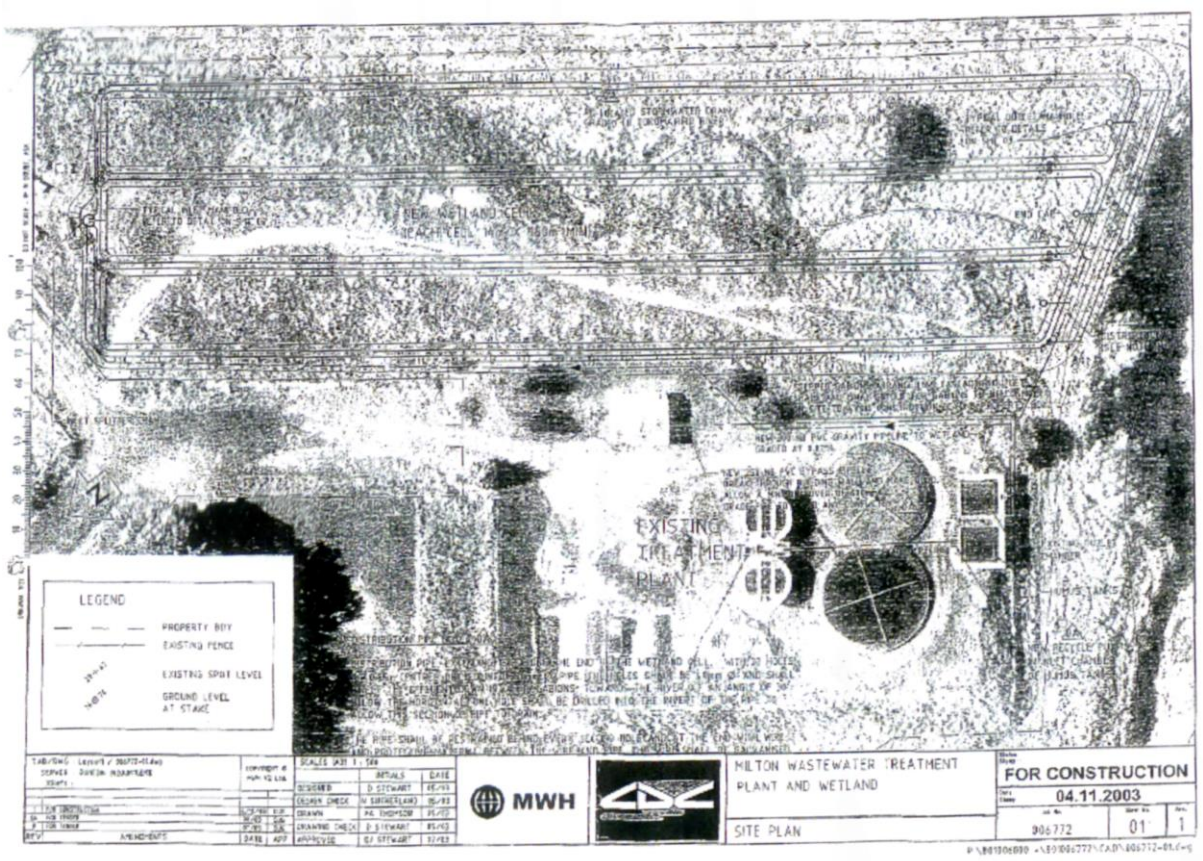

Figure 2: Existing Site Plan Layout for Milton Wastewater Treatment Plant

The treated wastewater is discharged from the wetland cells to the Tokomairiro River via stepped gabions, arranged as a cascading outlet, and a bank-side gravel seep, as shown in Figure 3. The Tokomairiro River flows to the right of the grassed bank-side gravel-seep and its banks can be seen in the top right corner of the picture. The overflow discharge pipe from the humus tanks runs along the gabions in the centre of the picture. The constructed wetlands are in the top left corner of the picture.

2.1.2 Compliance with Current Consent Conditions

Condition 6(b) of current Discharge Permit 2001.755 V1, sets out effluent quality limits to be met by 1 December 2005. The applicant's previous upgrade of the WWTP, in order to meet the requirements of condition 6 of the current consent, commenced with the construction of the wetland cells. Plant upgrade commenced in 2003 and additional refurbishment work was carried out in 2005.

The applicant states that the effluent quality, since December 2005, has been meeting the rolling 12-month geo-mean limits set out for five day biochemical oxygen demand (BOD_5),

total suspended solids (TSS) and total phosphorous (TP), but has slightly exceeded the ammoniacal nitrogen (NH_4-N) limit and significantly exceeded the faecal coliform (FC) limit.

Figure 3: Stepped gabions and bank-side gravel seep outlet to the Tokomairiro River

In addition to the applicant's self-monitoring, the Council has carried out annual compliance audits at the Milton WWTP, including monitoring of effluent quality.

The results of the applicant's self-monitoring post December 2005, and the Council's annual compliance audit on 24 May 2007, compared with the limits set out in condition 6 of the current consent, are presented in Table 1 below (all units in grams per cubic metre (g/m^3), except for FC, which are presented as colony forming units per 100 millilitre (cfu/100 ml)).

Monitoring results that exceed the limits for the rolling 12-month geo-means, or the maximum levels, are highlighted in bold in Table 1 above.

With regard to the rolling 12-month geo-mean, it is noted that the concentration of NH_4-N is exceeding twice the limit, and the concentration of FC is grossly and continuously exceeding the limit, set out in current consent conditions.

With regard to the maximum limits set out in condition 6 of the current consent, it is noted that the concentration of all parameters, except TP, have on at least one occasion exceeded consent limits.

Table 1: Compliance with current consent conditions, post December 2005

Parameter	Rolling 12-month geometric mean shall not exceed(1)	No sample result shall exceed	The applicant's self-monitoring, post December 2005			ORC's 2007 compliance audit	
			Calculated Geo-mean (n = 41)(3)	Min	Max	Rolling 12-month geo-mean	Spot sampling on 24 May 2007
BOD_5	20	35	12	4	**40**	15	22
TSS	25	40(2)	12	2	**91**	9	13
NH_4-N	7	15	**9.5**	3.7	**18.1**	**14**	**22.3**
TN	--	--	16.3	11	31	--	28.2
TP	8	14	5.6	3.3	9.4	7.4	7.6
FC	1,000	5,000	**27,529**	**1,600**	**1,700,000**	**81,607**	**500,000**

Notes:

1) Based on the results of any four consecutive three-monthly self-monitoring rounds.
2) Except where the consent holder can demonstrate that a higher value is the result of increased algal growth during the summer.
3) Number of self-monitoring rounds

The ORC's compliance audit, albeit monitoring sampling only being carried out once each year, confirms the results of the applicant's self-monitoring. In the consent audit report for the period 1 July 2006 to 30 June 2007, compliance with condition 6 (effluent quality limits) received the grading "*Grade V: Non Compliant, Significant Adverse Effects."*

The ORC Compliance officers carrying out the compliance audit constantly note that the effluent quality has been very poor. The consented limit for FC has been exceeded at every sampling occasion and the very high level of FC in the discharge is having an adverse effect on the receiving environment, where the downstream (<100 m of the discharge point) levels of *Escherichia coli (E. coli)* was 5,300 cfu/100 mL at the time for the 2007 audit visit. The self-monitoring results submitted by the consent holder (i.e. the applicant) show that the downstream in-stream concentration of *E. coli* were 7,700 cfu/100 mL on 12 February 2007.

Conditions 5 and 7 of the current consent requires the applicant to resample both the Tokomairiro River and the effluent with regard to the concentration of *E. coli* and FC respectively, if the downstream (<100 m of the discharge point) concentration of *E. coli* in the Tokomairiro River exceeds 273 cfu/100 ml. The applicant has failed to carry out such re-sampling. Condition 5 also requires the applicant to submit daily flow records for the three month period preceding each self-monitoring round. However, the applicant has not submitted any flow record since July 2006, when the estimated daily flow was 785 m^3. Consequently,

compliance with conditions 5 and 7 has been graded "*Grade IV: Non - Compliant. Minor Adverse Effects"* and compliance with condition 1 (maximum discharge volume) has been graded "*Grade III: Non - Compliant, Significant (No Adverse Effects)."*

The applicant argues in its application that setting maxima (i.e. no sample to exceed ...) is not acceptable because it is impossible to comply with such a requirement. It was argued this was because of sampling or testing error or treatment failure. We will concur with applicant's statement only in the cases of a poorly managed or designed treatment system. In the case of well managed and designed systems maxima can be set on the basis of minor failures and consideration to any adverse effects on the environment.

Of the 14 conditions of consent, the applicant was found to be fully compliant with only four conditions: three conditions relating to administration, such as using an IANZ registered laboratory for analysis, and one relating to the management of wet sludge.

The ORC Compliance officer's comments from the site visit on 24 May 2007 note that the Imhoff tanks and humus tanks were operating as per the current consent. The two rock media trickling filters were operational, but one of the circulating arms was stationary, such that the effluent was only filtering through a small portion of the rock media. A strong hydrogen sulphide odour was detectable alongside the wetland treatment area and at the three discharge points into the Tokomairiro River (one from each of the three wetland cells). The bank-side gravel seep had accumulated a lot of debris, mainly from the overflow discharge pipe direct from the humus tanks.

2.1.3 Proposed Wastewater Treatment Plant Upgrade

The applicant is proposing a three-staged upgrade of the Milton WWTP.

Both stages 2 and 3 have two different options. The applicant has presented the stages as follows:

Stage 1: Reconfiguration of the inlet pump station, automation of the humus tank sludge removal, increasing the size of the sludge drying beds and disinfection of the treated wastewater by the installation of an ultraviolet (UV) radiation system.

Stage 2: *Option 1* - Upgrading of the existing trickling filters by replacing the current rock with plastic media. Adding plastic media to the existing filters would improve their capacity and provide better opportunity for BOD and NH_4-N reduction to be carried out in a single stage.

Option 2 - Installation of new, second stage trickling filters and dedicated clarifiers/humus tanks. The primary purpose of a second stage trickling filter process would be to ensure that greater nitrification is achieved (i.e. similarly to option 1, provide better opportunity for NH_4-N reduction).

Stage 3: *Option 1* - If required, i.e. if after implementation of stages 1 and 2 the effluent from the wetland would prove to have too high a load of suspended solids, a tertiary mechanical disc filter could be installed, to render the effluent suitable for UV-disinfection. This is also an improvement that could be added in the longer term, as loads continue to increase.

Option 2 - If option 1 is adopted in stage 2 (i.e. plastic media in the trickling filters) and if required, a third humus tank would be installed to service the trickling filters, following the stage 2 upgrade. This would serve to augment the capacity of the existing humus tanks to remove suspended solids. With increased loading and if there is no second stage filter, it may be necessary to improve the performance of the existing humus tank clarifier stage, to meet the applicant's proposed consent conditions.

The applicant proposes to defer the main process upgrade (i.e. stage 2: upgraded first stage or additional second stage trickling filters) until such time that the OCF WWTP is producing a known effluent quality and quantity; however, the applicant does not indicate at what point in time this information could be expected to be at hand. The applicant states that this approach would allow a choice to be made between single stage trickling filters with plastic media, or two stage trickling filters. It has been proposed that a decision whether to proceed with any of the stage 3 options should be made after the upgrade of the trickling filter process step, when actual influent quality to the WWTP and performance of the stage 2 upgrade is known.

The applicant argues that the future incoming loads of contaminant to the Milton WWTP will vary, due to the actual loads from and the performance of the OCF WWTP. Depending on the actual future loads and the conditions as a result of this application, the applicant proposes that it may be possible to do all necessary treatment with upgraded single stage trickling filters. Should it be considered that adequate biological treatment would not be achieved in upgraded single stage trickling filters, second stage trickling filters would instead be constructed, fitted with plastic media and their own dedicated clarifiers (i.e. stage 2 - option 2: humus tanks).

The trigger for which filter type to choose would be the consideration of a number of key characterisation and performance data obtained from the first two to three years of OCF operation, and how these data compare with estimates and assumptions made at the preliminary design phase (i.e. this application). The data would include:

- Raw wastewater load to the OCF treatment plant, versus prison population.
- Performance of the OCF WWTP and resulting contaminant loads to the Milton WWTP.
- Growth of Milton Township and resulting increase in contaminant loads.
- Ongoing performance of the Milton WWTP in its current format.

To obtain the first set of data, it would be necessary to implement an ongoing wastewater treatment monitoring programme at the OCF WWTP, post the opening of the OCF.

The applicant suggests that the stage 3 upgrades are optional and may not be required. Stage 3 - option 1, is the installation of a 10 micron (µm) tertiary, cloth media, disc filter. The filter would be used to remove fine sediment (suspended solids) and would be implemented if, and when, treated wastewater from the existing wetlands regularly starts to display high concentrations of sediment, enough to impair the ability of the UV-system to achieve the required discharge standard. According to the applicant, the current wetland performance suggests that the disc filter is unlikely to be required at an early stage, but that the situation could change, as loads progressively increase. The disc filter is therefore an additional unit process that could be added in the future, if wetland performance deteriorates.

Stage 3 - option 2 above, would be to install additional clarification capacity (i.e. an additional humus tank) to the existing trickling filters. According to the applicant, if a decision is made at

stage 2 to upgrade the existing trickling filters (stage 2 - option 1), it is likely that this stage 3-option would also be required. However, the applicant proposes that this would be determined following an assessment of the results from monitoring the actual process performance of the stage 2 upgrade.

2.1.4 Key Upgrade Elements

The applicant proposes that the key elements of the upgrade are:

- *Influent screening and inlet pump station* - Currently, influent (i.e. incoming wastewater) to Milton WWTP passes unscreened into the Imhoff tanks. The accumulation of rags and other gross wastewater solids in the tanks require regular removal, to maintain the performance of the tanks. Therefore, the applicant proposes that screening of the influent is installed at the inlet pump station, to remove gross solids.

  The inlet pump station would be relocated towards the Imhoff tanks, which would allow all influent to be pumped up to a new screen, with stormwater flows being bypassed from the treatment plant, for direct discharge to the Tokomairiro River. The proposed relocation of the inlet pump station would also create the additional space that would be needed to accommodate the stage 2 - option 2 second stage trickling filters, if required.

- *UV disinfection* - a UV disinfection system is designed to significantly reduce microbial concentrations in the discharged effluent. The process works by inactivation of pathogens through exposure to UV-light and therefore requires relatively good quality effluent in order to be effective. Typically, suspended solids concentrations should be in the order of 20 g/m\ or less, with particle size distribution also important in determining likely shielding of pathogens from UV-light. The amount of disinfection provided by a UV-system operating in a particular effluent quality is dependant upon the dose rate which in turn is determined by the number of lamps used.

  The applicant states that the inlet pump station relocation, influent screening and UV disinfection works would be completed as part of stage 1. As previously discussed, for stage 2, the applicant proposes that there are two options available: either an upgrade of the existing trickling filters, or the construction of new, second stage trickling filters. Both options are discussed in more detail below.

- *Trickling filter upgrade* - the existing rock media in the trickling filters would be replaced with plastic media of higher specific surface area, which would increase the treatment capacity of the existing trickling filters. The predicted, future flow of 1,625 m7d would exceed the upper end of a typical loading for a rock media trickling filter, with an expected deterioration in treatment performance compared with the current situation. Replacing the rock media with plastic media would increase the surface area available for the growth of the bacteria used for carbonaceous (biological) treatment and nitrification of the wastewater.

- *New trickling filter* - Alternatively, if required, the applicant proposes that additional trickling filters could be added, either in parallel with the existing rock filters, or in series, to provide a two-stage biological treatment process. The applicant states that the results of modelling suggest that if further nitrification is required (beyond what can be

achieved by replacing the rock media in the existing filters with plastic media), a two-staged approach may be appropriate for the Milton WWTP, with the first stage providing BOD-removal and the second stage removing residual BOD in and providing nitrification of the wastewater (i.e. oxidising ammoniacal-nitrogen to nitrate-nitrogen).

According to the applicant, the existing trickling filters are adequately sized to fulfil the function of the first stage of a two-stage filter process. As the primary function of the second stage trickling filter would be to achieve nitrification, relatively low quantities of suspended solids would be produced from the second filter stage. These suspended solids would be removed in dedicated clarifiers (e.g. two humus tanks, or a circular clarifier), installed immediately downstream of the new trickling filters.

A trickling filter process produces relatively low quantities of excess biological growth, reducing the quantities of sludge requiring treatment and disposal. The operational costs are typically relatively low, with aeration of the process achieved naturally, rather than mechanically.

- *Mechanical filter, if required* - Tertiary filtration can be provided, as an addition or alternative to effluent polishing via the constructed wetland cells. The applicant states that the latest generation of tertiary filters are those using rotating discs covered in a polyester cloth. These filter down to around 10 microns and so will remove a much greater range of particulates than sand filters. These filters are, however, not to be confused with membrane filters, which operate in the molecular rather than particulate filtration range and have pore sizes down to 0.4 microns.

  The cloth disc filters are immersed in a tank and used inside to outside flow. The applicant states that the particulate matter (i.e. suspended solids) removed by the mechanical disc filter takes with it a certain amount of BOD, organic nitrogen, particulate phosphorous and pathogens, thus improving the effluent quality for the subsequent UV-disinfection. Regular backwashing is required to keep the cloths clean. Backwash volume is approximately 1 percent (%) to 3 % of throughput.

  The applicant proposes that this option would only be required if the concentration of suspended solids in the effluent from the constructed wetlands consistently exceeds about 40 g/m^3, with large particle size, causing a deterioration of the UV system performance to the extent that the proposed pathogen limits could not be met.

- *Additional humus tank, if required* - If, at stage 2, the decision is made to upgrade existing trickling filters by installing plastic media, it is likely an additional humus tank needs to be added, in parallel with the existing two humus tanks. The performance of the existing two humus tanks is not great and the additional loading imposed by achieving all treatment in one stage would likely cause their performance to deteriorate further. The additional humus tank would also be provided with automated sludge withdrawal.

  If additional second stage trickling filters were installed, additional dedicated clarification (e.g. humus tank) would be essential. In this instance, an additional humus tank for the existing first stage filters (as provided for by the stage 3 -option 2) would be unlikely to be required.

The applicant states that it is appropriate to adopt a staged approach to the upgrade of the Milton WWTP for the following reasons:

- The actual performance of the OCF WWTP (and hence wastewater volumes and contaminant loads) is not yet certain.
- It is best practice, time allowing, to install and run an 'upstream' process step, before designing the next 'downstream' process step, so that the actual influent quality to any given unit process is known, before the unit is designed and ordered.

As previously discussed, the applicant proposes that the main process upgrade, i.e. stage 2, should be deferred until after the OCF WWTP is producing a known effluent quantity and quality. According to the applicant this would allow an informed choice to be made between single stage trickling filters with plastic media, or two-stage trickling filters.

The tertiary mechanical disc filter and the UV system would ideally be designed and installed after the upgrading of the trickling filter process, when the actual influent quality is known and the capacity specification could be more precise. However, given that the treatment plant is already non-compliant with the faecal coliform limits in current conditions of consent, the applicant considers it prudent to install the UV-system as part of the stage 1 upgrade.

The applicant's proposed timeline for the various stages of upgrade of the WWTP are discussed further in section 2.15 below.

2.1.5 Quantity of Discharge to Water

The applicant states that current flow data indicates that the typical daily influent flow ranges between 600 m^3/d to 800 m^3/d during reasonably dry weather conditions. The flow to the treatment plant is measured by a flow meter and storm bypass flows have been estimated by pump hours since November 2004.

During wet weather, total influent flows in excess of 3,000 m^3/d have been measured, although the vast majority do not exceed 2,000 m^3/d. The large storm event on 26 April 2006 resulted in an indicated flow of 1,850 m^3 to the treatment plant and 8,988 m^3 to bypass, but the applicant states that there is significant uncertainty regarding the applicable pump flow calibration used to estimate the bypass flow.

At the time of the 2001-census, Milton Township had a population of 1,920 people. The average influent flow rate at the time was 700 m^3/d, equating to a flow rate of 365 litres per person per day (l/p/d). This is higher than the more typical New Zealand per capita volume of 200 - 250 l/p/d, possibly reflecting infiltration to the reticulation system also during dry weather conditions.

The applicant's current discharge permit (2001.755_V1) authorises a discharge of 1,050 m^3/d, which includes allowance for the OCF to open and operate with the initial inmate numbers outlined in the designation.

The applicant has estimated that the influent dry weather flow to the Milton WWTP will not exceed 1,050 m^3/d until at least 2009. Any flow increase beyond that will depend on the timing and extent of any increase in inmate numbers at the OCF, and the timing and extent of population growth for Milton Township.

By 2042 (the end of the 35 year term of consent sought), the applicant has estimated that the maximum influent, dry weather flow volume to the Milton WWTP will be 1,625 m^3/d, of which 1,225 m^3/d would be generated by Milton Township and 400 m^3/d would be generated at the OCF.

Consequently, the applicant is seeking resource consent to discharge up to 1,625 m^3/d of treated wastewater to the Tokomairiro River.

As previously discussed, the applicant also holds Discharge Permit 2002.369, to discharge up to 9,150 m^3/d of untreated wastewater and stormwater to the Tokomairiro River. The purpose of this discharge permit is to bypass, during wet weather conditions, combined untreated wastewater and stormwater flows in excess of plant capacity. The permit expires on 31 December 2017 and no changes to this permit are proposed as part of the above applications.

2.1.6 Quality of Discharge to Water- Original Application dated 1 March 2007

In the original application the applicant has estimated the average influent flow and contaminant load characteristics from Milton Township and the OCF by 2042. The flow and contaminant characteristics were used to assess the various options for the Milton WWTP upgrade and are presented in Table 2 below (contaminant units in kilogram per day (kg/d)).

Table 2: Estimated influent characteristics to the Milton WWTP by 2042

Parameter	Milton Township	OCF Pre-treated	OCF Pond Rain	Total
Flow (m^3/d)	1,225	315	85	1,625
COD[(1)] (kg/d)	501	28	-	529
BOD (kg/d)	233	9	-	242
TKN (kg/d)	43	9	-	52
NH_4-N (kg/d)	28	8	-	36
TSS (kg/d)	307	16	-	323
VSS[(2)] (kg/d)	233	16	-	249
TP (kg/d)	9.3	2.1	-	11.4

Notes: [(1)]COD = Chemical oxygen demand; [(2)]VSS = Volatile suspended solids

In an attempt to propose a future effluent quality that meets national guidelines and regional plans, the applicant has attempted to interpret the current state of the environment for the Tokomairiro River and determine the extent of WWTP upgrade that is necessary in order to meet the desired water quality in the receiving environment. In carrying out this exercise, the applicant has addressed a number of key contaminants and the conclusions are summarised below:

Faecal indicator bacteria

The applicant states that the relevant microbiological guidelines for the Tokomairiro River are those that relate to secondary contact recreation. The applicant has reached this conclusion on the basis that the water quality of the Tokomairiro River, upstream of the point of discharge for the Milton WWTP, currently does not meet the guidelines set out in the Ministry of Environment (MfE) *Microbiological Water Quality Guidelines for Recreational Areas 2003* (contact recreation guidelines). To maintain a water body in an acceptable, or 'green', mode

under these guidelines, no single water sample should contain *E. coli* levels greater than 260 cfu/100 ml.

The applicant notes that the contact recreation guidelines are not intended to be used as the basis for establishing resource consent conditions, but may be used as a component in decision making.

Further, the applicant states that it is not aware of the Tokomairiro River being used for primary contact recreation (such as bathing and shellfish gathering), but that it is being used for fishing (i.e. secondary contact recreation).

Consequently, the applicant believes that the Australian and New Zealand Environmental and Conservation Council *Australian and New Zealand Guidelines for Fresh and Marine Waters, National Water Quality Management Strategy 2000* (ANZECC 2000) is the applicable guideline, as it (amongst other guideline values) specifies a water quality median value (in-stream after reasonable mixing) for fishing of 1,000 cfu/100 ml, as a median of five samples taken over the bathing season.

The applicant refers to its proposal to upgrade the WWTP with a UV-system and believes that the use of this technology would make the ANZECC 2000 guideline for fishing achievable. However, the applicant also states that, even with UV disinfection and membrane filtration, it would not be possible to achieve the primary contact recreation standard (*E. coli* <260 cfu/100 ml) in the river downstream of the discharge point, and after reasonable mixing, as already the water quality upstream of the discharge point exceeds this guideline value.

Ammonia

With regard to water quality guidelines for ammonia, the applicant refers to the ANZECC 2000 guidelines and the two types of trigger values applying to total ammonia concentration in New Zealand fresh water environments:

- a default regional trigger value for slightly disturbed ecosystems of 0.021 g/m^3, intended to trigger further investigation into the risk of management objectives not being met; and
- a toxicity trigger value of 0.9 g/m^3 (after reasonable mixing), based on chronic toxicity data and aimed at protecting 95 % of species in slightly to moderately disturbed ecosystems.

The applicant states that the trigger values should not be considered as blanket guidelines, but should rather be applied as part of a decision making process, to assess the risk of adverse effects. A key part of this process would be to consider site-specific factors that may raise the need for modifying the guideline trigger value, such as locally important biota and water quality modifiers.

For ammonia toxicity in particular, the applicant notes that the guidelines state that water managers need to consider pH and water temperature in setting an appropriate trigger value for a specific water body. Ammonia toxicity varies with pH, temperature and, to a very smaller extent, salinity. The relevant tables in the ANZECC 2000 have simplified the toxicity of total ammonia to show its variation with pH only, as the pH is the most dominant variable influencing its toxicity. The default toxicity trigger value of 0.9 g/m^3 is a further simplification, by assuming a pH of 8 and a water temperature of 20°C.

The applicant acknowledges that the ANZECC 2000 guidelines recommend that stricter trigger values may be appropriate, if the aquatic community contains important species that are particularly sensitive to ammonia. In this instance, and as stated by the applicant, the Tokomairiro River supports a freshwater clam (*Sphaerium* spp.) that is very sensitive to ammonia. To ensure its protection, the ANZECC 2000 guidelines recommend applying a toxicity trigger value for total ammonia of half the default trigger value, or 0.45 g/m^3.

However, the applicant does not consider that this stricter toxicity trigger value should be applied to the Tokomairiro River, because *Sphaerium* spp. are common in Otago rivers and the species form only a minor component of the macroinvertebrate community throughout the Tokomairiro River. Furthermore, the applicant's biological investigations have indicated that there is insignificant impact on *Sphaerium* spp. from ammonia downstream of the discharge point for the Milton WWTP.

Consequently, the applicant proposes that the most appropriate trigger value to be applied to the Tokomairiro River is the instream toxicity trigger value for a total ammonia concentration of 0.9 g/m^3. The applicant proposes that this trigger value should be monitored 150 m downstream of the discharge point, to allow for reasonable mixing and dilution of the ammonia concentration in the effluent discharge.

Although the applicant accepts that there could be toxicity effects on aquatic life within the proposed mixing zone, extending from the discharge point and 150 m downstream, the applicant does not anticipate that it would have more than very minor effects and no more than what currently exists. In particular, the applicant notes that the discharge plume hugs the true left bank, allowing fish passage up the true right bank.

Nitrogen and Phosphorous

Nitrogen and phosphorous are nutrients naturally found in rivers, but elevated concentrations of nutrients may stimulate excess periphyton (filamentous algae) growth. The ANZECC 2000 guidelines set default trigger values for various species of nitrogen and phosphorous, but the applicant considers it more appropriate to use the Ministry for the Environment (MfE) *New Zealand Periphyton Guideline* (Biggs, 2000).

To maintain trout habitat and angling, the guideline specifies that:

- no more than 30 % of the whole stream bed should be covered by periphyton longer than 2 centimetres (cm). This corresponds to a periphyton biomass, expressed as a maximum chlorophyll *a* concentration, of 120 milligram per square metre (mg/m^2);
- the in-stream concentration of dissolved reactive phosphorous (DRP) should be less than 0.026 g/m^3; and/or
- the concentration of dissolved inorganic nitrogen (DIN) should be less than 0.295 g/m^3.

The applicant states that the potential effect of in-stream nitrogen and phosphorous concentrations relates to the stimulation of excessive periphyton growth, and that high in-stream concentrations of these nutrients may not result in excessive growth, if periphyton is controlled by factors other than nutrients. In this instance, based on investigations made in support of these applications, the applicant has concluded that periphyton growth in the Tokomairiro River is likely to be limited by factors other than nutrients, such as the availability of suitable substrate and light.

Summary of Proposed Water Quality Targets

In summary, based on the applicant's assessment of suitable in-stream water quality for the parameters discussed above, the applicant proposes the following water quality standard, to be achieved after full mixing 150 m downstream of the discharge point, as targets for monitoring purposes:

Table 3: The applicant's proposed in-stream water quality standard for the Tokomairiro River, 150 m downstream of the discharge point

Parameter	In-stream concentration	Applicant's Comment
Total ammonia	0.9 g/m^3	As a 90-percentile, to avoid toxicity effects
Total phosphorous	–	Not controlling periphyton growth
Faecal bacteria	1,000 cfu/100 ml	As a median, to achieve secondary contact recreation standard

Having arrived at the conclusion summarised in Table 3 above, the applicant has calculated the effluent quality it would have to achieve, in order to meet the proposed in-stream water quality standard at the proposed end for the mixing zone 150 m downstream of the discharge point. We note that the applicant's approach would not allow for any other contributors downstream of the Milton WWTP.

The effluent quality has been calculated for a discharge volume of 1,050 m^3/d and 1,625 m^3/d, assuming dilution based on a 7 day low flow (7 DLF) in the river, current background concentration of contaminants in the river and full mixing. For total phosphorous, the applicant has simply adopted the current, maximum, consent limit as a future 90-percentile, because the background concentration already exceeds the (ANZECC 2000) in-stream trigger value of 0.026 g/m^3 and because the applicant has concluded that periphyton growth in the river is limited by factors other than nutrients.

During winter, the Tokomairiro River has higher flows and lower water temperature. The applicant argues that the higher flows provide more dilution and the lower temperatures mean that total ammonia is less toxic, and periphyton growth is slower. Therefore, the applicant considers that more relaxed effluent quality standards are justified during the winter period and proposes that effluent standards derived for median river flow may be most appropriate for the winter period, and that effluent standards derived for the Mean Annual Low Flow (MALF), or the 10 year 7 DLF, may be most appropriate for the summer period. Similarly, the applicant proposes that relaxed winter effluent standards are justified for faecal coliforms, because of less recreational use of the river during this period.

Table 4 below presents the seasonal quality of discharge proposed by the applicant. Based on what the applicant argues is standard practice for wastewater discharges, the proposed standards are presented as 90-percentiles; however, it is also proposed that, if necessary, a geometric mean of about half the proposed 90-percentile value could also be set.

The applicant states that the proposed 90-percentiles for total ammonia and faecal coliforms have been calculated assuming dilution from a 10 year 7 DLF during the summer period and MALF during the winter period.

Table 4: Proposed staged and seasonal future effluent quality for the Milton WWTP

Parameter and season	Current Effluent Quality		Current Condition of Consent		Proposed Effluent Quality (90-percentile)	
	Geo-mean	90-percentile	Geo-mean	Max	Up to 1,050 m^3/d	1,050 m^3/d to 1,625 m^3/d
Summer BOD5 (g/m^3)	12	21	20	35	35	35
TSS (g/m^3)	9	37	25	40	40	40
NH_4-N (g/m^3)	9.8	13	7	15	30	19
TP (g/m^3)	6	7.6	8	14	14	14
FC (cfu/100 ml)	28,000	102,000	1,000	5,000	25,000	16,000
Winter BOD5 (g/m^3)			20	35	35	35
TSS (g/m^3)			25	40	40	40
NH_4-N (g/m^3)			7	15	57	35
TP (g/m^3)			8	14	14	14
FC (cfu/100 ml)			1,000	5,000	47,000	30,000

Similarly, the 90-percentile for faecal coliforms has been based on achieving the applicant's interpretation of the applicable secondary contact recreation standard (1,000 cfu/100 ml), assuming a background *E. coli* concentration in the river of 425 cfu/100 ml.

2.1.7 Quality of Discharge to Water – "Response to ORC Proposed Effluent Standards" dated 23 August 2007

Following the lodging of the application on 1 March 2007 there has been consultations between the applicant and ORC staff. As a result of such a consultation ORC staff told the applicant in a letter dated 26 April 2007 (Appendix A) that given the applications were for long-term consents (35 years), the proposed discharge quality was not acceptable. Given ORC staff had previous detailed discussions on its preferred water quality standards with the applicant the letter simply listed the preferred quality standards without delving into detailed rationales for such standards (Table 5).

The response (dated 23 August 2007) from the applicant is outlined below.

The applicant argued that the use of maximum standards is not appropriate for biological treatment systems. According to the applicant the organisms and biological processes respond strongly to average concentrations of BOD, TSS, TN, nitrate and TP than instantaneous peak. The applicant accepts upper limits for NH_4-N and *E.coli* but opposes maximum limits and recommends 90 or 95-percentiles.

A BOD requirement of 15 would mean Stage 2 of the upgrade is fast tracked by skipping the proposed Stage 1 process. A tertiary filter would also be required at Stage 2 level. The applicant does admit that reducing BOD levels will be beneficial to increase dissolved oxygen levels and

reduce heterotrophic growth (sewage fungus). In order to avoid sewage fungus growth the applicant recommends to reduce the proposed BOD level from 35 to 30 (90 %ile) despite the ongoing exceedance of the lowland stream mean concentration for BOD.

Table 5: Revised proposed effluent standards

Parameter	Current consent	ORC proposed standards		CDC original standards		CDC new proposed standards	
		Until 2009	From 2009	1050 m^3/d	1625 m^3/d	1,050 m^3/d	1,625 m^3/d
	Maximum	Maximum	Maximum	90%ile	90%ile	90%ile	90%ile
Volume (m^3/d)	1050	1050	1625	1050	1625	1050	1625
BOD_5 (mg/l)	35	15	15	35	35	30	30
TSS (mg/l)	40	20	20	40	40	40	40
NH_4-N (mg/l)	15	30	10	30	19	30	10
TP (mg/l)	14	15	15	14	14	14	14
TN (mg/l)	-	-	20	-	-	22	22
Nitrate-N (mg/l)	-	-	5	-	-	-	-
FC cfu/100 ml	5000	-	-	25,000	16,000	-	-
E. coli cfu/100 ml	-	50,000	260	-	-	50,000 (95%ile)	4500 (95%ile)

The ORC required TSS of 20 was too low and based on ANZECC guidelines on downstream effects the proposed 40 (90 %ile) was acceptable to the applicant. The applicant commented that the ammoniacal-N requirement of 10 was too low given the downstream effects are minor. Given the proposed treatment systems could achieve 10 (90 %ile) the applicant agreed to 10. The applicant rejected the ORC proposed nitrate standards on the basis of controlling nitrate by setting standards on TN and ammoniacal-N.

Of the ORC proposed standards the *E.coli* levels received much of the applicant's attention. The applicant continued to maintain that when the upstream water quality is degraded there is no need to improve the downstream quality. The applicant used various models in its discussion and finally concluded that a level of 4500 (95 %ile) is acceptable during winter and summer. The applicant believes that at this level the upstream and downstream quality will be similar.

2.1.8 Method of Discharge to Water

As discussed in section 2.1.1 above, the treated wastewater is currently discharged to the Tokomairiro River from the constructed wetland cells, via stepped gabions, arranged as a cascading outlet, and a bank-side gravel seep, as shown in Figure 3 above. The applicant proposes that the upgraded WWTP will continue to discharge the treated wastewater to the Tokomairiro River, via the existing, constructed wetland cells.

2.1.9 Alternative Treatment and Discharge Options

In the applicant's initial Issues and Options (I&O) Report (Opus, July 2005), a wide range of alternative upgrade processes were discussed, along with advantages and disadvantages of each option. From this initial report, upgrade options utilising trickling filter technology were adopted as the preferred options.

Rejected options included membrane bioreactor (MBR), trickling filter (TF)/activated sludge (AS) hybrid, and biological nutrient removal (BNR). These upgrade options were, principally, dropped for reasons of capital cost and inefficiency at maximising re-use of existing assets. The options would, however, easily have been able to fulfil the treatment requirements identified by the applicant.

The November 2006 I&O Report (Opus, 2006), was based on the applicant's decision to accept the pre-treated OCF wastewater and the use of TF technology as the main biological process. Six combinations of unit process were selected for further consideration.

All upgrade scenarios included retention of the two Imhoff tanks, the two first stage TF and the two first stage humus tanks. A number of options also proposed to retain the existing constructed wetland cells. All upgrade scenarios included provision of a new inlet fine screen and additional sludge drying bed area.

The alternative options are summarised in Table 6 below:

Table 6: Summary of alternative treatment options

Option	Performance, relative to proposed standard	Capital cost (±20 %)	Operational cost ($l,000/year)	25-year NPV	Other considerations
1. One stage TF, with additional 1.5 ha wetland area.	Marginal for BOD standard. Unlikely to achieve 10 g/m^3 ammonia or disinfection standard.	S1.9M	116	S3.9M	Requires additional land acquisition at net cost of $ 150k.
2. One stage TF, additional 1.5 ha wetland area and UV disinfection.	Marginal for BOD standard. Unlikely to achieve 10 g/m^3 ammonia. OK for disinfection.	S2.1M	144	S4.6M	Requires additional land acquisition at net cost of $ 150k.
3. One stage TF, secondary clarifiers and filter, existing wetland and UV disinfection.	Unlikely to achieve winter BOD standard, or 10 g/m^3 ammonia. OK for disinfection.	S1.7M	150	S4.4M	Does not require additional land acquisition.
3a. Single stage TF with plastic media, potential third humus tank and	Uncertain, as dependant on actual loads to be received. Likely to achieve	$1.7M to S2.6M	160 to 179	$6.1M to S7.5M	Does not require additional land acquisition.

disc filter, existing wetland and UV disinfection.	accept-able limits for most parameters.				
4. Two stage TF with additional 1.5 ha wetland area.	OK for all chemical parameters. Unlikely to achieve disinfection standard.	S3.6M	149	S6.2M	Requires additional land acquisition at net cost of $ 150k
5. Two stage TF with additional 1.5 ha wetland and UV disinfection.	OK for all parameters. Very good disinfection potential.	S3.8M	176	S6.9M	Requires additional land acquisition at a net cost of $ 150k
6. Two stage TF, secondary clarifiers and potential disc filter, existing wetland and UV disinfection.	OK for all parameters.	S2.6M to S3.2M	179	S6.4M	Does not require additional land acquisition.

As discussed in section 2.1.4 above, the applicant's preferred option is a staged approach to option 3a in Table 6 above. This option was selected on the basis that it would achieve the proposed effluent standard. In addition, the applicant considers the option to be more reliable from an operational point of view, as it is more mechanical.

With regard to alternative methods of disposal (i.e. discharge of treated wastewater to land), the applicant does not consider it appropriate to promote a discharge to land, for the following reasons:

- The current discharge does not have any significant adverse effects on the environment. The effluent quality has been improving, as a result of the recent upgrade to the constructed wetland cells.
- The proposed upgrade is significant, particularly considering the UV disinfection.
- It would be an inefficient use of the physical resource of the treatment plant and the natural resource represented by the land required for land disposal, to move to land disposal in a situation where the increased discharge will not cause any more than minor adverse effects on the environment.
- Land disposal would not be the best practicable option, taking into account cost, practicality and the risk associated with land based disposal.

The applicant refers to current discharge permit (2001.755 V1), which does not place any requirement on the consent holder to investigate alternative methods for disposal of the treated wastewater. By implication, the applicant has concluded that at the time the original consent was issued (March 2003), the Council must have considered that the continued discharge to the Tokomairiro River was acceptable for the term of consent, i.e. until 31 December 2017.

2.2 Discharge to Air

The applicant does not hold a current permit to discharge odorous contaminants to air, but has been operating under the permitting requirements of rule 16.3.7.1 of the Regional Plan: Air for Otago (RPA).

The applicant states that it remains of the view that discharges to air will continue to comply with the permitted activities under this rule, but is nevertheless, on a without prejudice basis, applying for resource consent to discharge odorous contaminants to air, as a matter of precaution and in response to a recommendation from the ORC officers.

The activities that have the potential to result in a discharge of odorous contaminants to air are all associated with the upgrade, continued operation and maintenance of the Milton WWTP, as illustrated in Table 7 below:

Table 7: Potentially odorous activities at the Milton WW TP

Existing activities	**Proposed additional activities**	**Potential further additional activities**
Desludging of Imhoff and humus tanks	Inlet pump station	Third humus tank
Trickling filters	Screening of influent and bin storage of screenings	Tertiary mechanical disc filter
Constructed wetlands	Trickling filter upgrade	
Sludge drying beds, storage and removal of sludge from the site	Extended sludge drying bed capacity	
	UV disinfection	

Reticulation residence time, infiltration levels and rainwater interception are possible causes of odour generation. Long residence times within the reticulation system have the potential to generate conditions where sulphide is produced. The release of sulphide is pH and temperature dependent and warmer periods are likely to result in a higher risk of odour generation.

The current inlet pumping station is proposed to be relocated closer to the existing Imhoff tanks, further away from the residential area. Screening would then occur on the inlet to the Imhoff tanks. This would allow the screenings to be dropped, by gravity, from the screening system and into a bag system, or similar. This way, screened material would remain covered from the screen, through to cartage to disposal. This proposed screening management procedure, together with regular removal of the screenings, would be the primary means of odour mitigation.

The existing sludge drying beds are proposed to be extended to accommodate the increase in sludge volumes due to increased wastewater volumes and the proposed upgrade of the WWTP. Currently, the Imhoff tanks are desludged to the sludge drying beds approximately three to four times per year. The extension of the sludge drying beds will allow for more frequent sludge removal. While more frequent sludge removal has the potential to change the nature of odours, the sludge composition will also change as some of the gross solids previously entering the Imhoff tanks will be removed by the screen. In comparison with the existing infrequent sludge removal regime, the more frequent draw off will still produce an aged, anaerobic sludge, with

an anticipated average age of 30 days. The applicant proposes that odours are not expected to be noticeably different to those currently being produced. The wetlands and the UV disinfection are not likely sources of odour.

The applicant is only aware of two odour complaints lodged with the Council against the Milton WWTP. The applicant itself has received four odour complaints against the Milton WWTP, lodged between August 2005 and March 2007.

The following odour mitigation measures are proposed by the applicant:

- The use of treatment processes that are not known to be problematic in terms of producing odour.
- Continued good management of the WWTP.
- Adherence to odour management measures, as set out in the *Operations and Management Manual* for the WWTP.
- Compliance with conditions of consent.

2.2.1 Alternative Treatment and Discharge Options

The applicant states that there are no alternative locations or receiving environments to the discharge of odorous contaminants to air from the Milton WWTP. The applicant argues that some level of odour is inevitable with the operation of a WWTP and that considering specific treatment methods would be unwarranted, given the scale of any discharge of odorous contaminants to air.

2.3 Description of the Receiving Environment

The site for the Milton WWTP is designated in the Clutha District Plan and the underlying zoning is “Rural”. The surrounding environment is zoned "Rural" to the east, south and west, and "Urban" to the northeast.

The nearest residential property (6 Burns Street) is located northeast of the WWTP, approximately 115 m from the northernmost edge (at the property boundary) of the existing wetland cells.

To the east of the site is farmland and the nearest farm building is located approximately 480 m from the eastern boundary of the WWTP. The nearest residence from the easternmost boundary of the WWTP is located approximately 150-160 m away. Any extension of the WWTP facilities is likely to occur to the east of the current facilities.

The nearest farmhouse to the south is located approximately 880 m from the southern boundary of the WWTP site. The nearest building to the west is an industrial building located on the opposite side of the river, approximately 275 m west of the boundary for the WWTP. The Tokomairiro River runs along the western boundary of the site, and then eastward and south of the site.

The Tokomairiro River has a total catchment area of 50 square kilometres (km) and flows into the Pacific Ocean at Toko Mouth, approximately 50 km south of Dunedin. Three distinct landform regions exist within the catchment; the inland hills, which rise to 630 m above sea level, the Milton (Tokomairiro) Plain and the coastal hills.

The ORC's Resource Science Unit (RSU) states that the Tokomairiro River, at the discharge point for the Milton WWTP, has a mean annual flow of 2,000 litres per second (1/s) and an

estimated MALF of 650 1/s. This is important to note, because the applicant has used a MALF of 825 1/s for its calculations of the standard the future effluent quality needs to meet. Hence, the applicant has arrived at an effluent quality which exceeds the assimilative capacity of the river by a factor of three.

The ORC's **growOTAGO** project comprehensively maps the Otago region's climate and soils, based on statistics for the period 1970-2001. The maps for the area of the lower Tokomairiro River main stem indicate that the area receives a median annual rainfall of 801-900 millimetres (mm) per year. The median annual temperature is 10.1-10.5 degrees Celsius (°C), with a median winter (July to September) temperature of 6.6-7.0 °C and a median summer (January to March) temperature of 13.6-14.0 °C. The median annual soil temperature, measured 100 mm below ground level, is 9.1-9.5 °C. The predominant wind is south-westerly.

The current and proposed future discharge point for the treated wastewater is located on the true left bank of the Tokomairiro River main stem, immediately downstream of the confluence of the West and East branches of the river (see Figure 1 above). Both branches of the river originate as swift flowing streams in the northern inland hills and flow in an easterly direction to merge just southeast of Milton Township, immediately upstream of the discharge point for the treated wastewater.

The mid and lower reaches of the Tokomairiro River main stem are different from many other South Island east coast rivers, because of its meandering pattern. The meanders are commonly incised a few metres and although low flows are sluggish, there is some active bank erosion at higher flows. Approximately 9 km downstream of the discharge point, the river forms a wetland, the Tokomairiro River Swamp, and then flows out to sea at Toko Mouth.

Schedule 1 of the Regional Plan: Water for Otago (RPW) lists the main stem of the Tokomairiro River as having a significant number of natural and human use values. Schedule 9 of the RPW lists the Tokomairiro River Swamp as a significant wetland in the region. These values are presented in more detail in the following sections.

2.3.1 Natural Values

Schedule 1A of the RPW lists the following natural values (i.e. ecosystem values based on specific physical, habitat and species characteristics) for the upper Tokomairiro River main stem (including the West and East branches):

- Large water body, supporting high numbers of particular species, or habitat variety, which can provide for diverse life cycle requirements of a particular species, or range of species.
- Access within the main stem, through to the sea, is unimpeded by artificial structures such as weirs, or culverts.
- Bed composition of gravel is of importance for resident biota.
- Presence of significant spawning and juvenile rearing areas for trout.
- Significant presence of trout and eel.
- Presence of indigenous fish species threatened with extinction.
- Presence of riparian vegetation of significance to aquatic habitats in the upper catchment.
- Significant habitat for Lower Taieri galaxiid in tributaries.
- Significant habitat for fernbird.
- Significant habitat for lamprey (in the West and East branches).

For the lower Tokomairiro River main stem, Schedule 1A of the RPW lists the following natural values:

- Large water body, supporting high numbers of particular species, or habitat variety, which can provide for diverse life cycle requirements of a particular species, or range of species.
- Access within the main stem, through to the sea, is unimpeded by artificial structures such as weirs, or culverts.
- Bed composition of macrophyte, gravel, sand and silt is of importance for resident biota.
- Presence of significant spawning and juvenile rearing areas for trout.
- Presence of riparian vegetation of significance to aquatic habitats.
- Significant presence of trout and eel.
- Presence of significant range of indigenous fish species.

2.3.2 Human Use Values

Schedule IB of the RPW identifies existing water takes from lakes and rivers, where the water is used for public water supply purposes. There are no such values listed for the Tokomairiro River.

However, the Tokomairiro River supports a diverse range of recreational activities, including a healthy whitebait fishery. In its submission (see section 4 below), the Otago Fish and Game Council (Fish and Game) states that children and family groups can often be observed swimming in the river upstream of where it enters the estuarine area. According to Fish and Game, the Tokomairiro River attracts approximately 4,089 angler visits annually and is thereby the sixth most visited river in Otago.

2.3.3 Cultural Values

Schedule 1C of the RPW identifies registered historic places which occur in, on, under or over the beds and margins of Otago's lakes and rivers. The schedule indicates that there are no registered historic places in the Tokomairiro River.

Schedule ID of the RPW identifies the spiritual or cultural beliefs, values or uses associated with water bodies of significance to Kai Tahu. For the upper Tokomairiro River main stem (immediately downstream of the discharge point for the Milton WWTP), the schedule specifies that the river supports "Mahika kai", e.g. places where food is procured or produced. Examples of waterborne mahika kai present in this part of the river include eels, whitebait, kanakana (lamprey), kokopu (galaxiid species) and koura (fresh water crayfish).

The schedule identifies the following values for the lower Tokomairiro River main stem:

- Kaitiakitanga - the exercise of guardianship by Kai Tahu in accordance with tikanga Maori in relation to Otago's natural and physical resources, including the ethic of stewardship.
- Mauri - the mauri (life force) of a river where there is an abundance of water flow and the associated ecosystems are healthy and plentiful.
- Waahi tapu and/or Waiwhakaheke - sacred places; sites, areas and values associated with the water body that hold spiritual values of importance to Kai Tahu.
- Waahi taoka - treasured resource; values, sites and resources that are valued and reinforce the special relationship Kai Tahu has with the water body.
- Mahika kai - places where food is procured or produced.
- Kohanga - important spawning/nursery areas for native fisheries and/or breeding grounds for birds.

- Trails - sites and water bodies which form part of traditional routes, including tauraka waka (landing place for canoes).
- Cultural materials - water bodies that are sources of traditional weaving materials and rongoa (medicines).

As part of a review of all of the applicant's eleven municipal wastewater schemes, Kai Tahu ki Otago (KTkO) undertook a cultural impact assessment. The report by KTkO noted that the discharge of treated wastewater from the Milton WWTP had an impact on downstream water quality and adversely affected Ngai Tahu customary activities. KTkO considered that improvements to the Milton WWTP rated as the top priority in the region.

Kai Tahu Ki Otago - Natural Resources Management Plan 2005 specifically identified the Tokomairiro catchment (within the greater Clutha/Mata-au catchment) as an area covered by the plan (p58).

The plan describes the importance of waterways in Otago as follows:

5.3.1 Wai Maori Description

The waterways of Otago, carrying the precious waters from the mountains to the sea, are a significant feature of the region.

From the source to the mouth of the sea all things are joined together as one Water plays a significant role in our spiritual beliefs and cultural traditions, the condition of water is seen as a reflection of the health of Papatuanuku. The loss and degradation of this resource through drainage, pollution and damming is a significant issue for Kai Tahu ki Otago and is considered to have resulted in material and cultural deprivation.

The plans stated objectives for managing discharges in section 5.3.4 are as follows:
Discharges:

8. To require land disposal for human effluent and contaminants.

9. To require consideration of alternatives and use of new technology for discharge renewal consents.

10. To encourage all stormwater be treated before being discharged.

11. To encourage identification of non-point source pollution and mitigate, avoid or remedy adverse effects on Kai Tahu ki Otago values.

12. To encourage Kai Tahu ki Otago input into the development of monitoring programmes.

13. To require monitoring of all discharges be undertaken on a regular basis and all information, including an independent analysis of monitoring results, be made available to Kai Tahu ki Otago.

14. To encourage Management Plans for all discharge activities that detail the procedure for containing spills and including plans for extraordinary events.

15. To require all discharge systems be well maintained and regularly serviced. Copies of all service and maintenance records should be available to Kai Tahu ki Otago upon request.

16. To require re-vegetation with locally sourced indigenous plants for all disturbed areas. Re-vegetation should be monitored by an assessment of the vegetative cover at one growing season after establishment and again at three seasons from establishment.

17. To require visible signage informing people of the discharge area; such signs are to be written in Maori as well as English.

18. To require groundwater monitoring for all discharges to land.

2.3.4 Wetland Values

Schedule 9 of the RPW identifies Otago's significant wetlands, including the Type A and Type B values for each wetland. The Tokomairiro River Swamp is listed in this schedule and its physical description states that the wetland covers an area of 100 hectares (ha) and consists of areas of rush/sedge/flax fresh water swamp, adjacent to the Tokomairiro Estuary and the main river channel landward of the coastal marine area boundary. The area south of the Toko Mouth (27.5 ha) has been protected by QEII National Trust Open Space Covenant since 1993. A management statement was prepared in 1994.

The wetland's Type A value is based on it being a scarce wetland type in Otago, in terms of its ecological, or physical, character. A scarce *Sarcocornia quinqueflora* saltmarsh community is present.

The wetland's Type B value is based on it being a wetland with high diversity of indigenous flora and fauna. It supports habitat for a diversity of waterfowl species, including the mallard, grey and New Zealand shoveller duck, and the grey teal and black swan. It links directly with the downstream estuarine area, which provides habitat for the same species. Marsh crake and South Island fernbird are also present.

2.4 State of the Receiving Environment

Routine physical-chemical water quality monitoring has been undertaken in the Tokomairiro River catchment since 1994. The historical water quality monitoring of the Tokomairiro River has shown that the water quality is degraded, particularly in its lower reaches (downstream of the discharge point for the Milton WWTP).

Water quality monitoring has been undertaken at various sites on the Tokomairiro since 2000. The sites still monitored are Lisnatunny on the East Branch (Dec 2001 to present) and the West Branch at SH8 Bridge (Aug 2002 to present). Monitoring at Tokoiti ceased in June 2005 as Milton WWTP monitors downstream of its discharge as a requirement of its consent conditions (Consent 2001.755).

Policy 7.6.1 and Policy 7.6.2 of the RPW acknowledges that water quality in the Tokomairiro River needs to be enhanced; so that it becomes suitable to support primary contact recreation and that the macroinvertebrate community index (MCI) score is increased. Table 8 below summarises the historical monitoring results (median and maximum values) for one site in each of the West and Each Branches, and one site on the main stem, with exceedances (median) of the applicable guideline value highlighted in bold font.

The historical monitoring results in Table 7 above confirm that the discharge of treated wastewater significantly increases the dissolved and total nutrient concentrations in the main stem of the Lower Tokomairiro River. The median value for *E. coli* exceeds the primary contact recreation guideline by a factor of five per 100 ml of river water.

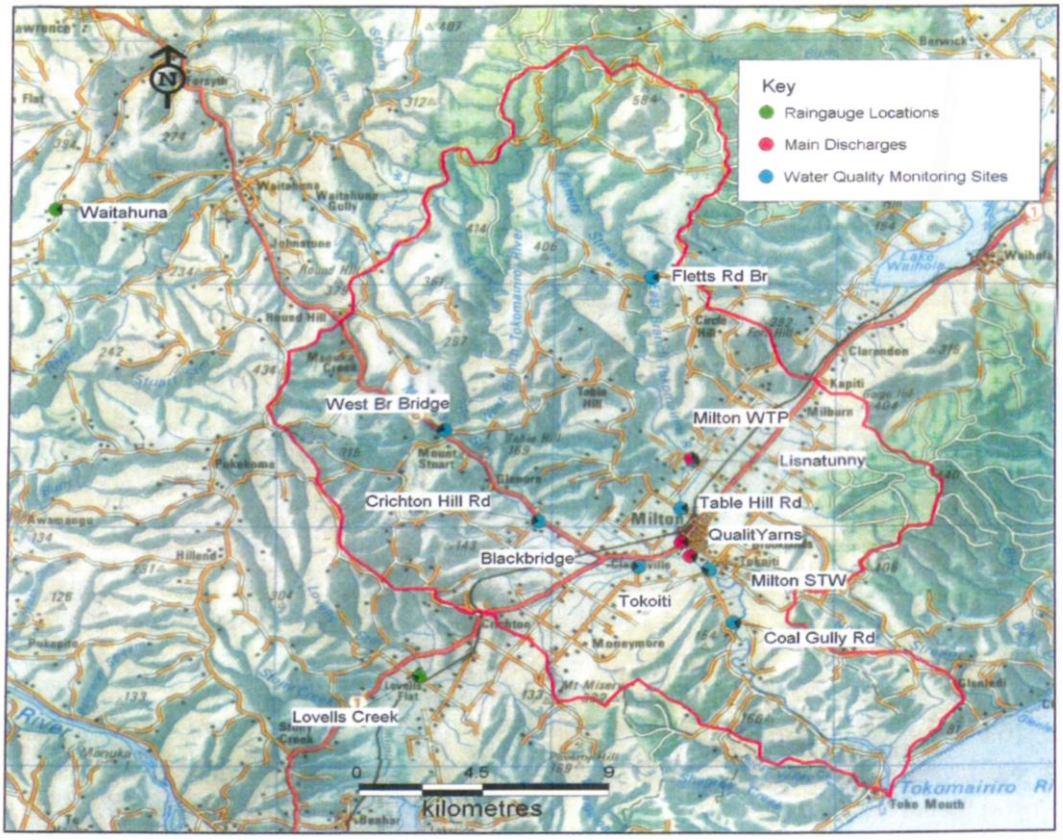

Figure 4: ORC Monitoring Sites on the Tokomairiro River

Table 8: Historical water quality monitoring results for the Tokomairiro River, August 2002 - June 2005

Site	**Turbidity (NTU)**		***E. coli* (cfu/100 ml)**		**Ammoniacal N (mg/l)**		**Nitrite/nitrate N (mg/l)**		**Total N (mg/l)**		**DRP (mg/l)**		**Total P (mg/l)**	
Guideline Value[+]	**5.6**		**260[++]**		**0.9**		**0.444**		**0.614**		**0.01**		**0.033**	
West Branch														
SH8	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max
	2.35	4.1	195	**2600**	0.015	0.03	0.015	0.03	0.405	1 01	0.005	**0.01**	0.03	0.121
East Branch														
Lisna-Tunny	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max
	3.1	6.5	185	770	0.02	0.04	0.196	0.677	0.42	0.9	0.002	0.01	0.03	0.078
Main Stem														
Tokoiti	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med	Max
	3.8	14	1200	6900	0.105	0.33	0.394	2.07	0.87	2.99	0.038	0.227	0.08	0.35

Notes: +ANZECC 2000 Default Trigger Value for Lowland Rivers

++ Acceptable/Green Mode for primary contact recreation, as specified in the Ministry of Health *Microbiological Water Quality Guidelines for Marine and Freshwater Recreation Areas 2003*

As discussed in sections 2.1.3 and 2.1.4 above, the discharge volume and contaminant load from the Milton WWTP will increase with the addition of the pre-treated wastewater from the OCF, and it is recognised that the discharge quality needs to be progressively improved through upgrades to the existing treatment plant and by addressing stormwater issues.

In May 2007, the ORC's RSU published a state of environment report titled *Surface Water Quality of the Tokomairiro River* (ORC, 2007). The purpose of the report is to provide an understanding of water quality in the Tokomairiro River, before the Milton WWTP is upgraded. Intensive monitoring was undertaken between July 2006 and March 2007, at eight sites in the catchment.

The monitoring will enable a comparison of the water quality in the Tokomairiro River before the Milton WWTP upgrade, with future monitoring results after the upgrade, which in turn will enable an assessment of whether the objectives of Policies 7.6.1 and 7.6.2 of the RPW are being met.

For the purpose of this recommending report, however, the water quality monitoring results in the RSU's 2007-report for the Tokomairiro River, together with the Council's long records of flow in the river, can be used to set an effluent quality standard for the discharge, such that the water quality standard set out by national and regional plans and guideline documents would be achieved shortly downstream of the discharge point for the Milton WWTP.

The RSU's monitoring survey was based on nine samples taken between July 2006 and March 2007. Although this is quite a limited dataset, it is clear that water quality deteriorates with distance from the headwaters of the catchment; nutrient and bacteria concentrations increase, whilst dissolved oxygen levels decrease.

On the East Branch of the Tokomairiro River, water quality is highest at Fletts Road, then decreases as the river flows past Lisnatunny and Table Hill Road, and then into the main stem at Tokoiti.

On the West Branch, water quality is highest at the West Branch Bridge, then decreases as the river flows past Crichton Road and Blackbridge, and then into the main stem at Tokoiti.

When compared to other sites, parameters were elevated at Tokoiti and Coal Gully Road in the main stem; both monitoring sites located downstream of the Milton WWTP discharge point. The discharge point is located 1.5 km upstream of the monitoring site at Tokoiti, but the river is slow flowing over this stretch, preventing rapid mixing of treated wastewater with the river flow. In addition, as the Tokomairiro River flows through a developed catchment, its capacity to assimilate organic contaminant loadings will be reduced by the time it reaches the discharge point for the Milton WWTP.

The West Branch recorded some high bacteria levels. Of the nine samples taken, the primary contact recreation guideline (MfE, 2003) was exceeded seven times at SH8, four times at Crichton Road and five times at Blackbridge. The West Branch exceedances are due to agricultural land use practices. In the East Branch, the guideline was exceeded once at Fletts Road (in the upper catchment), four times at Lisnatunny and twice at Table Hill.

Nutrients (ammonium, nitrate/nitrite nitrogen, total nitrogen, dissolved reactive phosphorous and total phosphorous) in the Tokomairiro Rover all followed a similar pattern, i.e. increasing with distance downstream from the headwaters, with the most elevated results being recorded in the main stem downstream of the Milton WWTP. However, there were marked seasonal differences. During the summer months, the flows were lower and therefore the proportion of treated wastewater in-stream is higher, which accounts for higher phosphorous concentration in the main stem during this period.

The opposite was found with nitrogen, with higher concentrations found during the winter. This may be due to high rainfall, causing increased run-off of nitrogen, and because the accumulated and leached nitrate-N in the catchment groundwater entering the surface water.

Chlorophyll *a* concentrations were below the ANZECC 2000 guideline levels for lowland rivers (8 mg/m^3). This was unexpected, because of the elevated concentrations of nutrients downstream of the Milton WWTP, as well as samples being taken in summer months, when water temperatures and light levels are high, which often leads to greater phytoplankton numbers.

Macroinvertebrate monitoring results supported the physical-chemical monitoring results and indicated that water quality below the Milton WWTP is poor. However, a key component of the MCI is the availability of suitable habitat, as the MCI is specifically designed for stony riffle substrates in flowing water. Coal Gully Road monitoring site is a gravely run/riffle and not ideally suited to the MCI methodology, but the RSU still found it useful to compare changes in MCI values at the same site over a period of time. The results of the biological monitoring support the physical-chemical monitoring results and indicates that the water quality below the Milton WWTP discharge point is poor.

The objective of Policies 7.6.1 and 7.6.2 of the RPW is being sought through addressing both non-point and point source discharges.

Non-point source discharges were addressed by the Council through the Tokomairiro Catchment Programme, which ran from 2001 to 2006. This programme has now finished, but field days discussing best management practices are held approximately three to four times per annum. As the RSU's intensive monitoring has identified that elevated bacteria concentrations are still found in the Tokomairiro River upstream of the Milton WWTP (particularly in the West Branch), the RSU recommends that the field days should continue to promote good land use practices in the catchment, to try to minimise non-point source pollution and reduce bacteria levels.

In response to the Clean Stream Accord (initiated by Fonterra, MAF, MfE and regional councils) ORC has been promoting no stock access to waterways on dairy farms. As a result an estimated 90% of the dairy farms have been fenced off. We estimate that there are about 20 dairy farms in the Tokomairiro catchment. Sheep and beef farming may be Tokomairiro catchment's predominant land use. More recently an active compliance surveillance field work

has been initiated by ORC to identify activities related to stock access and grazing and effluent management. If breaches are found warnings followed by enforcement actions will be taken. Enforcement actions will include prosecutions. Between 2002 and 2006 there have been five infringement notices served on dairy farmers in the catchment on effluent breaches. Last season (2007) three dairy farmers in the catchment have been prosecuted for effluent related offences. It is ORC's intention to clean up the pollution as soon as possible. Currently ORC is also considering plan changes to introduce stringent rules to improve tile/mole drain discharges and other farming activities that lead to pollution. There has been several workshops held on this matter and councillors are fully supportive of the above initiatives. A working party with several councillors have already been set up to make rapid progress on water plan changes and other initiatives.

Milton WWTP is the main point source discharge that influences water quality in the lower Tokomairiro River. The RSU recommends that the bacteria loading from the treatment plant be addressed through this resource consent process.

Table 9 below summarises the results of the ORC's 2006-2007 water quality monitoring in the Tokomairiro River, with medians exceeding the applicable guideline trigger value highlighted in bold font:

Table 9: Median water quality results for the Tokomairiro River, July 2006 -March 2007

Site	Turbidity (NTU)	*E. coli* (cfu/100 ml)	Ammoniacal N (mg/l)	Nitrite/nitrate N (mg/l)	Total N (mg/l)	DRP (mg/l)	Total P (mg/l)
Guideline Value[+]	5.6	260[++]	0.9	0.444	0.614	0.01	0.033
West Branch							
SH8	1.82	**560**	0.01	0.183	0.37	**0.011**	0.027
Crichton Road	2.93	120	0.02	0.193	041	0.009	**0.037**
Blackbridge	3.61	**360**	0.03	0.191	0.47	**0.013**	**0.047**
East Branch							
Table Hill	3.31	230	0.02	0.238	0.57	**0.012**	**0.05**
Lisnatunny	3.31	250	0.01	0.106	0.36	0.01	**0.043**
Fletts Road Bridge	1.56	150	0.01	0.075	0.26	0.008	0.021
Main Stem							
Tokoiti	3.52	**440**	0.07	0.276	**0.62**	**0.043**	**0.107**
Coal Gully	3.2	150	0.05	0.322	**0.72**	**0.039**	**0.101**

Notes: + ANZECC 2000 Default Trigger Value for Lowland Rivers

++ Acceptable/Green Mode for primary contact recreation, as specified in the Ministry of Health *Microbiological Water Quality Guidelines for Marine and Freshwater Recreation Areas 2003*

Dissolved oxygen concentrations (not shown in the table above) are higher in the upper catchments of each branch and they decrease with distance downstream, such that the main stem has the lowest oxygen concentration. However, oxygen concentrations are not yet badly depleted at any site (Third Schedule of the Act states that dissolved oxygen levels should not fall below 6 mg/1), although they fall from above 11 mg/1 in the headwaters to below 9 mg/1 at Tokoiti. The Council's RSU states that the decrease in dissolved oxygen downstream of the upper catchments primarily is due to gradient morphology and organic loading from the Milton WWTP.

The applicant has also monitored water quality in the two upstream branches, 10 m upstream and 100 m downstream of the Milton WWTP respectively. The median results of the upstream branches do not exceed DRP guidelines; it is only just above the discharge point for the WWTP that the median concentration exceeds the New Zealand periphyton guideline. The median DRP increases by 39 % downstream of the WWTP and there is no doubt that the WWTP contributes to the large exceedance at the monitoring site 100 m downstream of the WWTP discharge point. However, both (immediately) upstream and downstream sites had DRP concentrations above the New Zealand periphyton guideline value of 0.026 g/m^3.

TN increases by 56 % downstream of the WWTP. Nitrate-N monitored by ORC at Mt Stuart and Lisnatunny, is approximately 25 % of the TN. If this is applied to the applicants monitoring, the nitrate-N upstream of the WWTP would be well within guideline levels, rather than 'above or close to guideline values' as stated by the applicant.

In conclusion, the RSU's 2007 monitoring report states that the Tokomairiro River is characterised by elevated bacteria concentrations that exceed the primary contact recreation guidelines. Water quality is poorest in the main stem at Tokoiti, where most water quality analytes exceed relevant guideline values. This is attributed to the discharge of treated wastewater from Milton WWTP and the RSU expects that this application for resource consent will address bacteria concentrations in the lower Tokomairiro River, which are directly attributable to the Milton WWTP. However, there are also many instances of elevated analytes upstream of the discharge point for the WWTP, which are attributed to non-point sources and will have to be addressed by the Council's continued work regarding best land use management practices.

3. Status of the Applications

The discharge of treated wastewater (human sewage) to water is a **discretionary** activity under rule 12.6.2.1 of the RPW.
The discharge of contaminants into air from the storage, transfer, treatment and disposal of liquid-borne municipal waste (i.e. human sewage) is a **discretionary** activity under rule 16.3.7.1 of the RPA.

Council may grant or decline the applications and, if granted, may impose any conditions that fall within the Council's powers under section 108 of the Act.

4. Public Notification and Submissions

The applications were publicly notified in the Otago Daily Times on 12 May 2007. Public notification was justified due to the adverse effects being more than minor and potentially significant, and the difficulty in identifying all potentially affected parties.

By the close of submissions on 11 June 2007, the Council had received four submissions; two in support, one in conditional support and one neutral. The submissions were as follows:

- Public Health South (PHS), who advises that it does not object to the issuing of resource consent for the proposed activities.
- Te Runanga o Otakou (Inc), who states that it supports the granting of resource consent, subject to consultation being undertaken with Hokonui Runaka and South Otago Runaka (Wai Koau).
- Director-General of Conservation (DoC), who is neutral to both applications.
- Fish and Game, who supports the applications.

Te Runanga o Otakou states in its submission that it has been a participant in the applicant's Wastewater Working Party process since its inception and is satisfied that the application to discharge treated wastewater to the Tokomairiro River is a fair representation of the approach and methodology agreed by the group.

In its submission, Fish and Game states that the Tokomairiro River is regarded as a good local sports fishery that contains a resident trout population and sea-run brown trout, which enters the river seasonally. The Tokomairiro River attracts approximately 4,089 angler visits annually and is the sixth most visited river in Otago. Children and family groups can often be seen swimming in the river, upstream of where it enters the estuarine area. The submitter supports the RPW objective for primary contact recreation standard in the Tokomairiro River and also the staged approach to the upgrade of the WWTP proposed by the applicant. Based on the applicant's proposal, Fish and Game considers a 35-year term to be reasonable, but is concerned about the significant amounts of phosphorous being discharged to the river and the consequential risk for nuisance algal growth to occur. Fish and Game wishes to be heard in support of its submission.

On 17 July 2008 PHS withdrew its submission. It explained that its 'no objection' submission had been listed by ORC Consent Administration section as 'in support' and on reflection it was not the intention of PHS to be in support of this application without appropriate conditions. PHS would give support to this application only on the condition that suitable long term upgrade options were to proceed. PHS would support the continuation of sewage reticulation and effluent discharge for Milton and the OCF based on fundamental public health principles, with suitable conditions.

No other submitters wish to be heard. Individual submissions are attached as Appendix A.

5. Assessment of Environmental Effects

The actual and potential effects the discharge may have on the environment are discussed below, in relation to water quality, natural values, human use values, cultural values, wetland values, amenity values, cumulative effects and air quality.

5.1 Effects of the Discharge to Water

The effects of the discharge of treated wastewater from the Milton WWTP to the Tokomairiro River are essentially a product of the quantity and quality of the discharge, and the flow in the river at the time of discharge. As discussed in section 2.4 of this report, the water quality in the Tokomairiro River is poor, and efforts are necessary to reduce the discharge of nutrients and bacteria to the river. This resource consent process provides an important opportunity to achieve a significant improvement of the receiving environment, particularly since the

discharge from the Milton WWTP has been identified as the major cause of the poor water quality in the lower Tokomairiro River main stem.

The primary contaminants of concern are *E. coli*, nitrogen (particularly ammoniacal nitrogen), BOD, and phosphorous. The applicant has acknowledged that the discharge needs to be improved in terms of faecal bacteria, ammonium and BOD, but proposes no improvement to the consented concentration of phosphorous in the discharge, on the basis that the background concentrations of phosphorous in the river already exceeds the applicable guideline value and that factors other than nutrients control the periphyton growth.

We are aware that treatment of P through biological processes is difficult. Any chemical processes to treat P in association with the biological processes will incur a high maintenance cost. Given the saturated status of P in the river it should be reduced progressively from non-point and point sources. If N levels could be managed below periphyton trigger levels the river will be an 'N limited' water body. Without sufficient N there is no likelihood of unwanted periphyton growth. Having stated this we are aware that high levels of P in river could cause blue-green algae breakouts as occurred in other N limited water bodies in the country. Therefore we agree that the correct steps should be focus on non-point P discharges and N reduction particularly ammoniacal-N reduction from Milton WWTP discharge and non-point discharges.

Contrary to acknowledging the need for improvement in terms of faecal bacteria, BOD and ammonium in the discharge, the applicant proposed no improvement to the consented concentration of faecal bacteria, BOD and ammonia in the original application. In fact, the applicant proposed that following a significant upgrade the consented concentrations of contaminants be allowed to increase substantially than the concentration allowed by current consent (see Table 4 above).

Considering the water quality of the Tokomairiro River and the work that has been, and continues to be, undertaken by the Council to divert non-point discharges from the river, an acceptable design proposal for the upgrade of the Milton WWTP would need to show a significantly reduced load of the contaminants of concern. In this context, it should be noted that the present discharge does not comply with the (ammoniacal nitrogen and faecal bacteria) effluent quality standard set out in the current consent, thereby already exceeding the consented contaminant load to the Tokomairiro River.

While contaminant ***concentrations*** are important, particularly in the short term, the contaminant ***load*** may have greater long-term effects on the receiving environment. To allow an assessment of potential effects to be made, the Council has estimated consented, actual present and proposed contaminant loads to the Tokomairiro River, using information supplied by the applicant in the application document (see Table 4 above). In calculating the proposed load, it has been assumed that by "winter", the applicant refers to the months April to August inclusive. The results are presented in Table 10.

The applicant is proposing to, at best, apply the current maximum effluent concentrations as 90 percentiles over the next 35 years. It should be noted that the maximum concentration limits stated in current conditions of consent do not allow the applicant to continuously discharge treated wastewater of that quality, as the other part of the condition requires that the stated geo-means shall not be exceeded on a rolling 12-month basis.

Table 10: Consented, present and proposed contaminant loads to the Tokomairiro River from the Milton WWTP discharge

Scenario Parameter	Consented Load		Present Load		Proposed Load (according to the revised proposal by the applicant)	
Max discharge volume (m^3/d)	1,050		1,050		1,050	1,625
BOD_5 (kg/year)	Geo-mean	Max(1)	Geo-mean	90 percentile	90 percentile	90 percentile
	7,665	13,414	4,599	8,048	13,414	17,793
TSS (kg/year)	9,581	15,330	4,599	14,180	15,330	23,725
NR,-N (kg/year)	2,683	5,749	3,641	4,982	11,497	5,931
TP (kg/year)	3,066	5,366	2,300	2,913	5,365	8,304
FC (cfu/100 ml)	1,000	5,000	28,000	102,000	50,000	4,500

Note: (1) For the purpose of allowing a comparison between present and proposed loads, the maximum consented loads have been calculated based on the "No sample to exceed" concentrations stated in current consent condition 6 and are not truly consented maximum loads. Instead, the consented geo-means shall not be exceeded on a rolling 12-month basis.

With regard to the contaminants of concern, i.e. faecal bacteria, ammoniacal nitrogen and phosphorous, the applicant is actually proposing a reduced effluent quality for the next 35 years, such that already the 90 percentiles proposed by the applicant exceed the maximum concentrations stated in current conditions of consent.

Increasing the concentration of contaminants in the treated wastewater (as proposed by the applicant), while at the same time increasing the discharge volume by up to 55 % could only result in the significant increase in contaminant loads presented in Table 10 above.

The Council does not foresee a future increase in the MALF, or 7 DLF, in the Tokomairiro River, nor has a future flow increase been suggested by the applicant. For the purpose of the assessment of current and future effects of the proposed activity, it can therefore be assumed that the same present river flow volumes would be available for mixing of the proposed, increased contaminant loads in the treated wastewater discharged to the river.

Consequently, with a proposed increase of all contaminant loads to the river, and significant load increases of the contaminants of concern, it is given that the concentration of all contaminants in the river, downstream of the discharge point, will also increase. Resultantly, the proposed activity would render the already poor water quality in the Tokomairiro River even worse.

As stated before through consultation/discussions held between ORC and the applicant the applicant had proposed a revised set of standards as provided in Table 5. Whilst the applicant attempted to address several issues raised by ORC in the revised proposal, there are key outstanding issues still being unresolved despite several discussions being held between the applicant and ORC staff before and after the lodging of the applications.

The remainder of this section presents ORC’s staff view of the original and revised proposals.

Faecal bacteria

Throughout the entire process the applicant and ORC staff held a significant difference of opinion on the matter of faecal bacteria standards. When applicant conducted initial discussions with ORC (e.g. discussions held between ORC staff, Department of Corrections and the applicant on 26 April 2006) during its planning stages ORC staff advised clearly that any decisions on long term consents would be guided by the RPW policies 7.6.1 and 7.6.2.

At the outset of the consultation process between the applicant and the council, the council staff had clearly stated council's required discharge quality (particularly regarding faecal bacteria discharge) to improve the river use status. Throughout the entire process the applicant refused to accept this requirement. The applicant appears to be driven by the OCF upgrade process rather than focusing on its own discharge quality improvement.

From the consultation viewpoint (the applicant vs council) this has been the worst process council has ever undertaken to date. It should be noted that similar consultation processes held between Queenstown Lakes District Council (QLDC) (regarding the Wanaka- Albert Town sewage discharge and Queenstown sewage discharge) and Waitaki District Council (regarding Palmerston and Moeraki sewage discharges) have been very successful.

The RPW Policy 7.6.1 states "*...To enhance water quality in the following water bodies so that they become suitable to support primary contact recreation Tokomairiro River...".*
Policy 7.6.2 states "*...To enhance the water quality in the following rivers so that the Macroinvertebrate Community Index score is increased: ...(f) Lower Tokomairiro River (below Tokoiti)...".*

During those discussions ORC staff gave clear and consistent guidance to the applicant on faecal bacteria standards (i.e. 260 *E.coli* cfu/100 mL) to enhance river water quality suitable to primary contact recreation.

The applicant states that (because Policy 7.6.1 is not given effect to by a rule in the RPW) *"the contact recreation standards in the Third Schedule of the RMA are not directly applicable".*

The RPW specifically addresses this in Policy 7.6.1:
"This policy is adopted to implement Policy 6.5.5 of the Regional Policy Statement for Otago, which requires, where appropriate, the enhancement of Otago's water quality. This reflects the community expectation that water quality within Otago will continue to support natural and human use values. The successful implementation of this policy would provide the opportunity for safe contact recreation in the identified water bodies."

Moreover, the RPW Policy 7.7.3 is directly linked to the above policies 7.6.1 and 7.6.2. It states *"...when considering an application to discharge contaminants to water, to have regard to opportunities to enhance the existing water quality of the receiving water body at any location for which the existing water quality can be considered degraded, in terms of its capacity to support its natural and human use values..".* The explanation for this policy in the RPW states "...there is the opportunity, particularly with new resource consents for existing discharges, to achieve an enhancement in water quality. This can occur when the consent holder re-examines the discharge activity and makes use of technological advances in the reduction, reuse, recycling, or treatment of contaminants. The ORC will have regard to these opportunities when considering resource consents to discharge contaminants to water. The policy applies to any location for which the existing water quality can be considered degraded in terms of its capacity

to support natural and human use values. Opportunities to enhance water quality in the water bodies identified in Policies 7.6.1. 7.6.2 and 7.6.3 are of particular importance....the policy reflects the importance of the enhancing water quality to the region's people and communities...".

It is disappointing that the applicant fully ignores the ORC water plan policies and imposes its own values on the Tokomairiro River. The applicant firmly believes that given the current poor water quality status of the river it deserves a secondary contact recreation status as against the community required primary contact recreation status. The applicant is aware that 57% of the time the upstream water quality is fit for primary contact recreation (fair to good). Despite this due to its poor proposed discharge quality it proposes secondary contact recreational status for much of the time including when the upstream water quality is fit for primary contact recreation.

The applicant also states that microbiological water quality is typically viewed in orders of magnitude and removal rates in terms of $\log_{10}$ removal. This is a strange statement to make when the MfE contact recreation guidelines (2003) distinguish between green mode at < 260, amber mode at 261-550 and red mode at > 550 (all levels expressed as cfu *E. coli*/100 ml). There is not an order of magnitude between these modes. The fact is that upstream of the Milton WWTP, the median level is in the amber category at 425 cfu/100 ml and downstream of the Milton WWTP, it is in the red category at 2,000 cfu/100ml. This is a significant difference.

Given the intentions set out in Policy 6.5.5 of the Regional Policy Statement for Otago (RPS) and Policy 7.6.1 of the RPW, the ORC staff are of the firm view that the assessment of effects of the proposal needs to be based on achieving an in-stream microbiological water quality in the Tokomairiro River (during mean annual low flow of 650 L/s) that does not exceed 260 cfu *E. colil* 100 ml (green mode) in the long term.

In the long term, assuming that the ambient in-stream *E. coli* concentration upstream of the discharge point can be reduced to 260 cfu/100 ml and that the maximum discharge volume increases to 1,625 m^3/d, the resulting MALF downstream of the discharge point will be approximately 669 l/s. To then achieve a resulting in-stream microbiological water quality of ≤ 260 cfu *E. coli*/100 ml, the maximum concentration of *E. coli* in the discharge could not be allowed to exceed 260 cfu/100 ml.

The applicant has been of the firm and *unique* view that if the upstream water quality is degraded there is no need to improve any downstream discharges. This view reflects in applicant's original proposal requiring the relaxing of the existing maximum FC requirement of 5000 cfu/100 ml to 16,000 cfu/100 ml for a 35 year term. Following numerous discussions between the applicant and ORC, the applicant has revised the above long-term standard to 4500 *E.coli* cfu/100 ml.

We are not surprised by the revised standard because the philosophy used by the applicant still remains the same and that the proposed revised level is based on maintaining the existing *degraded* status of the downstream water quality similar to that of the upstream water quality. The philosophy held by the applicant is new to ORC staff. ORC staff had never come across a similar philosophy held by other applicants. There are many examples that are contrary to that held by the applicant. One such example is the recently upgraded Dunedin International Airport Ltd's (DIAL) discharge does not discharge any faecal bacteria (i.e. <1 *E.coli* cfu/100 ml). The required effluent standard by ORC was 260 *E.coli* cfu/100 ml (90 %ile) to improve the West

Taieri Main Drain (which discharges into Lake Waipori) water quality. The DIAL decided to install a filtration system during the upgrade which provides a better quality discharge than required by ORC. Millions of dollars are being invested on major upgrade of industrial and school boilers to improve polluted air sheds even before the NES had been introduced by the government. None of the above polluters questioned the need for a clean up.

When a regional council is required by the community to clean-up polluted waterways or air sheds it is counterproductive to face backward and archaic arguments from non-point or point source polluters (e.g. we will do our part only once others have done their parts or if the air shed or a waterway is polluted we will ensure our discharges will result in no change to the poor quality of air or water). In this case the view held by the applicant is based on a reactive approach rather than proactive, relying on other polluters (i.e. farmers) to improve water quality.

We are aware that the central government is frustrated that many of the waterways in New Zealand require a major clean up and that regional councils' progress on clean up of waterways is very slow. To address this issue the government has been working on Sustainable Water Programme of Action. Given the upgrade of the Milton WWTP is partially or fully funded by the central government agency (OCF) it is disappointing that it failed to use the opportunity to provide a better discharge to improve downstream water quality.

ORC's requirement of the applicant is clear. Given the upstream faecal bacteria levels do fall below the 260 *E.coli* level during 34% of the time (estimated by the applicant-the applicant also estimated that 57% of the time the upstream faecal bacteria level will be <550) it is reasonable to expect a point source discharge such as Milton WWTP to discharge at or below 260 *Ecoli* at all times.

We are also aware that the applicant sought our views on human health risks related to setting an in-pipe standard such as 260 *E.coli* cfu/100 ml. We believe that such a debate should be held by health experts in a technical forum given that 100s of publications have been released on the matter. We believe such a debate is a waste of time and counterproductive. At the moment we are guided by the national guidelines to achieve primary contact recreation. The guidelines state that such guidelines should not be used as the basis for establishing conditions for discharge consents, although they may be used as a component for decision making. We believe that the use of such guidelines in pristine or good quality water bodies to set discharge quality standards should be prohibited. However, in the case of polluted waterways where there is plan/policy requirement to improve water quality to a required human value (i.e. primary contact recreation) it is pragmatic to use such guidelines to achieve the desired outcome. The alternative approach will impose expensive and laborious research by the applicant to perform long-term monitoring of a range of actual pathogens (such as *Salmonella*, protozoa and viruses) in the discharge and upstream and downstream of the discharge. We believe this approach is onerous and impractical given the extent of research performed to determine the existing guidelines.

With regard to the revised microbiological discharge quality, the applicant is proposing a 95-percentile of 50,000 cfu *E.coli*/100 ml until the influent exceeds 1050 m^3/d or the OCF's 2nd stage is commissioned. This is also a strange request given the existing poor status of the river and the lack of certainty on upgrade. From a practical viewpoint if such a proposal is accepted by ORC, to trigger an upgrade (2nd stage) based on effluent output being in excess of 1050 m^3/d may take more than 10 years because the total estimated effluent output from OCF is 400 m^3/d

and the current Milton WWTP discharge is between 600 and 700 m^3/d. Given the projected Milton population growth being slow and any reduced storm water intrusion into the sewer by the applicant's storm water detection programme to reduce storm water intrusion, we believe that the Milton WWTP effluent flow will be static for sometimes.

If we ignore the influent flow trigger of 1050 m^3/d to progress towards Stage 2, other processes that trigger (i.e. OCF Stage 2 commissioning) has many uncertainties attached. Uncertainties should not be accepted in consent conditions. From a compliance monitoring viewpoint such a condition is unenforceable hence not accepted by ORC staff. Moreover, given the poor water quality downstream and the unusually high faecal bacteria output required (50,000 *E.coli* cfu/100 ml) any such discharge should be allowed only under extreme circumstances and for a very short period such as 1-2 years for the purpose of any upgrade work. This was what was proposed (allowing the above standard until 2009) by ORC staff in their letter (26 April 2007) to the applicant. Allowing a discharge that is 10 folds poorer than the existing consent standards for an unknown or long period will be contrary to the philosophy of the RMA, RPS and RPW.

The applicant has tested numerous models on faecal bacteria and other contaminant assimilation by using mixing zone provisions. Whilst s107 of the Act allows consideration to mixing zones, not allowing a mixing zone is not a breach of the Act. In other words, any consent conditions can be stricter than the provisions of s107. We maintain that given the accorded primary contact recreation status to such a significant waterway in the Otago Region there should not be any non-complying zones provided within the river particularly with regard to elevated faecal bacteria levels. As for other contaminants such as nutrients it may be appropriate to consider any small mixing zones. Many regional councils have policies on mixing zones restricting mixing zone length or width on a case by case basis (value of the waterway, flow, contaminant type etc.). The RPW policy 7.7.6 is relevant to mixing zone which is similar to other councils' policy. The only difference is that the ORC RPW mixing zone policy starts with "*...where mixing zone is required for the discharge of contaminants to water...*". We interpret this as mixing zone is not always provided.

We promote in-pipe standards for faecal bacteria discharges. In polluted waterways for an existing discharge it will be 260 *E.coli* cfu/100 ml (95%ile) and for a green-field discharge full disinfection will be required. In waterways where faecal bacteria are consistently lower than 260, either full disinfection or partial disinfection (e.g. <10 *E.coli* at 90%ile) will be required. This provides sufficient certainty to comply with the consent conditions. Such a requirement does not require or promote a mixing zone. Regardless of the upstream (better or worse) water quality fluctuations and the amount of flow in the river, in-pipe faecal standard will constantly ensure (during most periods) that the discharge will not result any adverse effects on the environment.

We note that the applicant is uncomfortable with a scenario of good quality effluent diluting the stream. Our observation to date is that many discharge consent holders differ from this opinion. Any river clean-up process will involve polluters making steps to improve their discharges substantially. When such steps are taken upstream and downstream clean-ups are not expected to occur simultaneously. One polluter does not wait for the other polluter to improve its respective discharge qualities. If the upstream water quality is improved by reducing non-point discharges, the downstream effects by the applicant's discharge will be diluted by the better upstream water quality. The situation applies to the applicant's own improved discharge which may provide dilution at times of pollution upstream.

Apart from the unique and strange philosophy held by the applicant on enhancing water quality as per the RMA, RPS and RPW, the applicant is also strongly stuck with the philosophy of staging of any upgrades. This staged approach (with several options) has caused significant confusions within the submitters and council staff and its consultants. It was not clear whether all stages would be implemented during the required term of the consent. Our limited understanding of the staging philosophy of the applicant is that the applicant wishes to stage these processes in order to deal with increased effluent loadings from the OCF system.

It is clear from the above approach taken by the applicant that the applicant's main focus is on the OCF effluent treatment, loading and any consequential upgrades. This is a very short-sighted approach because in our view the OCF discharge is small and already pre-treated (unlike many other trade wastes) hence the key focus should be on improving the existing poor discharge quality of Milton WWTP. We believe that it is not rocket science or complex process to upgrade the existing Milton WWTP with a view of accepting up to 400 m^3/d of pre-treated effluent on a long or short-term basis or on an incremental basis. It is normal for many municipal treatment plants are designed to accommodate future population growth and any future large trade waste inputs. Whilst such matters are realistic to municipal wastewater treatment plant designs, any future upgrades should not be used as an excuse to adopt a status quo approach to poor discharge or making the discharge any worse.

We are not privileged to any contractual arrangements between the applicant and OCF. We should not be interested in such matters. However, if the upgrades are performed strictly under the terms of OCF the applicant may not have any say in the timing of the upgrades unless ORC consent conditions override any upgrade timing. The staging approach proposed by the applicant is strictly not acceptable to ORC staff based on ongoing significant adverse effects on the environment and the significant adverse effects caused by the proposal.

ORC granted the existing Milton WWTP discharge in 2003 to discharge up to 850 m^3/d treated wastewater under certain discharge standards. A variation to accommodate 200 m^3/d of OCF effluent was granted in 2006 by ORC in good faith to substantially improve the existing discharge quality and standards. If the applicant and OCF are unable to meet the ORC requirements in this report, the most pragmatic approach will be to allow a 1-2 year timeframe in the consent for OCF to stop discharging into the Milton WWTP and re-grant the applicant a consent similar the old consent (2003) under a similar term and conditions (expiry in 2017) (see Table 4 for standards in the existing consent). This way the OCF will have to disconnect their discharge from the Milton WWTP and apply for its discharge consent within 1-2 years' time. We understand that the applicant is not compliant with its current consent conditions. Rather than providing a variation to relax any standards in the 2003 consent this matter will be dealt through ORC's compliance process by providing a reasonable timeframe for the applicant to fully comply with all current consent conditions.

If the above approach is taken, given the OCF discharge being 'green-field' and the catchment waterways are already polluted (or saturated with contaminants) any discharges to waterways will require fully disinfected effluent (<1 *E.coli* cfu/100 ml) with extremely low levels of other contaminants (e.g. <5 TN, <5 BOD etc.). The OCF may consider a staging process but the above standards will apply from the commencement of the discharge consent despite any staging because it is a new discharge into already polluted waterways. The other option for OCF is to consider a land based discharge.

The above approach also illustrates that if OCF had applied for a separate consent to discharge into any polluted waterways in the same catchment it would have required substantially more capital and maintenance cost for a best practice system due to extremely stringent standards imposed by ORC. We believe that OCF has made the correct and pragmatic decision to connect its discharge to Milton WWTP but unfortunately such a union has not resulted in any major positive changes to the existing consent conditions.

Our opinion of effects on the microbiological water quality of the Tokomairiro River is therefore that the applicant's proposal would lead to further degradation of the receiving environment and that the effects are significant. We consider that the applicant has failed to submit a proposal that is consistent with the applicant's stated intention of improving effluent quality in terms of faecal bacteria.

Nitrogen and phosphorus

The ANZECC 2000 guidelines emphasise that the best reference conditions are set by locally appropriate data. The guidelines recommend deriving site-specific trigger values, using water quality data from an appropriate reference site. The guidelines recommend that a minimum of two years of water quality results from continuous monthly sampling (24 samples) be used to develop site specific guidelines. A trigger for further action is deemed to have occurred when the median concentration of *n* independent samples taken at a test site exceeds the 80^{th} percentile of the same indicator at a suitably chosen reference site (ANZECC 2000).

The ORC does not yet have sufficient data from a reference site to derive sites-specific trigger values for the Tokomairiro River. This will not be possible until the data from the Mt Stuart monitoring site will be complete. However, using Mt Stuart historical samples to date, the 80^{th} percentiles are 0.0126 g/m^3 (DRP) and 0.133 g/m^3 (NNN). Although these values are rough guidelines only, they are useful for comparative purposes. It is noted that both values are approximately half that of the New Zealand periphyton guidelines (MfE, 2000).

For freshwater rivers where no site-specific values can be derived, the ANZECC 2000 guidelines specify the following default trigger values for nitrogen and phosphorous compounds (as physical and chemical stressor) in New Zealand for lowland rivers with slightly disturbed ecosystems:

- Nitrite/nitrate (NO_x) - 0.444 g/m^3
- Ammoniacal nitrogen (NH_4-N) - 0.9 g/m^3 (to avoid toxicity effects)
- Total nitrogen (TN) - 0.614 g/m^3
- Dissolved reactive phosphorous (DRP) - 0.010 g/m^3
- Total phosphorous (TP) - 0.033 g/m^3

The applicant in its revised standards proposes an ammoniacal-N level of 30 mg/l during the 1050 flow regime and 10 mg/l during the 1625 flow regime. We believe that given the current condition requires 15 mg/l and the applicant's own estimate of 19 mg/l resulting in an in-stream ammoniacal-N level of 0.9 mg/l (which is the maximum acceptable level for in-stream ammoniacal-N as per the ANZECC guidelines) any long-term discharge should contain ammoniacal-N well below 19 mg/l. The applicant is confident that at 19 mg/l (90%ile), on average the ammoniacal-N level will be around 10 mg/l which will maintain the in-stream ammonia level at 0.45 mg/l (ANZECC's preferred in-stream level to maintain the macro invertebrate community). During the consultation process with the applicant we proposed a maximum of 30 mg/l as a short-term discharge level until 2009 (and 10 mg/l to enable the commissioning of the upgrades. Given the current discharge quality is 13 mg/l (90%ile)

(applicant's self monitoring for maximum being 18.1 mg/l) we believe our proposed discharge level is high.

It is also surprising that the applicant has been constantly requiring greater ammoniacal-N output (than achieved currently by a poor treatment system) from the upgraded treatment plant. We feel that the applicant is strongly bound to the idea of in-stream ammoniacal-N requirements and setting discharge quality level based on this. Whilst such an approach is the first step to determine discharge qualities, applicant failed to move to the next step by considering the treatment plant capability. In reality the human raw effluent produces 70-80% ammoniacal-N (from urine) and up to 30% of organic-N. In order to maintain the TN at low level nitrification and dentirification are essential treatment processes. In reality as the existing poor treatment system illustrates the ammoniacal-N level will be lower than that promoted by the applicant. Based on this observation our revised proposal for the short-term ammoniacal-N level will be 19 mg/l (90%ile) rather than a maximum of 30 mg/l.

As per our recommendations if the upgrades are staged September 2009, achieving an ammoniacal-N level of 10 mg/l (90%ile) is not difficult for the applicant since it has proposed this level for the 1625 flow regime (there is also another key reason to reduce ammoniacal-N, to maintain or reduce N levels in water as discussed below under P). Therefore our recommendation is to require 10 mg/l (90%ile) from 2010 (which is different to our originally proposed maximum of 10). We believe that judging by the current treatment plant's output (13 mg/l 90%ile), the above requirement is still high for fully upgrade treatment plant. The hearing panel should consider reducing our proposed ammoniacal-N level of 10 further based on the proposed treatment plant's higher treatment capability.

We also proposed a nitrate-N limit of 5 mg/l and a TN limit of 20 mg/l after 2009. The reason was to encourage a high nitrification process which in turn will reduce the ammoniacal-N level and keep the overall N discharge lower. We do not agree with the applicant's statement that nutrient levels will not impact periphyton growth in the Tokomairiro River based on a recent one-off bioassay. Based on the bioassay the applicant inferred that whilst nutrients *limited* the periphyton growth the biomass accumulation and growth was controlled by habitat and biological factors. Such an observation implies that higher nutrient inputs to the Tokomairiro River will not have any effects on periphyton growth (i.e. on all species of periphyton). Whilst the Tokomairiro River bed habitat may be limiting certain periphyton growth the biological factors could vary substantially depending on the physical and chemical properties of water. Therefore we believe that the above inference is misleading. We take a cautious approach and recommend to keep the N input to the river low. But we agree with the applicant that there is no need for a separate limit for nitrate-N when there are limits on TN and ammoniacal-N. Since we proposed 10 mg/L as ammoniacal-N we propose 20 mg/l (90%ile) as TN.

With regard to phosphorous, the applicant is well aware that the phosphorous contribution from the Milton WWTP is approximately 80 % of that in the river. As stated before we argue that one of the two nutrients needs to be significantly reduced in the discharge, such that the resulting in-stream water quality can meet the ANZECC 2000 guideline values, in order to avoid significant adverse effects on the Tokomairiro River in the future. In this instance, given the treatment of P is difficult, we suggest that the applicant needs to take significant steps to control the load of ammoniacal and total nitrogen in the discharge, as these compounds are likely to cause the most immediate significant adverse effects to aquatic ecosystems since the river is already P saturated.

However, care should also be taken to optimising the treatment process with the focus of reducing, as far as possible, any increase of the load of phosphorous in the future discharge. We acknowledge that the background in-stream concentration of phosphorous exceeds the ANZECC 2000 guideline already upstream of the Milton WWTP. However, the ORC is committed to improving the water quality in this regard and is continuously working towards achieving the ANZECC 2000 guidelines.

During our consultation we proposed a maximum level of 15 mg/l TP as short and long-term discharge standard. The applicant's proposed level had been consistent (14 mg/l 90%ile) in the original and revised standard. Given the existing TP discharge is <10 mg/l (90%ile) (applican''s self monitoring maximum was 9.4 mg/l) and applicant's maximum estimate of influent TP is 9.3, we believe the applicant's proposed 14 mg/l (90%ile) is an overestimate. Therefore we propose a more realistic output of TP being 10 mg/l (90%ile) for the short and the long-term. This approach is expected to keep the adverse effects attributable to phosphorous (i.e. mainly periphyton growth) at an acceptable level.

BOD and suspended solids

During the consultation with the applicant we proposed a BOD level of 15 mg/l and a TSS level of 20 mg/l. In response the applicant reduced the BOD level from 35 to 30 mg/l in order to reduce any potential heterotrophic growths (e.g. sewage fungus). Based on a crude relationship between TSS and turbidity the applicant concluded that a TSS level 40 mg/l would not have any impact on aquatic communities. Applicant's self monitoring (sample number of 41) indicates that the maximum BOD was 40 and the geomean was 12 mg/l. Similarly the maximum for TSS was 91 and the geomean was 12 mg/l.

We believe that given the Tokomairiro River is an excellent trout habitat, it is prudent to keep the BOD and TSS levels low. The proposed BOD and TSS levels by the applicant are marginal in terms of meeting the ANZECC guidelines and are also considered as very high for an upgraded treatment plant. If the current treatment plant can produce lower levels of BOD and TSS we expect a better performance from the upgraded plant. Therefore whilst it is important to set water quality standards based minimising any adverse effects on the environment, it is also important not to grant unusual levels of contaminant discharge allowances that are not compatible with the proposed overall treatment capability. Moreover, high levels of TSS will only reduce the effectiveness of the disinfection system (i.e. UV). Therefore, based on the current performance of the Milton WWTP and the proposed upgrades we recommend that our proposed maximum level of BOD of 15 mg/l and TSS of 20 mg/l are acceptable as 90%ile standards.

5.1.1 Effects on Natural Values

Objective 7.5.1 of the RPW is to maintain or enhance the quality of water in Otago's lakes and rivers so that it is suitable to support their natural and human use values and people's use of water. The plan states that it is therefore important that no degradation is allowed to occur.

The applicant is proposing to reduce the effluent quality with regard to all the contaminants of concern, i.e. faecal bacteria, ammoniacal nitrogen and total phosphorous, and increase the maximum consented discharge volume by up to 55 %. As we demonstrated in section 5.1 above, the consequence of such a proposal would result in a significant degradation of the in-stream water quality in the Tokomairiro River, downstream of the discharge point for the Milton WWTP.

Of particular concern is the indication that ammoniacal nitrogen, downstream of the discharge point for the Milton WWTP and after complete mixing has been assumed, could exceed the ANZECC 2000 trigger value for the avoidance of toxicity effects by up to 20 %.

In December 1999, the USEPA published the *1999 Update of Ambient Water Quality Criteria for Ammonia* (1999 Ammonia Update). The 1999 Ammonia Update contains the USEPA's most recent freshwater aquatic life criteria for ammonia and pertains only to fresh waters.

The 1999 Ammonia Update tabulates pH-dependent, acute toxicity Criterion Maximum Concentration (CMC), i.e. the one-hour average concentration of total ammonia nitrogen that should not be exceeded more than once in three years. The ORC's RSU's historical monitoring has reported (ORC, May 2007) median pH values upstream (in both branches) of the discharge point of between 6.95 and 7.14, which would correspond to a CMC for freshwater, where salmonids are present, of 24.1 g/m^3 to 22.0 g/m^3.

Our assessment is consequently that the acute toxic CMC for salmonids would be exceeded on a regular basis. The short-term effects that are anticipated include fish death of all life stages of salmonid species, for a distance downstream of the discharge point to where the in-stream ammonia concentration no longer exceeds the CMC. Long-term, it is anticipated that salmonid species would not successfully re-populate that same stretch of river downstream of the discharge point, during the term of the proposed discharge. These effects are both significant and unacceptable. Unlike the applicant, we do not believe that the fish would know to swim up the river on one side, to avoid the acute toxic ammonia concentration in the discharge plume travelling downstream (p. 31 of the application document).

The applicant states that high levels of filamentous-green algae (periphyton) were observed both upstream and downstream of the discharge point during the applicant's macroinvertebrate survey in March 2007. The periphyton was abundant at sites both upstream and downstream of the discharge point, particularly 10 m and 75 m downstream, and 50m upstream. The thickness and extent of the algae cover at the site 75 m downstream, exceeded the New Zealand periphyton guidelines, i.e. exceeded 30 % cover for filamentous algae greater than 2 cm long.

Given the proposed increase in both concentration and load of nutrients in the 1050 m^3/d discharge regime, when the receiving environment is already exhibiting periphyton growth exceeding the New Zealand guidelines, the Council's assessment is that the proposed discharge would cause a further increase in the abundance of periphyton growth downstream of the discharge point. As a consequence, adverse effects can be expected on those natural values that would be affected by increased periphyton growth (bed composition of importance to resident biota, spawning and juvenile rearing areas for fish etc.). Considering the proposed increase in both concentration and load of nutrients in the future discharge, the current state of the receiving environment and the sensitivity of the potentially affected natural values, our assessment is that these adverse effects may be significant.

In addition to the natural values described in section 2.3.1 above, the applicant states that the Tokomairiro River also supports a freshwater clam (*Sphaerium* spp.) that is very sensitive to ammonia. To ensure its protection, the ANZECC 2000 guidelines recommend using a total ammonia value that is half that of the default 95 % species protection value, i.e. 0.45 g/m^3. However, the applicant does not believe that this stricter guideline value is required for the Tokomairiro River, because the *Sphaerum* spp. are common in Otago rivers and form only a minor component of the macroinvertebrate community throughout the river. Furthermore, the

applicant states that its biological investigations have indicated that there is an insignificant impact from ammonia on *Sphaerum* spp. downstream of the discharge point for the Milton WWTP.

We note that the biological investigations undertaken by the applicant studied the effects of a discharge with a 90-percentile ammonia concentration that is currently less than half (13 g/m^3) of what the applicant is proposing for the period until 2009 (30 g/m^3). The Council has no doubts that the effects of what the applicant is proposing would have significant adverse effects also on the downstream macroinvertebrate community in general, and on the *Sphaerum* spp. in particular.

In summary, considering the anticipated effects on natural values from the proposed discharge, the Council considers that the effects of the 1050 m^3/d discharge regime would be both significant and unacceptable. The proposal would further deteriorate the already poor water quality of the Tokomairiro River and significantly impair its future potential to support the natural values currently attributed to it.

5.1.2 Effects on Human Use Values

We consider the adverse effects of the proposal on human use values are not only significant, but also unacceptable.

In its discussion on relevant water quality standards and guidelines for faecal bacteria (p. 29 of the application document), the applicant states that, to its knowledge, the Tokomairiro River is not being used for swimming; however, it is used for fishing. Furthermore, the current in-stream water quality standard does not support primary contact recreation (although the East branch does and it is not greatly exceeded in the West branch; our comment). Therefore, the applicant proposes that the suitable in-stream standard should be one that supports secondary contact recreation and proposes a standard of 1,000 cfu/100 ml, as set out in the ANZECC 2000 guidelines for secondary contact recreation.

However, in its assessment of effects on natural character and amenity from the proposed discharge of faecal bacteria (p. 47 of the application document), the applicant acknowledges that the Tokomairiro River supports not only fishery (both upstream and downstream of the wetland area), but also recreational activities such as swimming, walking and picnicking.

Fish and Game, in its submission, also raises the fact that the Tokomairiro River currently is being used for both primary and secondary contact recreation. According to Fish and Game, the Tokomairiro River attracts approximately 4,089 angler visits annually and is the sixth most visited river in Otago. Children and family groups can often be seen swimming in the river, upstream of where it enters the estuarine area.

We are mindful of the primary and secondary contact recreation activities in the Tokomairiro River and are working towards achieving a reduction of the concentration of faecal bacteria in the river, such that it becomes suitable to support primary contact recreation. This objective is given effect to in Policy 7.6.1 of the RPW and reflects the community expectation that water quality within Otago will continue to support natural and human use values. The successful implementation of this policy would provide the opportunity for safe primary contact with water in the Tokomairiro River.

However, as presented in section 5.1, the applicant's proposal for microbiological effluent quality, would result in exceedances of the MfE contact recreation guidelines that are, in the short term, up to twice that of the amber mode guideline value and, in the long term, two to three times that of the green mode guideline value. Consequently, the microbiological effluent quality proposed by the applicant would, today and 35 years into the future, continue to render the Tokomairiro River, downstream of the discharge point for the Milton WWTP, unsuitable for human primary contact recreation purposes.

The microbiological effluent quality proposed by the applicant would also continue to be the most significant cause of rendering the in-stream water quality of the Tokomairiro River, downstream of the Milton WWTP, unsuitable for consumption by farm animals. The ANZECC 2000 guidelines specify that drinking water for livestock and irrigation of pasture and fodder for dairy animal stock (without withholding period) should contain less than 100 cfu FC/100 ml (median value from regular monitoring).

The ANZECC 2000 guidelines state that good water quality is essential for successful livestock production. Poor quality water may reduce animal production and impair fertility. In extreme cases, stock may die. Contaminants in drinking water can produce residues in animal products (e.g. meat, milk and eggs), adversely affecting their saleability and/or creating human health risks.

According to the Council's records, there are no consented surface water takes from the Tokomairiro River downstream of the Milton WWTP discharge point. However, surface water may still be taken as a permitted activity under Rule 12.1.2.1 (for an individual's reasonable domestic needs, or the reasonable needs of an individual's animals for drinking water) and Rule 12.1.2.5 (not exceeding 25,000 1/d at any landholding), provided the requirements of the permitted activity rules are otherwise complied with. These permitted activities do not require consent and would therefore not appear in the Council's records. However, given the agricultural land use on both sides of the Tokomairiro River, downstream of the discharge point for the Milton WWTP, the Council anticipates that such permitted activities are frequently occurring.

Considering the anticipated effects on human use values discussed above, and illustrated in Table 10, the Council considers that the effects would be both significant and unacceptable. The proposal would further deteriorate the already poor microbiological water quality of the Tokomairiro River and significantly impair its present and future potential to support the human use values currently attributed to it.

5.1.3 Effects on Cultural Values

As previously stated (see section 2.3.3 above) a cultural impact assessment report by KTkO noted that the discharge of treated wastewater from the Milton WWTP had an impact on downstream water quality and adversely affected Ngai Tahu customary activities. KTkO considered that improvements to the Milton WWTP rated as the top priority in the region.

Given that the applicant is proposing an increase of both the concentration and load of contaminants of concern in the discharge, the Council's assessment is that the proposed activity would have significant adverse effects on cultural values. The effects of the proposal, as discussed in section 5.1 and presented in Tables 9, 10 and 11 above, is that the already poor water quality of the Tokomairiro River would become further degraded.

The proposed increase in the volume of treated wastewater to be discharged, and the associated increase of the load of contaminants, would further degrade the mauri (life force) of the river and its associated ecosystems.

Given the anticipated toxic effects on fisheries from the proposed increase of the discharge of ammoniacal nitrogen during the 1050 m^3/d flow regime, significant adverse effects on waterborne mahika kai can be expected.

Furthermore, the Council's assessment is that the proposed discharge would cause an increase in the abundance of periphyton growth downstream of the discharge point.

As a consequence, adverse effects are expected for kohanga, i.e. important spawning and nursery areas for native fisheries.

5.1.4 Effects on Wetland Values

The Tokomairiro River Swamp wetland ecosystem contains unique plant communities and fauna. Inland and coastal wetlands play an important role in supporting fish, and fisheries, at all levels and the Tokomairiro River Swamp is no exception. Such coastal wetlands also play a critical role as spawning and juvenile rearing areas for many marine species. The area has already been drastically reduced by many years of drainage, and global climate change is likely to place further pressures on these sensitive systems.

Because past and current development and modification of the wetland area has greatly reduced its former extent, emphasis in wetland management has to be given to preservation, with development only when there is an overwhelming balance in its favour.

Handbook for Monitoring Wetland Condition (Clarkson *et al*, 2003), specifies the various pressures that may affect a wetland's condition. In this instance, 'Water quality within the catchment' is considered to be the most relevant pressure.

The handbook (Clarkson *et al*, 2003) states that little monitoring of water quality is carried out in New Zealand wetlands, but water quality data are often available for the water bodies in the catchment. Poor upstream water quality (such as is the case with the Tokomairiro River) is a key indication of future deterioration in wetland condition. Increased nutrient inputs inevitably lead to changes in water quality, and vegetation composition and structure.

As the applicant is proposing an increase of both the concentration and load of nutrients in the discharge, our assessment is that the proposed activity would have significant adverse effects on the Tokomairiro River Swamp and its future suitability to support the wetland values currently attributed to it.

5.1.5 Effects on Amenity Values

Amenity values are those natural or physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes.

In this instance, amenity values associated with the Tokomairiro River, downstream of the discharge point for the Milton WWTP, include mainly those with cultural and recreational attributes. The effects on recreational and cultural values have been discussed in detail ill sections 5.1.2 and 5.1.3 above.

As the Council's assessment is that the proposal would have significant adverse effects on both recreational and cultural values, and because these values are the main amenity values associated with the Tokomairiro River, the Council's assessment is that the adverse effects would be significant also on amenity values.

5.1.6 Cumulative Effects

Historical and recent monitoring of the State of the Environment in the Tokomairiro River (ORC, May 2007) has shown that water quality is degraded. As presented in Table 8 & 9 above, water quality can be compromised throughout the catchment, but is clearly poorest at the monitoring stations at Tokoiti and Coal Gully, which are both located downstream of the discharge point for the Milton WWTP.

The applicant is proposing to place further stress on the Tokomairiro River, by increasing both the concentration of contaminants in the discharge and the volume of discharge particularly during the 1050 m^3/d flow regime for which the regime period is unknown. This alone would lead to a significant degradation of the in-stream water quality.

In addition, the applicant has approached its calculations of the assimilative capacity of the river as if it could be claimed entirely by the applicant. This is of course not the reality and some other, non-point, discharges from agricultural land use downstream of the Milton WWTP must be expected.

Given the current state of environment, the applicant's proposed discharge and other downstream land uses, the cumulative effects are expected to be significant and unacceptable.

5.1.7 Effects of the Discharge to Air

The discharge of odour associated with the transfer, treatment, storage and disposal of wastewater has the potential to adversely affect human use values in general, and aesthetic, amenity and recreational values in particular.

As described in section 2.3 above, the nearest residences are located approximately 115 m to the northeast and 150 m to the east of the WWTP respectively. The predominant wind is south-westerly and it is therefore reasonable to expect that the nearest residences, at times, may experience odour from the WWTP. The applicant has stated that any extensions to the WWTP are likely to occur to the east of the current facilities, and thus in the direction of the nearest residences and downwind of the prevailing wind direction.

We acknowledge that some level of odour arising is inevitable in the vicinity of the WWTP. However, the potential for the discharge of odour arising from the proposed activity is largely dependant on whether the treatment plant is adequately designed and operated. In this instance, ensuring aerobic conditions as far as practicable is essential for the avoidance of odour nuisances. Provided the WWTP is designed to capacity and all wastewater is being treated in accordance with the treatment process proposed by the applicant, and best management practices are implemented as proposed, odour should not be offensive beyond the property boundary of the proposed site.

6. Statutory Considerations

Section 104 of the Act sets out the matters to be considered when assessing an application for a resource consent. Those matters which should be considered for these applications, being Part 2 (sections 5-8) of the Act, section 104(1) of the Act, the Regional Policy Statement, the

Regional Plan: Water for Otago, the Regional Plan: Air, the Kai Tahu ki Otago Natural Resource Management Plan 2005, and section 105 and section 107 of the Act, are discussed below.

6.1 Part 2 of the Act

Part 2 of the Act, the purpose and principles, is set out in sections 5 to 8 of the Act. Section 5 states that the purpose of the Act is to *"to promote the sustainable management of natural and physical resources"*. Sustainable management has two facets. The first aspect is "*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"*. In this respect, the concept of sustainable management is permissive. The purpose of the Act is achieved by allowing activities that benefit people.
However, there is another aspect to sustainable management. The use, development and protection of resources are only allowed while:

a) *"sustaining the potential of natural and physical resources, (excluding minerals) to meet the reasonably foreseeable needs offuture 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".*

The application to discharge treated wastewater with poor quality to water is inconsistent with the purpose of the Act, as outlined above. The discharge would enable the applicant to meet its needs and responsibilities in relation to providing community wastewater treatment and disposal, thus protecting public health in the built-up community. However, the proposed effluent quality would not protect public health in the recreational environment, would be detrimental to the life-supporting capacity of ecosystems and the resource's potential to meet the reasonably foreseeable needs of future generations, thereby causing adverse effects on the environment.

The application to discharge odorous contaminants to air is considered to be consistent with section 5 of the Act.

Section 6 requires all persons acting under the Act to recognise and provide for matters of national importance, including the protection of areas of significant indigenous vegetation. There are no matters of national importance to be considered in this instance. The applications are therefore considered to be consistent with section 6 of the Act.

Section 7 requires persons acting under the Act, in relation to managing the use, development, and protection of natural and physical resources, to have particular regard to the following matters.

(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:
(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.

Regarding (a) and (aa), kaitiakitanga and the ethic of stewardship have been recognised and provided for. The applicant has carried out consultation (through a working-party) with local runanga, prior to the applications being lodged. Local runanga and Kai Tahu were served a notice of the applications and local runanga has made a submission in conditional support of the applications.

With respect to (b), (c), (d), (f) and (h) above, the application to discharge treated wastewater to water is not consistent with section 7 of the Act. The water quality in the Tokomairiro River, downstream of the discharge point for the Milton WWTP, is already poor, in part due to the fact that the applicant is not complying with current conditions of consent. The application proposes to increase not only the maximum discharge volume, but also increase the concentrations of contaminants in the discharge. As we have demonstrated in section 5.1 of this report, the anticipated effects of the application are not consistent with matters (b), (c), (d), (f) and (h) of section 7 of the Act.

The application to discharge treated wastewater to water is not expected to have any effects that are more than minor on the remaining matters addressed by section 7 of the Act.

Conclusively, the application to discharge treated wastewater to water is inconsistent with section 7 of the Act, because it is not consistent with those matters that address the use, maintenance and enhancement of natural and physical resources, intrinsic values of ecosystems, amenity values and the quality of the environment, and the protection of habitat for trout and salmon.

The application to discharge odorous contaminants to air is considered to be consistent with section 7 of the Act.

Section 8 requires all persons acting under the Act to take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). Kai Tahu and local runanga were served a notice of the applications, and local runanga has made a submission on the applications. The applications are therefore considered to be consistent with section 8 of the Act.

6.2 Section 104 of the Act

Section 104(1) requires the Consent Authority to have regard to a range of matters in considering resource consent applications and any submissions received:

(a) any actual and potential effects on the environment of allowing the activity; and

(b) any relevant provisions of -

(iii) a regional or proposed regional policy statement:

(iv) a plan or proposed plan; and

(c) *any other matter the consent authority considers relevant and reasonably necessary to determine the application.*

These matters are discussed below.

6.2.1 Environmental Effects

The actual and potential effects of the proposed activities were considered in section 5 of this report. Recommended conditions of consent will ensure that any significant adverse effects are avoided, remedied or mitigated.

6.2.2 Regional Policy Statement for Otago (RPS)

The provisions of Chapter 4 (Manawhenua Perspective), Chapter 6 (Water), Chapter 7 (Air), Chapter 9 (Built Environment), Chapter 10 (Biota), Chapter 13 (Wastes and Hazardous Substances) and Chapter 14 (Monitoring and Review) of the RPS are relevant to these applications.
The following are relevant objectives from Chapter 4 - Manawhenua Perspective:
• *4.4.3 Wai (Water) - To recognise the principle of wairua and mauri in the management of Otago's water bodies.*
• *4.4.4 Mahika Kai (Places where food is produced or procured) - To maintain and enhance mahika kai and access to those traditional resources.*
• *4.4.5 Kaitiakitanga (Guardianship) — To incorporate the body and spirit of kaitiakitanga in the management of Otago's natural and physical resources in a way consistent with the values of Kai Tahu.*

The above objectives are given effect to by policies in the subsequent chapters of the RPS. The relevant policies are addressed below:

Policy 6.5.1(a) and Policy 13.5.1: relate to recognising and providing for the relationship Kai Tahu have with natural and physical resources, when managing Otago's waste stream, through taking into account Kai Tahu cultural values and working towards eliminating human waste and other pollutants from entering waterways.

Effluent from the proposed treatment and disposal system is to be discharged to water; therefore the proposed activity is not consistent with Policies 6.5.1(a) and 13.5.1. However, the Council notes that local runanga has made a submission in conditional support of the application.

Policy 6.5.5(a)-(d): seeks to promote, while considering financial and technical restraints, a reduction in the adverse effects of contaminant discharges into Otago's water bodies through:
• adopting the existing water quality as a minimum acceptable standard;
• investigating and (where appropriate) enhancing water quality so that, as a minimum, it is suitable for contact recreation and aquatic life;
• requiring that all discharges into Otago's water bodies maintain the standard for the receiving waters after reasonable mixing; and
• promoting discharges to land where practicable and where there are no significant adverse effects on groundwater, or surface water resources, or soil.

The application is to increase the volume of treated wastewater to be discharged, while also allowing an increase in concentration of the contaminants of concern in the discharge. A granting of the application would lead to a deterioration of the existing (and already poor) water quality in the Tokomairiro River, downstream of the discharge point for the Milton WWTP, and the discharge would not maintain the standard for the receiving water, even after reasonable mixing. In this instance, we have consistently promoted discharge to land instead of water (see section 7.1 below) and we do not agree with the applicant that the land treatment option is not a technically and financially practicable option. Consequently, the application to discharge treated wastewater to water is not considered to be consistent with this policy.

Policy 6.5.6(a): seeks to protect Otago's remaining significant wetlands from the effects of any activity, except where the activity can be shown to have no significant effects on:
• Community needs, or Kai Tahu cultural and spiritual values;

• The natural hydrological characteristics of the wetland, or natural character of the water body, or amenity values; and
• Intrinsic values of ecosystems, or habitats of indigenous fauna, or trout or salmon habitat.

The application to discharge treated wastewater to water is not consistent with this policy. As the Council has shown in section 5.1 of this report, the proposal will have significant adverse effects on natural values, human use values, cultural values, wetland values and amenity values.

Methods 6.6.4 and 6.6.5: specify that, in order to achieve the outcome of the above policies, methods to be used by the Council include considering including conditions on resource consent, or considering declining such consents, as necessary:
• to maintain and, where practicable, enhance the quality of Otago's water resources; and
• to protect Otago's significant wetlands.

Policy 7.5.1: relates to recognising and providing for the relationship Kai Tahu have with the air resource in Otago. The applicant has carried out consultation (through a working-party) with local runanga, prior to the applications being lodged. Kai Tahu and local runanga were served a notice of the applications, and local runanga has made a submission on the applications. The applications are therefore considered to be consistent with this policy.

Policy 7.5.2: seeks to avoid, remedy or mitigate any discharges which have adverse effects on the air resource, including effects on odour.

As discussed in section 5.2 of this report, provided the WWTP is designed to capacity and best management practices are implemented as proposed, odour should normally not be offensive beyond the property boundary of the site. Provided recommended conditions of consent are complied with, effects of odour should be no more than minor. The application is therefore considered to be consistent with this policy.

Policy 9.5.2(a): seeks to promote and encourage efficiency in the development and use of Otago's infrastructure, through encouraging development that maximises the use of existing infrastructure, while recognising the need for more appropriate technology.

We acknowledge that the applicant has proposed an upgrade of the WWTP that maximises the use of existing infrastructure. However, we have not found that the applicant has recognised the need for more appropriate and future proofed technology. The applications are therefore considered to be inconsistent with this policy.

Policy 10.5.1(a) and (c): relate to recognising and providing for the relationship Kai Tahu have with mahika kai in Otago, through working towards eliminating the disposal of human wastes and pollution into, or onto, mahika kai, and to recognise the need to maintain and enhance mahika kai.

As discussed in section 5.1 above, we do not consider the application to discharge treated wastewater to water to be consistent with this policy. The application to discharge contaminants to air is, however, considered to be consistent with this policy.

Policy 14.5.5: to monitor, as required, the effects associated with the exercise of resource consents, to provide for the review of the appropriateness of the issue, terms and conditions of resource consent.

The applicant has proposed a monitoring programme which includes effluent quality, in-stream water quality upstream and downstream of the discharge point, and annual macroinvertebrate sampling for at least the first two years. The application is therefore considered to be consistent with this policy.

6.2.3 Regional Plan: Water for Otago (RPW)

The RPW specifies issues, objectives and policies that address water quality and wetlands issues. The application to discharge treated wastewater to water is made under the provisions of the RPW, and the following objectives and policies from the RPW are particularly relevant to this application:

Objective 7.5.1: seeks to maintain and enhance the quality of water in Otago's lakes and rivers, so that it is suitable to support their natural and human use values, and people's use of water. As discussed in section 5.1 of this report, the application to discharge treated wastewater to water is not consistent with this objective.

Policy 7.6.1(g): seeks to enhance the water quality in the Tokomairiro Rover, so that it becomes suitable to support primary contact recreation.

As discussed in section 5.1 of this report, the application to discharge treated wastewater to water is not consistent with this policy. Furthermore, the proposal would see the microbiological water quality in the Tokomairiro River deteriorate significantly in the future (particularly during the 1050 m^3/d flow regime for an unknown period), compared with the current situation.

Policy 7.6.2(f): seeks to enhance the water quality in the lower Tokomairiro River (below Tokoiti), so that the Macroinvertebrate Community Index score is increased. As discussed in section 5.1 of this report, the application to discharge treated wastewater to water is not consistent with this policy.

Policy 7.7.1: relates to promoting the discharge of contaminants to land in preference to water, where appropriate. As effluent from the WWTP is proposed to be discharged to water, and we believe that land disposal or treatment is a practical and feasible option, the proposed activity is not considered to be consistent with this policy.

Policy 7.7.3: when considering an application to discharge contaminants to water, to have regard to opportunities to enhance the existing water quality of the receiving water body at any location for which the existing water quality can be considered degraded, in terms of its capacity to support its natural and human use values.

Both the applicant and we acknowledge that the water quality in the Tokomairiro is poor and currently struggles to support its natural and human use values. However, the applicant is proposing to increase the discharge *load* of all contaminants for the next 35 years. The application is therefore not considered to be consistent with this policy.

Policy 7.7.4: when considering an application to discharge contaminants to water, to have regard to the nature of the discharge and the sensitivity of the receiving environment to adverse effects, and any financial or technical constraint on the adoption of alternative treatment or discharge methods.

In this instance, the proposed discharge rate and reduced effluent quality, particularly with regard to faecal bacteria and nutrients in the discharge, is expected to cause significant adverse effects in the receiving environment. The proposed upgrade of the treatment and disposal system is considered to be insufficient, and cannot be considered to be the best practicable option for managing wastewater from the Milton Township and the OCF. The application to discharge treated wastewater to water is therefore not considered to be consistent with this policy.

Policy 7.7.5: when considering applications for resource consent, to have regard to the cumulative effects of discharges of contaminants and the assimilative capacity of the water body.

In this instance, we consider that the assimilative capacity of the Tokomairiro River has already been exceeded (ORC, May 2007), that the Milton WWTP is the main source of the poor water quality in the lower main stem of the river, and that steps to reduce the discharges of faecal bacteria and nutrients are required. The potential consequences of the applicant's proposal have been presented in section 5.1 of this report and we consider the potential environmental effects to be unacceptable. The application to increase the load of contaminants from the WWTP to the Tokomairiro River is not considered to be consistent with this policy.

Policy 7.7.6: where a mixing zone is required for the discharge of a contaminant to water, to ensure that it is limited to the extent necessary to take account of the sensitivity of the receiving environment, natural and human use values, amenity values, the natural character of the water body, physical processes acting on the area of discharge and the particular discharge.

The currently consented mixing zone is 100 m and the applicant is proposing a mixing zone of 150 m, though the applicant's mixing study indicated that full mixing at median flow is achieve within 70 m of the discharge point. As discussed before it is not reasonable to provide a mixing zone for faecal bacteria given current degraded status of the river and the primary contact recreation target. However, a 70 m mixing zone considered reasonable, having regard to the objective of this policy regarding other contaminants. This is reflected in recommended conditions of consent.

Policy 7.7.7: when considering any resource consent to discharge a contaminant to water, to have regard to any relevant standards and guidelines in imposing conditions on the discharge consent. Relevant standards and guideline values were discussed in section 5.1 of this report, and are reflected in the effluent quality limits set out in recommended conditions of consent.

Policy 7.7.8: to require provision for a review of any resource consent conditions for discharging a contaminant.

A standard review clause is proposed as a condition on the draft permit attached to this report. A review condition provides an important safeguard to address any unforeseen adverse effects on the environment should such effects arise during the exercise of the consent.

Policy 7.7.9: the duration of any new resource consent for an existing discharge of contaminants will take account of the anticipated adverse effects of the discharge on any natural and human use value supported by an affected water body.

As discussed in section 5.1 of this report, we do not consider the proposed discharge to supports these values, nor will it progressively meet that standard within the sought term of 35 years. The application is not consistent with this policy; therefore, should consent be granted, it should be for a very short term.

Policy 10.4.2: to avoid the adverse effects of activities on Type A values of any wetland.

As discussed in section 5.1.4 above, the effects from the proposed activity on the Type A value of the Tokomairiro River Swamp (scarce wetland type) are expected to be significant. The policy states that adverse effects should be avoided rather than remedied or mitigated. Given the increased discharge load of nutrients proposed by the applicant, the proposed activity is not considered to be consistent with this policy.

Policy 10.4.4: to avoid the adverse effects of activities on the Type B values of any wetland, or where it is not possible to do so, require financial contribution, or works or services, to offset any loss of wetland values.

In this instance, no actions to offset, remedy or mitigate any loss or degradation of Type B wetland values have been proposed by the applicant. As discussed in section 5.1.4 above, the effects from the proposed activity on the Type B value of the Tokomairiro River Swamp (high diversity of indigenous flora and fauna) are expected to be significant. Given the increased discharge load of nutrients proposed by the applicant, the proposed activity is not considered to be consistent with this policy.

6.2.4 Regional Plan: Air for Ofago (RPA)

The application to discharge contaminants (odour) to air is made under the provisions of the RPA. The following policies from the RPA are relevant to this application:

Policy 7.1.1: to recognise and provide for the relationship Kai Tahu has with the air resource, through procedures that enable Kai Tahu to participate in management of the air resource.

In this instance, this policy has been met. The applicant consulted with local runanga prior to the applications being lodged. Kai Tahu and local runanga were served a copy of the application, and local runanga has made a submission on the application.

Policy 8.2.3(a): when considering any application to discharge contaminants to air, to have particular regard to avoiding adverse effects, including effects on values of significance to Kai Tahu, the health and functioning of ecosystems, plants and animals, cultural heritage and amenity values, and human health.

As discussed in section 5.2 above, provided the WWTP is designed to capacity and all wastewater is being treated in accordance with the treatment process proposed by the applicant, and best management practices are implemented as proposed, odour should not be offensive beyond the property boundary of the proposed site. The application is therefore considered to be consistent with this policy.

Policy 8.2.4: specifies that the term of any permit to discharge contaminants to air will be determined while having regard to the mass and nature of the discharge, the nature and sensitivity of the discharge and any existing discharge from the site into air and its effects.

The applicant has applied for a 35-year term of consent to discharge contaminants to air. Given that the effects of the discharge are expected to be no more than minor, the application is considered to be consistent with this policy.

Policy 8.2.5: to require, as appropriate, that provision be made for review of the conditions of any resource consent to discharge contaminants to air.

As the application is a result of a proposed extension of the odorous activities on-site, a standard review clause is proposed as a condition on the draft permit attached to this report. A review condition provides an important safeguard to address any unforeseen adverse effects on the environment should such effects arise during the exercise of the consent.

Policy 11.1.1: to avoid or mitigate any adverse effects on human health or amenity values, resulting from the discharge of offensive or objectionable odour, through the use of good management practices and process technology that has an inherently low odour potential, appropriate control technologies to reduce the emission of odorous contaminants, site planning mechanisms and other land use management techniques to reduce the potential for adverse off site effects, and tools and techniques that provide an objective assessment of odour such as olfactometry, odour dose response assessments and community surveys.

These matters were considered in section 5.2 of this report. By implementing the management strategies proposed in policy 11.1.1, any adverse effects on the values in policy 8.2.3 should be effectively and sufficiently avoided or mitigated. Recommended consent conditions to this effect are included on the draft consent attached to this report.

6.2.5 Kai Tahu ki Otago Natural Resource Management Plan 2005

The Kai Tahu ki Otago (KTKO) Natural Resource Management Plan 2005, contains several policies of relevance to this application:

• To require land disposal for human effluent and contamination.
• To require monitoring of all discharges be undertaken on a regular basis and all information, including an independent analysis of monitoring results, be made available to Kai Tahu ki Otago.
• To require all discharge systems to be well maintained and regularly serviced. Copies of all service and maintenance records should be available to Kai Tahu ki Otago upon request.
• To require visible signage informing people of the discharge area. Such signs are to be written in Maori as well as English.

As effluent from the proposed treatment and disposal system is to be discharged to water, the proposed activity is not inconsistent with the above management policies.

However, we note that the local runanga has provided its conditional written approval to the applications.

6.2.6 Other Matters

New Zealand Wetlands Management Policy

The New Zealand Wetlands Management Policy (Commission for the Environment, 1986) states that the society's recognition of the need to preserve representative natural systems is embodied in international conventions and within legislation. New Zealand, as a signatory to the International Convention on Wetlands, shares the international concern for loss of wetlands as a habitat. Wetland modification may cause irreversible changes. Such changes reduce

choices available to future generations. This risk is heightened by the lack of knowledge about wetlands themselves as well as wetland catchment interactions. Once a wetland has been significantly modified it can rarely if ever be returned to its original state. Some of the values lost may be irreplaceable. A wetland may contribute benefits that are not appreciated until they have gone. Possible future benefits may not be recognised at the time of development.

We consider that the proposed discharge of treated wastewater to the Tokomairiro River, upstream of the Tokomairiro River Swamp, poses a significant risk for adverse effects and modification of the wetland characteristics, such that the Type A and Type B values currently supported by the wetland may be lost. Therefore, we consider that the proposed activity particularly the unknown period involved in poorly treated effluent discharge is not consistent with the New Zealand Wetlands Management Policy.

There are no other matters we consider relevant and reasonably necessary to determine the application.

6.3 Section 105 of the Act

Section 105(1) of the Act states that where an application is for a discharge permit, to do something that would otherwise contravene sections 15 or 15B of the Act, the Consent Authority shall have regard to:

a) the nature of the discharge, the sensitivity of the receiving environment, and the applicant's reasons for making the proposed choice; and
b) any possible alternative methods of discharge including any discharge into any other receiving environment.

These matters were considered in section 5.1 of this report and the Council's view on alternative methods of discharge is further addressed in section 7.1 below. The proposed treatment and disposal system is not considered to be the best practicable option and is expected to cause significant adverse environmental effects. The Council considers that any consent granted should have a minimal term that is only long enough to allow the applicant to upgrade of the WWTP that would result in a significant improvement of the in-stream water quality of the Tokomairiro River, downstream of the Milton WWTP.

6.4 Section 107 of the Act

Section 107(1) of the Act states that a discharge permit shall not be granted (with certain exceptions) if, after reasonable mixing, the contaminant or water discharged 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 material:
(d) Any conspicuous change in the colour or visual clarity:
(e) Any emission of objectionable odour:
(f) The rendering offresh water unsuitable for consumption by farm animals:
(g) Any significant adverse effects on aquatic life.

As discussed in section 5.1 of this report, we are not satisfied that the proposed discharge will not give rise to one or more of the above effects in the receiving waters. In this sense, section 107(1) is prohibitive and consent should not be granted.

However, section 107(2) of the Act states that a discharge permit may still be granted, if the Consent Authority is satisfied:

(a) That exceptional circumstances justify the granting of the permit; or
(b) That the discharge is of a temporary nature; or
(c) That the discharge is associated with necessary maintenance work -
and that it is consistent with the purpose of this Act to do so.

In addition, section 107(3) of the Act states that a discharge permit may include conditions requiring the holder of a permit to undertake such works, in such stages throughout the term of consent, as will ensure that upon expiry of the permit, the holder can meet the requirements of subsection (1) and of any relevant regional rules.

In section 5.1 of this report, we have presented the future effluent quality that the discharge of treated wastewater has to meet, in order to (after full mixing) comply with section 107(1) of the Act and any relevant regional rules. Our proposal for future effluent quality has been communicated with, and discarded by, the applicant. The proposal allowed for a temporary reduction in effluent quality until the end of 2009, thereby acknowledging the difficulty in achieving compliance with stringent consent conditions while undertaking upgrades of the WWTP.

Consequently, in order to allow for the community to provide for their health and safety by collecting and treating its wastewater, we consider that a consent should be granted, but only for a discharge that is temporary in nature (section 107(2)), and with the imposing of consent conditions that will subsequently see the applicant meeting section 107(1) of the Act, and relevant regional rules (section 107(3)).

7. Conclusion

Milton WWTP has a long history of non-compliance with consent conditions, something which is well known to both ORC and the applicant. The situation has been discussed on several occasions, such as during the pre-application consultation preceding the application (2001.755 VI) to vary the maximum discharge volume and enable the applicant to accept the pre-treated wastewater from the OCF.

At each of these discussions, we conveyed the view-point that it would be prepared to accept short-term non-compliance with current consent conditions, provided that the applicant would put effort into designing an upgrade proposal for the Milton WWTP, which would significantly improve the future quality of the discharge, as well as the water quality in the Tokomairiro River, downstream of the discharge point.

Given the history of discussions held and understandings reached between ORC staff and the applicant, it is unacceptable to us to consider a proposal to increase the discharge load of the contaminants of concern significantly, particularly given the current state of the receiving environment and the adverse effects the discharge is likely to have.

The applicant attempts to justify the proposal to not only increase the volume, but also the concentration of contaminants of concern (i.e. faecal bacteria, nitrogen and phosphorous) in the discharge, by stating that "*The current consent does not place any requirement on CDC to investigate alternative disposal options for the WWTP. By implication, ORC must have considered at the time of the granting* [of] *the consent (February 2003) that continued discharge to the Tokomairiro River was acceptable until at least 2017. The applicant is not aware of anything which requires a change in approach to this situation"*

As discussed before the applicant's proposal lacks in certainty and any major positive changes to the current consent discharge conditions. In our report we have demonstrated that the current consent conditions even if fully complied with will have adverse effects on the environment.

The staging proposal by the applicant is not time bound. If the staging is based on a flow basis or OCF facility wastewater output it is impossible to predict the timing of any significant upgrades. Uncertain consent requirements are not enforceable. Therefore we are unable to support the applicant's proposal of staging. On the other hand, if any timeframe is provided, given the ongoing adverse effects of the discharge on the Tokomairiro River and additional new discharge from the OCF only 1-2 year timeframe accepted for any upgrades.

We believe that the applicant is firmly bound to the proposed staging process. If so, based on our discussion such a situation is unacceptable because (a) the proposed effluent standards for 1050 m^3d flow regime are worse than that provided in the current condition which will significant adverse effects on the river and (b) if OCF were to deal with its discharge without connecting to the Milton WWTP it would have been required a full installation of a best practice system to discharge its effluent from the commencement of the consent.

We are aware of, at a minimum, the following issues that would require a change in approach to the current and proposed discharge:

- Current consent was granted for a term of less than 15 years and on the basis that the maximum discharge volume was to be 850 m^3/d. The applicant is now applying to discharge up to 1,625 m^3/d.
- Current consent was granted on the basis that the discharge would comply with consent limits. After a long period of non-compliance, particularly with regard to the discharge of faecal bacteria and ammoniacal nitrogen, the applicant is now proposing to abandon the rolling 12-month geo-mean limits for all contaminants monitored, and allow for significantly increased 90%ile concentrations of faecal bacteria and ammonia in the discharge within the 1050 m^3/d flow regime.
- Current consent was granted in March 2003. The RPW became operative on 1 January 2004 and contains a number of policies that are relevant to this application, in particular Policy 7.6.1 - to enhance the water quality in the Tokomairiro River so that it becomes suitable to support primary contact recreation.
- Contrary to what the applicant has stated, the proposal cannot be considered a significant upgrade of the WWTP. Instead, it is considered that the proposed upgrade would be no more than what is necessary to achieve compliance with current conditions of consent.
- The applicant also holds and exercises resource consent to discharge up to 9,150 m^3/d of untreated wastewater and stormwater to the Tokomairiro River during wet weather. By-pass of untreated wastewater into a water body would not be an acceptable discharge method anywhere else in New Zealand today. We recommend that the hearing panel should discuss this matter and set appropriate conditions. Otherwise we have to review the existing separate consent to discharge stormwater and untreated wastewater through another consent process.
- Agricultural land users, upstream and downstream of the discharge point, have taken, and continue to take, steps to actively reduce the discharge of faecal bacteria and nutrients from diffuse agricultural sources. Methods include converting to land treatment of dairy shed effluent and fencing of paddocks lining the Tokomairiro River.
- Land treatment of community wastewater is a well established and growing technology, and is considered to be a viable option for the applicant (see section 7.1 below).

During the pre-application discussions, and because the applicant indicated that it believes that land treatment of the discharge would not be a financially and technically viable option, we informed the applicant that, once the applications had been lodged, it would engage a technical expert (e.g. Rob Potts of Glasson Potts Fowler Limited and currently Duffill Watts) to review the proposed upgrade and the applicant's assessment of the subsequently rejected land treatment option. Section 7.1 below summarises the conclusions raised by the technical expert.

7.1 Review of the Application and Supporting Documents

Technical reviews were undertaken by independent experts on land treatment (previously Glasson, Potts & Fowler and currently Duffill Watts) and waste water (Harrison and Greirsons) treatment systems. The scope for the technical expert review was to allow the Council to determine:

- if the proposed treatment and disposal system is technically feasible, i.e. are the applicant's assumptions correct;
- if the applicant has considered land treatment options appropriately and is there is a risk associated with land treatment; and
- if land treatment is not viable, has the right option, with appropriate effluent quality, been selected.

If a new but a superior discharge consent were to be applied in the same catchment, given the 'saturated' status of the river no further discharge could be consented. The current 'saturated' status of the river was one of the key reasons for ORC staff to consider a land treatment option.

Apart from the application to discharge treated wastewater to water, the Council's technical experts reviewed the following documents (which were submitted in support of the application):

- *Milton WwTP: Issues and Options Report. Prepared for Clutha District Council* (Opus, November 2006).
- *Assessment of Options, Costs, Risks and Viability of Land Based Disposal for Milton. Prepared for Clutha District Council* (Opus, October 2006).
- *Soil Investigation to Evaluate Capability of Land Surrounding Milton, Kaka Point and Tapanui for Use as Municipal Wastewater Disposal Sites. Prepared for Clutha District Council* (Landcare Research, March 2006).

In addition, the technical experts have also reviewed:

- *Letter from the Council to the applicant, dated 26 April 2007, proposing effluent quality standards.*
- *Letter from the applicant to the Council, dated 4 May 2007, rejecting the proposed effluent quality standards.*
- *Milton Wastewater treatment plant resource consents "Response to Otago Regional Council proposed effluent standards*

After reviewing the documents, we make the following conclusions from our technical expert's advice on land treatment options:

- The land treatment report by Landcare Research, although possibly technically defensible, is not practical and is not what would occur at a land treatment scheme. Assumptions made regarding hydraulic loading, without detailed field assessment of soils and sub-soils, make the entire land treatment option unfeasible. Land treatment systems are generally designed on annual total nitrogen loading, with a check on whether soil hydraulics can absorb and infiltrate the water applied. These nitrogen loading rates are based on plant uptake,

volatilisation losses, soil microbe use, soil storage, denitrification and acceptable nitrogen leaching.

- As effluent criteria for land treatment have not been assessed by the applicant, or discussed with the Council, the treatment system upgrade has not focused on appropriate effluent quality for land treatment. The land treatment system has therefore been costed, based on better effluent criteria considered for river disposal. The report assumed a similar waste water quality was required to discharge to land ($1.7 million had been proposed for the plant upgrade to irrigate to land). Generally land based discharges only require primary treatment.
- The costs and revenue for a cut-and-carry system are based on outdated figures, with a gross margin for irrigated land of only $600/ha. For cut-and-carry systems, the gross margin is higher at around SO. 13 - 0.17/kg, depending on whether the crop is silage, hay or maize (1 cut). A low gross margin (4 cents/kg) was considered on the dry matter return. Based on $0.13 - 0.17/kg, from a 33 ha land the return will be $64,000 - 112,000 (@ 15-20 t/ha).
- The irrigation schedule of one application every 10 days and applying wastewater at rates of 10 mm to 28 mm per irrigation is probably a little high for optimal land treatment. The technical expert recommends that both the proposed irrigation interval and the rate of application per irrigation be reduced, i.e. if two centre pivots are used, these could be set up to apply 20 mm via a 4-day day cycle, then switched to the other pivot for a 4-day cycle (e.g. eight day return period at maximum dry weather flow), and then be run in parallel on a four day return period for short periods during wet weather.
- The effective areas for land treatment appear quite conservative, at between 50 -75 % of the gross area. The applicant is either using large buffer distances, or there are numerous water courses on the site. Maps are not provided and the technical expert cannot comment further.
- There needs to be some field testing of the soils investigated, to accurately determine permeability. This should preferably be done using the near-saturation hydraulic test, using a plate permeameter. Our experts have performed field tests in areas identified by the applicant as suitable for land treatment systems for hydraulic loading and have concluded that the design irrigation rate (D1R) to be in the range of 21.6 to 33.6 mm/d which represents a substantial capacity for receiving wastewater.
- The cut & carry estimates in the report are not technically defensible. It is easy to remove 550 kg N/ha/year by a cut & carry system. If a cut & carry system is used only 24 ha is required.
- Up to a loading of 300 kg N/ha sheep grazing can also be sustainable. This option has not been considered (e.g. Palmerston STP to land).
- The comments about Fonterra not accepting milk from cattle grazed on sewage effluent applied land is outdated. Fonterra now allows grazing of sewage irrigated pasture under certain criteria.
- The applicant's costing of the land treatment system is based on incorrect assumptions. Firstly, the area required will be significantly reduced when based on nitrogen loading and using a better hydraulic loading rate. In addition, using a number of centre pivots instead of solid set irrigation systems gives the operators flexibility, fits in better with cut-and-carry systems, has lower operating and maintenance costs, and is approximately 1/10 of the capital cost. A strict 10 d irrigation cycling had been followed in the report. This is considered as excessively cautious. Based on our consultant's estimate a properly designed land treatment will only cost $3000/ha rather than the applicant's estimate of $30,000/ha.

- The WWTP should be upgraded to deal with infiltration and inflow during wet weather, regardless of whether the discharge of treated wastewater is to water, or land. Requiring only the land treatment option to cope with the wet weather flow places an undue bias against land treatment.
- No risks of land treatment have been postulated. Risks elsewhere in New Zealand have been mitigated through land purchase or tight contracts, understanding the soil and groundwater situation, and obtaining suitable consent conditions.
- Land treatment has been rejected by the applicant due to risk, but there is no risk matrix analysing these risks. The technical expert does not agree with the rejection of the land treatment because it is too costly or risky.
- If the applicant does not want to consider land treatment further, the technical expert considers that the effluent criteria proposed by the Council (see Table 11 above) are reasonable and achievable. The proposed effluent quality is similar, although a little more relaxed, to what other regional councils are requiring. However, the technical expert does not agree with the setting of maximums, or a nitrate nitrogen limit, and considers rolling geo-means and 90 percentiles to be a more realistic approach.
- A storage system had been recommended to manage land treatment system under wet weather conditions. It is becoming a common practice to provide additional storage for all treatment systems including discharges to water. Other councils that discharge into water are spending millions to avoid or minimise raw effluent discharge during wet conditions.
- If assessed by experienced land treatment experts the required land area will be substantially less than half that had been promoted by the applicant.

The technical experts on waste treatment systems have made the following comments:

- The applicant's option 6 was preferred by our experts because it is likely to provide the desired standards.
- We are in favour of maximum utilisation of existing infrastructure at the Milton WWTP. However, if a membrane bioreactor (MBR) technology is used it will achieve good *E.coli* and TSS levels without needing wetlands and UV systems. An MBR system will reduce the capital cost.
- If a membrane filter system is introduced it can achieve 2 mg TSS/L and *E.coli* <10 cfu/100 mL. Such a plant will also occupy a much smaller foot print (10 m x 20 m).
- A peak flow treatment (PFT) system can be installed to treat wet weather flows. Flow in excess of 1625 m^3/d could be diverted and treated separately and discharged along with the main effluent. Actiflo® has been promoted as an effective treatment system to treat excess flows under storm events. But this will add $2 to 2.5 M capital cost to the project with $20 to 25k operating cost.
- The ORC staff recommendation of 260 *E.coli* 90%ile will be achievable with applicant's Option 6 with the estimated cost of S3.2M. However, wetland systems could affect UV transmission and faecal bacteria numbers (bird life).
- Since there is no denitriflcation system proposed reduction of TN may be a problem. Whilst there have been mention of P removal by chemical process there is no such provision.
- The population growth estimation of 1% annual growth is high given the population has not changed much since 1965.
- Compared to typical NZ figures, the average dry weather flow for Milton WWTP is very high (416 L/capita/d vs 200 L/capita/d).
- The proposed UV-disinfection and reconfiguration of the trickling filters have always been required to meet current consent conditions.

Given the conclusion reached by the technical experts, we are confident that the applicant's assessment of the land treatment option is significantly flawed and that the land treatment option may in fact be both a financially and technically viable option for the long-term discharge of the treated wastewater from the Milton WWTP.

The applicant has also failed to identify and propose an option for the continued discharge of treated wastewater from the Milton WWTP that could be granted a long-term resource consent. The proposal would lead to significant adverse effects in the receiving environment, is largely inconsistent with the relevant rules of the RPS, the RPW and the Act, and may not be the best practicable option for the future.

Based on our assessment of effects (section 5 above) and statutory assessment of the application (section 6 above), and the conclusions reached by our technical experts, it is our conclusion that consent, if granted, can only be granted for a short term for poor quality discharge and long term for a discharge that will reduce adverse effects and meet our plan and policy requirements. This is reflected in section 8 below and on the draft consent attached to this report.

We consider that any long term consent granted should have a short term that enough to allow the upgrade of the WWTP that would result in a significant improvement of the in-stream water quality of the Tokomairiro River, downstream of the Milton WWTP.

7.2 Recommended Conditions and Term of Consents

It is a recommended condition of consent that the applicant shall adopt an Odour Management Plan, in which the best practicable option to prevent or minimise odour are identified. The details of any odour complaints should be recorded by the applicant, along with the details of the corrective action taken to minimise the risk and extent of the recurrence of the causes of the complaint.

Whilst we understand that the wastewater volume will increase steadily from the existing 800 m^3/d towards 1625 in the long term, to avoid any confusion and to keep conditions simple we recommend to grant 1625 m^3/d from the commencement of the consent. We believe that this allowance of volume will enable the required upgrade without any delay.

As discussed before we recommend the following standards during and after the commissioning of the upgrade (with the exception of the volume of effluent all other parameters are 90%ile):

Parameter	Until Sept 2009	From Oct 2009
Effluent volume (m^3/d)	1625	1625
BOD_5 (mg/l)	15	15
Total suspended solids (mg/l)	20	20
Total nitrogen (mg/l)	20	20
Ammoniacal nitrogen (mg/l)	19	10
Total phosphorus (mg/l)	10	10
Escherichia coli (cfu/100 ml)	50,000	260

Originally we proposed maximum levels for contaminants. The applicant and our technical experts have advised that it is appropriate to set standards based on 90 or 95%ile. Whilst we agree with this approach reluctantly, such an approach required greater sampling numbers than

required under the maxima regime. The applicant proposed to sample effluent only 4 times a year. This is insufficient to consider 90%ile. Therefore we recommend *at least* monthly sampling is required to check 90%ile compliance on a calendar year basis. As for the in-stream monitoring we are satisfied that a quarterly monitoring is sufficient.

The applicant is seeking a term of 35 years for both the application to discharge treated wastewater to the Tokomairiro River and the application to discharge odorous contaminants to air.

The applicant had continued to ignore our long term proposal which is based on reducing adverse effects and complying with the plan/policy requirements. Our technical experts concur with our view that our proposal is achievable within the projected budget by the applicant. We recommend a 35 year consent based on discharge standards that will provide positive and long-term environmental outcomes. This is consistent with Policy 7.7.9 (a) of the RPW, which states that any new resource consent for an existing discharge *will be up to 35 years where the discharge will meet the water quality standard required to support that value for the duration of the resource consent.* It is prudent to give the air discharge permit the same term.

It is our view that neither the originally proposed or revised standards will meet the long term consent policy described in the RPW Policy 7.79. Therefore based on our assessment Policy 7.7.9 (c) *(...will be no more than 5 years where the discharge does not meet the water quality standards required to support that value...),* applies to the applicant's proposal. If our recommended standards are reduced by the panel we recommend that the term of the consent should be reduced accordingly and substantially. If the consent is granted on the basis of the applicant's original or revised proposal it should be short-term and a two year consent for the applicant to undertake more work on cost effective system that will meet our recommended standards.

The applicant is advised that Policy 7.7.9 (d) states that no resource consent, subsequent to one issued under 7.7.9 (c), will be issued if the discharge still does not meet the water quality required to support that value

8. Recommendation

That the Otago Regional Council grants to Clutha District Council, 1 Rosebank Terrace, Balclutha, a discharge permit to discharge treated wastewater to the Tokomairiro River and a discharge permit to discharge odorous contaminants to air, for the purpose of the continued operation of the Milton Wastewater Treatment Plant, subject to the terms and conditions set out in the draft consents attached to this report.

8.1 Reasons for Recommendation

a) That it is expected that the adverse effects on the environment will be minor, and can be adequately addressed through the recommended consent conditions.
b) That the proposed activities are consistent with the requirements of the Act and Council policy.

Selva Selvarajah
Director Resource Management

Consent No: 2007.090

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Clutha District Council

Address: 1 Rosebank Terrace, Balclutha

To discharge treated wastewater to water

for the purpose of disposal of wastewater from Milton Township and the Otago Corrections Facility, Milburn

for a term expiring: 30 October 2043

Location of activity: Tokomairiro River, true left bank, approximately 170 metres southwest of the intersection of Bruce Street, Scott Street and Hogg Street, Milton.

Legal description of land adjacent to point of discharge: Lot 45-50 and Pt Lot 51-53 BIk IX DP 104, Sec 143 Blk XVII Tokomairiro Survey District and Pt Lot 3 DP 1018.

Map reference: NZMS 260 H45:748-488

Conditions

1. The discharge shall only be treated wastewater.

2. The volume of effluent discharged under this consent shall not exceed 1,625 cubic metres per day.

3. The consent holder shall continually measure and electronically record the daily volume and the rate of discharge of effluent being discharged to the Tokomairiro River.

4. Within three months of 1 October 2009, the consent holder shall prepare and forward to the Consent Authority an Operations and Management Manual for the treatment and disposal system to ensure its effective and efficient operation at all times. The system shall be operated in accordance with this manual, which shall be updated as appropriate. The manual shall include, as a minimum:
   a) a brief description of the treatment and disposal system, including a site map indicating the location of the treatment and disposal system, points of discharge and any monitoring sites;
   b) key operational matters, including weekly, monthly and annual maintenance checks;
   c) monitoring requirements and procedures;
   d) contingency plans in the event of system malfunctions or breakdowns; and
   e) the means of receiving and dealing with any complaints.

Records of maintenance, complaints, malfunctions and breakdowns shall be kept in a log and this log shall be submitted to the Consent Authority by 30 June each year and be made available on request. At all times, the consent holder shall ensure that the Consent Authority has a copy of the most recent version of the Operations and Management Manual.

5. At monthly intervals (or as requested by the consent authority) the consent holder shall collect representative samples of the final effluent prior to discharge to the Tokomairiro River. Where the Tokomairiro River water samples are taken as in condition 7 the effluent sampling should be taken on the dates of river sampling.

   The effluent samples shall be analysed for:
   - pH
   - BOD_5
   - Total suspended solids
   - Ammoniacal nitrogen
   - Total nitrogen
   - Total phosphorus
   - *Escherichia coli*

6. In February, May, August, and November of each year (or as otherwise requested by the Consent Authority), the consent holder shall collect representative samples of:
   i. the East and West Branches of the Tokomairiro River, up to 50 metres upstream of the discharge; and
   ii. the Tokomairiro River, no more than 70 metres downstream of the discharge

   The receiving water samples shall be analysed for:
   - pH
   - temperature
   - dissolved oxygen
   - BOD5
   - Turbidity
   - Ammoniacal nitrogen
   - Nitrate-nitrogen
   - Total phosphorus
   - Dissolved reactive phosphorus
   - *Escherichia coli*

7. The analytical sampling results in conditions 5 and 6 shall be reported in writing to the Consent Authority before the end of the month following the collection of the samples together with records of the daily (24 hour) effluent flow (m^3/day) for the preceding three-month period.

8. The effluent discharged to the Tokomairiro River shall comply with the following criteria:

   pH: range 6.5 - 9.0

	Until 30 September 2009 **90 percentile within a calendar year**	**After 1 October 2009** **90 percentile within a calendar year**
BOD5 (grams per cubic metre)	15	15
Total suspended solids (grams per cubic metre)	20	20
Ammoniacal nitrogen (grams per cubic metre)	19	10
Total nitrogen (grams per cubic metre)	20	20
Total phosphorus (grams per cubic metre)	10	10
Escherichia coli (colony forming units per 100 millilitres)	50,000	260

9. The consent holder shall advise the consent authority within seven days of receiving any sampling results that exceed any upper limits set by condition 8, including a statement of the likely cause of the exceedance and any remedial action that has been undertaken, or is to be undertaken.

10. The consent holder shall also arrange for re-sampling/retesting of the discharge parameter(s) in breach of the consent limits within seven days of receiving any results that exceed any upper limits set by condition 8 and forward the results to the Consent Authority upon receipt.

11. All sampling techniques employed in respect of the conditions of this consent shall be acceptable to the Consent Authority. All analysis undertaken in connection with this consent shall be performed by a laboratory that meets ISO 17025 standards, or otherwise as specifically approved by the Consent Authority.

12. The discharge to the Tokomairiro River shall not give rise to any of the following effects 70 metres downstream of the discharge point:
    a) The production of any conspicuous oil or grease films, scums or foams or floatable or suspended material;
    b) Any conspicuous change in colour or visual clarity;
    c) Any emission of objectionable odour; or
    d) The rendering of fresh water unsuitable for consumption by farm animals.

13. Within 2 months of the commencement of this consent until 30 September 2009, the consent holder shall place and maintain, to the satisfaction of the Consent Authority, appropriate signs on the river bank in the vicinity of the outfall. The signs shall:
    a) provide clear identification of the location and nature of the discharge and the risk to public health from bathing or any other recreational activities in the vicinity of the discharge; and

b) be visible to the public visiting the area.

14. This permit does not authorise the discharge of sludge to land or water.

15. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent, for the purpose of:
    a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
    b) ensuring the conditions of this consent are consistent with any National Environmental Standards or regional policy statement or regional plan; or
    c) requiring the consent holder to adopt the best practicable option, in order to remove, or reduce, any adverse effect on the environment arising as a result of the exercise of this consent
    d) to amend any effluent or water monitoring programme, if the record of monitoring indicates that the monitoring programme is inappropriate.

16. If the consent holder:

a) Discovers koiwi tangata (human skeletal remains), or Maori artefact material, the consent holder shall, without delay:

    i. Notify the Consent Authority, Tangata whenua, the New Zealand Historic Places Trust and, in the case of skeletal remains, the New Zealand Police; and
    ii. Stop work within the immediate vicinity of the discovery, to allow a site inspection by the New Zealand Historic Places Trust and the appropriate runanga, and their advisors, who shall determine whether the discovery is likely to be extensive; if a thorough site investigation is required and whether an Archaeological Authority is required.
    iii. Any koiwa tangata discovered shall be handled and removed by tribal elders responsible for the tikanga (custom) appropriate to its removal or preservation.
    iv. Site work shall commence following consultation with the Consent Authority, Tangata whenua, the New Zealand Historic Places Trust and, in the case of skeletal remains, the New Zealand Police, provided that any relevant statutory permissions have been obtained.

        a) Discovers any feature or archaeological material that predates 1900, or heritage material, or disturbs a previously unidentified archaeological or heritage site, the consent holder shall without delay:
        b) Stop work within the immediate vicinity of the discovery or disturbance; and Advise the Consent Authority, the New Zealand Historic Places Trust, and in the case of Maori features and materials the Manawhenua, and if required, shall make an application for an Archaeological Authority pursuant to the Historic Places Act 1993; and Arrange for a suitably qualified archaeologist to undertake a survey of the site.

    v. Site work shall commence following consultation with the Consent Authority.

Consent No: 2007.091

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Clutha District Council

Address: 1 Rosebank Terrace, Balclutha

To discharge contaminants from wastewater treatment and disposal to air

for the purpose of operating the Milton Wastewater Treatment Plant

for a term expiring: 30 October 2043

Location of activity: Milton Wastewater Treatment Plant, approximately 170 metres southwest of the intersection of Bruce Street, Scott Street and Hogg Street, Milton.

Legal description of land adjacent to point of discharge: Lot 45-50 and Pt Lot 51-53 Blk IX DP 104, Sec 143 Blk XVII Tokomairiro Survey District and Pt Lot 3 DP 1018.

Map reference: NZMS 260 H45:748-488

Conditions

1. This consent shall only be exercised in conjunction with Discharge Permit 2007.090.

2. There shall be no discharge of odour, as a result of the exercise of this consent, that is noxious, dangerous, offensive or objectionable to the extent that is causes an adverse effect beyond the boundary of the site, in the opinion of an authorised officer of the Consent Authority.

3. The consent holder shall adopt the best practicable option to prevent or minimise odour discharges from the site. The best practicable options shall be set out in an Odour Management Plan that is to be submitted in writing to the Consent Authority within 3 months of the commencement of this consent. The plan shall be revised annually thereafter and the consent holder shall ensure that the Consent Authority has the most recent copy of the plan at all times. The Odour Management Plan shall provide for all the best practicable options for controlling odour to be in place by the commencement of this consent. The plan shall include, but not be limited to:
   a) A description of the potential sources of discharge to air on site;
   b) The methods undertaken to prevent odour including, but not limited to, the operation and ventilation of the wastewater treatment system, and the storage and management of screenings and sludge;
   c) A method for recording and responding to complaints from the public;
   d) A description of the monitoring required to comply with this consent; and

e) Assignment of responsibility for implementing and updating the plan.

4. The consent holder shall keep a record of any complaints received regarding discharges of odour from the site. The record shall, as a minimum, include the following:
   a) The time and place at which the complaint was generated;
   b) The nature of the complaint;
   c) Operating conditions at the time of the complaint, including any malfunctioning or breakdown of control equipment;
   d) Wind and weather conditions at the time of the complaint; and
   e) Corrective action taken by the consent holder to minimise the risk and extent of the recurrence of the causes of the complaint.

   The consent holder shall submit a copy of the written record of the complaint to the Consent Authority within two weeks after any complaint occurring, together with the details of the corrective actions taken.

5. The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent for the purpose of:
   a) determining whether the conditions of this consent are adequate to deal with any adverse effects on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
   b) ensuring the conditions of this consent are consistent with any National Environmental Standards; or
   c) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent.

APPENDIX A

2007.090

26 April 2007

Clutha District Council
P O Box 25
Balclutha

Attn: Jules Witt

Dear Jules,

Discharge Permit Application 2007.090 by Clutha District Council - Matters relating to long term consent and future effluent quality

Annica Lindgren, Rachel Ozanne and 1 met with you and Peter Ross of Clutha District Council (CDC) on Thursday 19 April 2007, to discuss Council's initial assessment of the above application.

You may recall that at a meeting between Council staff, yourself, representatives for the CDC and the Department of Correction (Corrections) on 26 April 2006, preceding the application by the CDC for a variation (i.e. increase in discharge volume) to Discharge Permit 2001.755, it was agreed that the variation would be for a short term period, and that an application for the new discharge (i.e. including the contribution from the Corrections' facility) would be lodged early in 2007.

At the April 2006 meeting, I spoke at length about the Council's current work of negotiating significant improvement in future effluent quality for current discharges to water, in return for granting consents of up to 35 years. It was clearly expressed to the representatives for the CDC that the granting of the variation to Discharge Permit 2001.755, despite regular non-compliance with some of the effluent quality limits, would be in anticipation of the pending application proposing a significant upgrade of the Milton Wastewater Treatment Plant, with a resulting significant improvement in future effluent quality. The Council would then be supportive of a term of 35 years for the new consent.

Given this background, it has been disappointing for this Council to note that your consultants have not proposed an improvement in effluent quality in the new application (2007.090) for the future discharge of treated wastewater from Milton WWTP. In fact, with regard to some parameters, your consultants are proposing a lesser effluent quality than is currently consented. We believe that your consultants' recommendations are based mainly on their perception of this Council's acceptance of the existing poor quality effluent, which was authorised by the Council several years ago under difficult circumstances. It is also disappointing that your consultants have accorded no respect to the key Regional Plan: Water for Otago (RPW) policies (e.g. Policy 7.6.1). They rubbish Policy 7.6.1, which requires Tokomairiro River to support primary contact recreation and went onto promote their own policy of managing Tokomairiro River for secondary contact recreational purposes.

As I outlined at our meeting last week, I am disappointed with the poor quality of the AEE prepared by your consultants. The report lacked in both technical and policy rigour. We are still waiting our consultant's (GPF) review of your options report.

Since we wish to make progress on your consent application, at the meeting on 19 April 2007, we agreed that we would respond with this letter, outlining the effluent quality that would be considered acceptable, in order to entertain a recommendation to grant a consent with a term of 35 years.

We propose that the following effluent quality (expressed as maximum values) is reasonable and fair, having regard to commonly used wastewater treatment technology, the in-stream water quality and the long-term values of the Tokomairiro River, and the relevant policies of regional plans and policy documents:

Parameter	Until 2009	From 2009
Effluent volume (m^3/d)	1050	1625
BOD_5 (g/m^3)	15	15
Total Suspended Solids (g/m^3)	20	20
Total Nitrogen (g/m^3)	-	20
Nitrate Nitrogen (g/m^3)	-	5
Ammoniacal Nitrogen	30	10
Phosphorous	15	15
Escherichia coli (cfu/100 ml)	50,000	260

We believe that our proposal is simple, achievable, and easy to enforce and monitor. It will meet the RPW objectives and policies, and avoid any need for further costly and untimely upgrade of the treatment plant through consent review during its consent term.

Please consider our proposal carefully and let us know whether you wish to amend the current application to reflect the above proposal, or if you wish to proceed to notification of the application as it stands at present. If you wish to discuss the matter further, I am happy to arrange another meeting between CDC and ORC staff.

Yours sincerely,

Selva Selvarajah
Director Resource Management

C.c. Philip Milne, Simpson Grierson, P O Box 2402, Wellington