

Technical Memorandum

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From	GHD	Project No.	12645246
Project Name	Shotover WWTP Disposal Field Alternative Discharge		
Subject	Impact of the new Wastewater Environmental Performance Standards		

1. Summary

The new Wastewater Environmental Performance Standards (WEPS) came into effect in part on 19 December 2025 and establish national minimum environmental thresholds for discharges of wastewater to land and water. Overall, the WEPS introduce additional requirements for long-term consenting, particularly around considering existing river water quality, achievement of higher rates of dilution for discharges to the Kawarau River and the corresponding implications this has on treatment requirements.

1.1 Discharge to water

The WEPS limits for discharges to rivers relate to the concentrations of key contaminants in wastewater as measured at the point of discharge i.e. prior to mixing in the environment. For discharge to rivers the limits depend heavily on the dilution capacity of the river as a whole, which is categorised in the range of very low to high dilution. Whether the river is classified as “hard-bottomed” (where more than half of the riverbed material is larger than gravel sized) also influences the limits. Both the Shotover and Kawarau Rivers are expected to meet the hard-bottom definition, which triggers a requirement for a formal periphyton (a complex mixture of algae, cyanobacteria, heterotrophic microbes, and detritus) risk assessment¹.

Short term consent

The short-term consent for the discharge of wastewater into the Shotover River was lodged in May 2025. Under transitional arrangement², as this consent application was accepted by Otago Regional Council (ORC), and a decision made to publicly notify prior to the standards being in effect, the consent is not legally subject to the new standards and will be assessed under the pre-WEPS framework. The consent may be granted without meeting the WEPS, though ORC may use the WEPS as a point of reference in considering potential effects. An assessment of the short-term discharge against the WEPS is included in this memo for comparative purposes only.

Long term consent

The long-term consent application is planned for lodging in May 2026, and must address the WEPS, unless an exception applies. A discharge to the Kawarau River is expected to meet the moderate dilution category for Options A and B, and potentially high dilution for Options C and D, if disposal to Frankton Flats significantly reduces the volume needed to be discharged to the river.

¹ WEPS 2025, Part 3 r 68: Application for resource consent must include periphyton risk assessment

² RMA 1991, Sch 12 cl 61, inserted 27 August 2025

Treatment performance at the Shotover Wastewater Treatment Plant (WWTP) has improved following recent upgrades and the proposed long-term consent limits for the current treatment plant will meet the WEPS requirements if the risk of periphyton growth in the river is not high. Greater periphyton risk could require additional treatment process optimisation, such as improved aeration control, supplementary carbon dosing, and increased alum dosing or significant plant augmentation to meet some of the stricter WEPS limits³. The WEPS provide for the consent authority to allow up to five years to implement the required upgrades following consent issue.

Exceptions to the WEPS

The WEPS contain several exceptions. Of relevance to the discharge to water options is the “pristine water” exception⁴, which applies when the receiving environment meets the National Policy Statement for Freshwater Management (NPS-FM) Appendix 2A Band A attributes. Final confirmation of this exception is expected to be provided by the regional council or higher consenting authority, as it is regional councils responsibility under the NPS-FM to determine the rivers attribute status. If the pristine water exception is confirmed, the WEPS would not be formally applied to the discharge.

Current evidence indicates that both the Kawarau and Shotover Rivers qualify as pristine rivers. However, further monitoring is required for dissolved oxygen and cyanobacteria, before a full comparison against the NPS-FM attributes can be made.

Implications for Kawarau River consent limits and treatment

If the pristine water exception is confirmed for the Kawarau River, the long-term consent application will not be subject to the standards and will be assessed under the pre-WEPS effects-based framework. However, the WEPS are expected to remain relevant as providing a comparison for assessing the level of effects.

Assessment for the long-term consent is expected to consider aspects of the discharge such as the extent of the mixing zone within the river. Achieving good mixing and dilution becomes important in limiting adverse effects, and so in determining consent limits and the level of treatment required. Where only low rates of dilution are achieved near the discharge, stricter limits than indicated by the WEPS will likely be applied, requiring optimised treatment and/or augmentation of the WWTP.

1.2 Discharge to land

The WEPS for the discharge of wastewater to land list exceptions for certain circumstances, include if the discharge has an adverse effect on the site of cultural significance⁵. The potential for treated wastewater discharges to adversely affect the cultural significant of an area or site is not considered within this review.

The WEPS for the discharge of wastewater to land provide limits related to the area of application as kilograms of nutrients per hectare per year, with different limits provided for slow-rate disposal⁶ (applications less than 6 m/year) and rapid disposal⁷ (applications greater than 6 m/year). The standards are interpreted as only applicable to horizontal land application methods. Vertical methods of discharge, such as boreholes and deep soak holes, have a very small footprint area and very high application rates (hundreds to thousands of m/year). The WEPS are therefore considered to not apply to the key disposal methods of the shortlisted options C (boreholes) and D (soakholes). Additionally, these disposal methods are expected to be an exception to the WEPS as they are discharges to an aquifer⁸.

However, each of these options does include secondary disposal as subsurface irrigation of treated wastewater to sports and recreation areas. This small component of treated wastewater, equating to approximately 1,500m³/day irrigated across approximately 20ha, is expected to be covered by the WEPS as a slow-infiltration discharge. For this part of the disposal the WEPS prescribe nutrient loading limits

³ WEPS 2025, Part 3 r 49: Discharge concentration limits: rivers

⁴ WEPS 2025, Part 3 r 43 (g) General exceptions for discharging treated wastewater

⁵ WEPS 2025, Part 4 r 87(e) Exceptions

⁶ WEPS 2025, Part 4 r 96 Discharge concentration limits: slow-infiltration discharges

⁷ WEPS 2025, Part 4 r 97 Discharge concentration limits – rapid infiltration discharges

⁸ WEPS 2025, Part 3 r 43: General exceptions for discharging treated wastewater

based on land classification⁹, which determines the allowable total nitrogen and phosphorus loads applied. A formal assessment of the risk presented by such irrigation to the sports fields is required¹⁰ to confirm the land classification. However, based on currently available data it is considered likely that the irrigation of these areas would comply with the slow-infiltration WEPS limits¹¹.

2. Introduction

New Wastewater Environmental Performance Standards (WEPS) were released by Taumata Arowai on 24 November, during the short list assessment process for the Shotover Wastewater effluent disposal project. The standards cover discharge of biosolids to land, wastewater overflows and bypasses, wastewater discharges into water, and wastewater discharges to land. Applicable to this project are discharges from wastewater treatment plants to land¹⁵ and water¹⁶ and the standards for these parts came into effect 19 December 2025.

QLDC lodged a short-term consent application for discharging treated effluent to the Shotover River in May 2025, before the WEPS came into effect. Under transitional arrangement¹⁷, as this consent application was accepted by Otago Regional Council (ORC), and a decision made to publicly notify prior to the standards being in effect, the consent is not legally subject to the new standards and will be assessed under the pre-WEPS framework. The consent may be granted without meeting the WEPS, though ORC may use the WEPS as a point of reference. An assessment of the short-term discharge against the WEPS is included in this memo for comparative purposes only.

Separately, the consent application related to the long-term effluent disposal solution of the Shotover Wastewater Treatment Plant (WWTP) is scheduled to be lodged in May 2026 and must address the WEPS, unless an exception applies.

2.1 Purpose of this Report

QLDC has requested a review of the WEPS as they relate to the Shotover WWTP disposal solutions. This Report documents the impact of the WEPS on the short-listed options and consenting process for the long-term disposal solution, as well as the implications for the short-term consent application. This Report is provided to foster discussion in relation to technical matters associated with the project and review findings should be tested with legal counsel and the regulator prior to being acted upon.

2.2 Scope and limitations

This technical memorandum has been prepared by GHD for Queenstown Lakes District Council. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

3. Discharges to water

3.1 Applicability of the standards

Discharges to water include to lakes, rivers, estuaries, coastal waters and the open ocean. In the context of the Shotover WWTP discharges, the WEPS for discharge to water are therefore considered for potential

⁹ WEPS 2025, Part 4 r 93: Determination of site classifications category: slow-infiltration discharge

¹⁰ WEPS 2025, Part 4 r 90: Site assessments

¹¹ WEPS 2025, Part 4 r 96: Discharge concentration limits: slow-infiltration discharges

¹⁵ WEPS 2025, Part 3: Discharge from wastewater treatment plants into water

¹⁶ WEPS 2025, Part 4: Discharge from wastewater treatment plants to land

¹⁷ RMA 1991, Sch 12 cl 61, inserted 27 August 2025

discharges to the Kawarau River (long-term options) and the Shotover River (short-term consent application).

As noted, even in situations where the WEPS do not apply, such as for the short-term consent application, it is expected that they will still be used as a point of comparison for decision makers. For this reason a discussion regarding the categorisation of discharges against the WEPS is provided in this memo, regardless of whether the WEPS apply or not.

3.2 WEPS exceptions

There are specific exceptions detailed in the WEPS, outlining the situations for discharges to water where the standards do not apply. The exceptions include the following:

Table 1 WEPS Exceptions

Exceptions	WEPS reference	Potentially affected discharge options	Comment
Where the point of discharge to water is closer than 1,000 m upstream or 100 m downstream of a drinking water abstraction point in a river.	Part 3 r 43 (1) (b), (c)	- None	There are no drinking water abstraction points from either the Shotover or Kawarau Rivers within the prescribed distances from the discharges options to either river
Where discharge is into an aquifer.	Part 3 r 43 (1) (a)	- Frankton Flats aquifer (Option C and Option D)	Vertical discharge methods such as boreholes (Option C) and soak holes (Option D) are not captured by the WEPS
Where discharge is into a water body that meets the Band A attribution in Appendix 2A of the National Policy Statement for Freshwater Management 2020 (NPS-FM), or one that fails to meet such attribution due to naturally occurring processes.	Part 3 r 43 (1) (g)	- Kawarau River - Long term - all options - Shotover River - Short term – current consent application	Kawarau and Shotover Rivers are at the top of the regional surface water catchment and expected to be of relatively high quality. There is potential for discharges to either river to be captured by the exception for high quality receiving water environments.

Further assessment is required to determine whether the Kawarau and Shotover Rivers meet the threshold for 'pristine' water quality, as defined by waters meeting Band A attribution in Appendix 2A of the NPS-FM, is required. This is discussed further in Section 3.2.2 below. The ultimate determination of whether the WEPS apply to discharges to the Kawarau River is expected to be made by Otago Regional Council or higher consenting authority, as it is the regional council that has responsibility under NPS-FM to determine attribute status for freshwater management units.

3.2.1 Adaptive achievement of WEPS

The WEPS allow the consenting authority to provide up to five years to implement necessary treatment enhancements in order to achieve the prescribed discharge limits. Following this transition period, and for the remaining duration of the 35 year consent, wastewater treatment processes are required to comply with the standards set for projected peak discharges, such as those anticipated for the year 2060.

In the event that the WEPS do not apply, but there is desire to reflect the intent of the WEPS, a more adaptive approach for improvements may be considered over intervals of time. For instance, rather than estimating dilution, defining limits, and WWTP level of treatment based on a 35-year horizon as required by the WEPS, the level of dilution, limits, and treatment might reflect discharges within a shorter horizon e.g. period for significant plant upgrade (approximately 5 years), or a long term plan duration (10 years). Any WWTP upgrades to reflect an increasing need for treatment are then applied when needed.

Forecasts to 35 years typically have markedly greater uncertainty than 5 - 10 year projections, As such, an adaptive approach can assist in reducing the impact of uncertainty associated with planning for future

growth and discharge volumes. Approaches such as adaptive pathways planning, can provide the means of mapping infrastructure improvements over such intervals, to reduce the potential for over investment.

3.2.2 Assessment requirements for NPS-FM attributes

The NPSFM characterisation of water quality of the Kawarau and Shotover River is provided in Table 2.

Table 2 NPSFM Band A Attribute Thresholds

Attribute	Band A Criteria	Kawarau Criteria Band	Shotover Criteria Band	Source of information
Ammonia (NH ₃ -N) ¹	≤ 0.03 mg/L (annual median), ≤ 0.05 (annual 95%ile)	A	A	Wildlands Desktop Freshwater Ecological Assessment of the Shotover and Kawarau Rivers at the Shotover Wastewater Treatment Plant (Section 5.1)
Nitrate (NO ₃ -N)	≤ 1.0 mg/L (annual median), ≤ 1.5 mg/L (annual 95%ile)	A	A	LAWA River Quality data
Dissolved Reactive Phosphorus	≤ 0.006 mg/L (5 year median), ≤ 0.021 mg/L (5 year 95%ile)	A	A	LAWA River Quality data
E. coli (Human Contact)	% exceedance over 540 MPN / 100 mL to be <5% % exceedance over 260 MPN /100 mL to be <20% ≤ 130 MPN/100 mL (5 year median), ≤ 540 MPN/100 mL (5 year 95%ile)	A	A	LAWA River Quality data
Dissolved Oxygen (DO)	≥ 8 mg/L (7 day mean minimum, for rivers) ≥ 7.5 mg/L (1 day minimum, for rivers)	Insufficient data to confirm	Insufficient data to confirm	
Periphyton	Numeric attribute state (default class): ≤ 50 mg/m ² chlorophyll-a (3 year sample period), with no more than 8% of samples exceeding.	Insufficient data to confirm	Insufficient data to confirm	
Suspended fine sediment (visual clarity)	Numeric attribute state by suspended sediment class: Sediment class 1, ≥ 1.78 Sediment class 2, ≥ 0.93 Sediment class 3, ≥ 2.95 Sediment class 4, ≥ 1.38	C ¹	D ¹	LAWA River Quality data
Cyanobacteria (human contact)	Numeric attribute state: 80 th percentile ≤ 0.5 mm ³ /L biovolume equivalent for the combined total of all cyanobacteria	No data available	No data available	

¹ Refer to Section 3.2.2.2 below for detail behind this category being a product of natural processes.

3.2.2.1 Kawarau River

The September 2024 Wildland Ecological Assessment of the Shotover and Kawarau Rivers¹⁸ states that the five-year median for ammoniacal nitrogen in the Kawarau River for 2016 – 2021 was 0.004 mg/L, placing it within the Band A category. Information published by Otago Regional Council also indicates that the Kawarau River meets Band A water quality for the parameters tested, with suspended fine sediment at

¹⁸ Wildlands (2024) Desktop Freshwater Ecological Assessment of the Shotover and Kawarau Rivers at the Shotover Wastewater Treatment Plant. September 2024

the point of monitoring (downstream of the Shotover River confluence) interpreted to be sourced from the Shotover River, and product of natural erosion processes in the river catchment.

The Wildland report notes that there is no data on periphyton available for the Kawarau River, nor data on dissolved oxygen. Likewise monitoring of cyanobacteria in the Kawarau River is not known to have been undertaken.

Recent water quality testing in the Kawarau carried out by GHD, indicates that dissolved oxygen, visual clarity, E.coli and contaminant concentrations upstream of the area influenced by Shotover WWTP discharges, are consistent with a Band A water quality.

At present, periphyton and cyanobacteria monitoring results for the Kawarau River to inform NPSFM attribute band have not been collected. This leaves a small degree of uncertainty regarding the characterisation of the river under the WEPS. The collection of this information is currently proposed to address the information gap. However, with currently available information it is considered likely that the Kawarau River in the vicinity of Queenstown, would be categorised as an **exception** to the WEPS for the purpose of consenting wastewater discharges.

3.2.2.2 Shotover River

Water quality of the Shotover River is monitored by ORC at the Bowens Peak monitoring site, upstream of the historical and current WWTP discharge location. Water parameters monitored at this location all meet the Attribute Band A category, with the exception of fine suspended sediment, which is consistent with Band D. The sediment load in the Shotover River is significant and the cause of the Shotover River delta formation. This is considered to be the result of erosion in its mountainous catchment and resulting from natural processes. The anthropogenic contribution to the Shotover Sediment load at the delta is expected to be minimal in the context of the significant natural sediment load.

The water quality results for sampling undertaken by GHD upstream of the current discharge location demonstrates a similar water quality status to that indicated by ORC monitoring. Assessment of periphyton and cyanobacteria in the Shotover River is currently proposed, to address the information gaps in determination of the WEPS exception.

The interpreted water quality of the Shotover River in the vicinity of Queenstown indicates treated wastewater discharge to it would likely constitute an **exception** to the WEPS. As with the Kawarau River, monitoring in the river is proposed to confirm this characterisation.

3.2.2.3 Long-term consenting impact

The WEPS set limits for key contaminants in wastewater, eliminating the need to assess the effects on the environment and human health for these contaminants. However, potential impacts from other contaminants in treated wastewater, for example metals, still requires evaluation.

If the Kawarau River is confirmed as meeting the requirements of Band A attributes provided in Appendix 2A of the NPSFM, the WEPS will not apply as a requirement of the consent application. In this situation, the consent application is required to be supported by a full assessment of effects, as would have been required prior to the WEPS coming into effect. Additionally, the consenting authority can impose consent conditions that are more stringent than the WEPS standards. It is anticipated that even where the standards do not apply, they will still be considered by the consenting authority as reference for assessing potential effects. As such, an assessment of the discharge against the standards is still expected to be required, at least for comparative purposes.

3.3 Additional work to confirm WEPS exceptions

Confirmation of whether the Kawarau River meets the threshold as an exception to the WEPS, based on existing water quality, is expected to be provided by ORC, as they provide the state of the environment monitoring including implementation of the requirements of NPSFM.

Localised monitoring for investigations is used to support confirmation of water quality conditions and is carried out to support assessment of environmental effects for resource consent applications. Monitoring

completed to date meets the majority of the requirements to determine WEPS applicability. The additional monitoring required to support this, includes monitoring for:

- Cyanobacteria (individual samples)
- Dissolved oxygen (continuous monitoring).

These parameters are not monitored by ORC in the Kawarau River, and so planned investigations will include capture of these parameters as a one-off snapshot of river conditions. It is envisaged that the confirmation of WEPS

3.4 WEPS requirements for river discharge

The below outlines the requirements of the WEPS where they do apply to discharges to rivers. To provide context for the potential consent limits and treatment requirements for the long term, an interpretation of the short listed options discharge to the Kawarau River is provided. For completeness, a comparison against the WEPS is also provide for the current discharge to the Shotover River.

3.4.1 River dilution category

For discharges to rivers and streams, the WEPS provide a receiving environment categorisation¹⁹ based on the amount of dilution the proposed discharge may receive. The categories represent a dilution range, from a very low dilution river to a high dilution river, based on a dilution ratio. The calculation of the dilution ratio is specific, and includes consideration of:

- Qeffluent - the daily average wastewater discharge, calculated on an annual basis for the peak year over the 35 year term of the consent i.e peak projected daily average flow.
- Qmean annual low flow - The 7-day mean annual flow of the receiving river or stream.

The dilution ratio is defined²⁰ as:

$$\text{Dilution Ratio} = \frac{Q_{\text{effluent}} + Q_{\text{mean annual low flow}}}{Q_{\text{effluent}}}$$

The categories for rivers or streams include:

- River or stream with dilution ratio < 10 (very low)
- River or Stream with dilution ratio >10 and <50 (low)
- River or stream with dilution ratio >50 and <250 (moderate)
- River or stream with dilution ratio > 250 (high).

3.4.1.1 Kawarau River

The long term full volume of wastewater discharge from the Shotover WWTP has a predicted 2060 daily average wastewater flow of 25,904 m³/day (0.3 m³/s).

The Kawarau River flow is measured at the Chard Rd monitoring station, downstream of the confluence with the Shotover River, at which point the mean annual low flow (MALF) is in the order of 83 m³/s. This provides a theoretical dilution ratio of 277 for the whole river. The actual mixing volume within 100 m of the discharge point would be determined through modelling of the mixing zone. However, it can be reasonably assumed the actual MALF derived for mixing purpose would be less than the reported flow, when allowing for the contribution from the Shotover River (MALF of between approximately 10 - 19 m³/s) which contributes downstream of a potential discharge point from the Shotover delta. Given this, the volume of mixing is expected to be less than the 75 m³/s required to meet the High dilution discharge category (dilution ratio >250), instead being within the range of flow of 15 m³/s to 75 m³/s which aligns with the **Moderate dilution** category (dilution ratio >50 and <250).

¹⁹ WEPS 2025, Part 3 r 47 Classification of rivers into dilution ratio classes

²⁰ WEPS 2025, Part 3 r 48 Calculation of dilution ratio classes

3.4.1.2 Shotover River

The short-term consent application to discharge to the Shotover River reflects the short-term requirements with consent duration proposed to be to 2030. The predicted daily average discharge volume in 2038 is up to 16,900 m³/day, compared to the current average discharge volume of 11,000 to 12,000 m³/day.

During low flow conditions in the Shotover River, the amount of dilution achieved within 100 m of the discharge is limited to a near riverbank branch of the river. The resource consent application for the short-term discharge seeks to allow maintenance of this river branch to maintain a minimum flow of least 1 m³/s. A further 2.5 m³/day is proposed to be diverted to the location to mitigate effects during periods of reduced WWTP performance, giving the branch a total flow of 3.5 m³/day during those times.

The Shotover River during periods when additional flow is diverted to the discharge area could be in the **Low dilution** range (DR >10 and <50). Without the proposed river diversion, the current discharge to the Shotover river could be considered as **Very Low** dilution (<10).

Further information for flow characterisation is not expected to be required for the short-term consent application, but it is expected that monitoring of the river diversion and water quality downstream of the discharge will be required as condition of consent.

3.5 Periphyton risk category

Periphyton or algal growth may be a risk in hard bottomed rivers, such as the Shotover and Kawarau Rivers. For such rivers, and where the WEPS apply, a site specific periphyton risk assessment is required to be undertaken to categorise the level of risk of prolific periphyton growth²¹. The level of risk identified determines whether more stringent nutrient limits are applied to treated wastewater.

The periphyton risk assessment is required for rivers when more than half the substrate is made up of particles that are the same size or larger than gravel. Both the Kawarau River and Shotover Rivers are expected to meet this requirement.

3.5.1 Periphyton risk assessment requirements

The WEPS requires that the periphyton risk assessment must follow a prescribed approach and must be undertaken by a suitably qualified and experienced practitioner (SQEP) with at least 10 years relevant experience in freshwater ecology. The assessment must also be peer-reviewed by a second independent SQEP from a separate organisation.

The assessment considers:

- The effect of shade or shadow.
- Time of discharge including time of day, season, and duration.
- Dilution ratio.
- Climate, source water, physical and chemical characteristics.

Taumata Arowai provides further guidance notes on the periphyton risk assessment. This assessment is being scoped and will be undertaken as part of the next phase of investigation work.

3.5.1.1 Kawarau River

Disposal of treated wastewater to the DAD disposal field resulted in elevated nutrient concentrations in the groundwater of the Shotover River delta. Groundwater discharging to the Kawarau River with nutrient concentrations near equivalent to treated wastewater has been observed to result in localised algal growth on the riverbank at the immediate point of discharge. Where observed, the extent of this was limited and did not extend into the river proper.

²¹ WEPS 2025 Part 3 r 69 Periphyton risk assessment mandatory considerations

As wastewater has historically and currently contributed to the nutrient load of Kawarau River, without apparent significant periphyton growth, it is considered unlikely that assessment will indicate a high risk of periphyton growth due to the discharge. However, while these historical observations suggest a potentially **low risk**, formal periphyton risk assessment and categorisation of risk in accordance with the WEPS is required. This assessment would take into consideration future discharge volumes, mixing and location specific influences.

3.5.1.2 Shotover River

An ecological assessment prepared by Boffa Miskell (BM) to support the short-term resource consent application for discharge of treated wastewater to the Shotover River considered the risk of meaningful periphyton issues developing to be relatively low. Ecological surveys of the river downstream of the historical discharge did not identify significant periphyton growth and this outcome has been relied upon by both Boffa Miskell and ORC technical reviewers to conclude that the risk of significant periphyton growth is relatively **low risk**.

Although further assessment and categorisation of periphyton risk for the Shotover River would be required to confirm this, it is considered probable that the risk level will align with previous assessment findings.

3.6 WEPS Discharge to water limits

The following table shows the WEPS limits for river discharges and is compared to the proposed short term and long-term consent limits as presented in the short list report that were prepared prior to the release of the WEPS.

Table 3 WEPS limits for river discharges compared to the consent limits proposed in the short list report

Parameter	WEPS Limits for river discharges					Proposed consent limits		
	Unit, statistic	Very low dilution	Low dilution	Moderate dilution	High dilution	Unit, statistic	Short term proposed limits	Long term proposed limits
cBOD ₅ (mg/l)	annual median	5	10	15	20	annual mean	10	5
	90%ile	10	20	30	40	90%ile	20	10
TSS (mg/l)	annual median	5	10	15	30	annual mean	10	5
	90%ile	10	20	30	60	90%ile	20	10
TN (mg/l)	annual median	4	5	10	35	annual mean	10	10
TP (mg/l)	annual median	0.5	1	5	10	annual mean	1.5	1.5
TAN (mg/l)	90%ile	1	1	3	25	90%ile	5	5
Ecoli (cfu/100 ml)	90%ile	130	650	3,250	16,250	95%ile	100	100

Note: Blue cells represent parameters that meet the proposed long-term consent limits. Orange cells represent parameters that do not meet the proposed long term consent limits.

The proposed short term consent conditions tabled above meet the requirements of a low dilution environment for all parameters except total nitrogen and total phosphorus, which meet the moderate dilution category, and total ammoniacal nitrogen which meets the high dilution category.

For the long-term discharge the proposed consent conditions meet the moderate dilution standards, with the exception of ammoniacal nitrogen (TAN).

Table 4 below shows the WEPS limits²² for hard bottomed rivers for total nitrogen and total phosphorus, reflecting the different periphyton risk categories. When these limits are compared to the proposed consent limits for both the short-term and long-term consents, they proposed limits meet the standards for the low periphyton risk, moderate and high dilution categories as shown in blue.

Table 4 WEPS limits for hard-bottomed rivers (mg/l, annual medians)

Periphyton risk category	Parameter	Unit, statistic	Very low dilution	Low dilution	Moderate dilution	High dilution
Low risk	TN	mg/l, annual median	4	5	10	35
	TP	mg/l, annual median	0.5	1	3	10
Medium risk	TN	mg/l, annual median	4	4	7	20
	TP	mg/l, annual median	0.3	0.7	1	5
High risk	TN	mg/l, annual median	4	4	4	10
	TP	mg/l, annual median	0.25	0.5	0.5	1
Very high risk	TN	mg/l, annual median	4	4	4	4
	TP	mg/l, annual median	0.25	0.25	0.25	0.25

Note: Blue cells represent parameters that meet the proposed long term consent limits. Orange cells represent parameters that do not meet the proposed long term consent limits.

4. Discharges to land

The standards cover discharge of biosolids to land, overflows and bypasses, discharges into water, and discharges to land. The WEPS outline a procedure for assigning a land class²³, based on undertaking assessment to assign a site classification category and a risk assessment category. These site and risk assessments cover the broad range of considerations that may influence the rate of wastewater discharge and the effects to environment and public health.

The WEPS also make a distinction between the type of land disposal scheme, differentiating discharges as follows:

1. **rapid-infiltration discharge**, meaning the discharge of treated wastewater to land at a rate that results in the land receiving an annual hydraulic load of 6 metres or more.
2. **slow-infiltration discharge** means the discharge of treated wastewater to land at a rate that results in the land receiving an annual hydraulic load of less than 6 metres.

A number of exceptions to the application of WEPS for land discharge are also outlined.

²² WEPS 2025, Part 3 r 71 Alternative nitrogen and phosphorus discharge concentration limits

²³ WEPS 2025, Part 4 r 91 Procedure for assigning land class to site

4.1.1 Exceptions for land discharges

The exceptions²⁴ in the WEPS relating to discharges to land include:

- discharge to land that is assigned to land class 4,
- discharge from a bypass,
- discharges to a wetland that is not part of the treatment process,
- when it has an adverse effect on a site of cultural significance,
- to crops that are grown for human consumption,
- discharge to land from an oxidation pond.

The potential for treated wastewater discharges to adversely affect the cultural significant of an area or site is not considered within this review.

Additionally, the standards for the discharge of wastewater to land are interpreted as being only applicable to horizontal land application methods as the provided limits relate to the area of application e.g. kilograms of nitrogen applied per hectare of land per year. Vertical discharge methods and those to groundwater such as soak holes and deep bores, as proposed in Options C and D, are not covered by the current standards.

4.1.2 Limits for land discharges

The land class is determined based on a number of different parameters including drainage, soil type, slope, climate, depth to ground water and differentiate between rapid and low infiltration rates. The standards provide limits^{25,26} for the amount of total nitrogen and total phosphorus can be discharge per hectare each year based on the class of land and disposal method and these are presented in Table 5.

Table 5 Application limits for different land classifications

Method		Class 1	Class 2	Class 3
Slow-infiltration	TN limit	550 kg/ha/yr	250 kg/ha/yr	150 kg/ha/yr
	TP limit	110 kg/ha/yr	50 kg/ha/yr	30 kg/ha/yr
Rapid infiltration	TN limit	20,000 kg/ha/yr	10,000 kg/ha/yr	4,000 kg/ha/yr
	TP limit	7,000 kg/ha/yr	3,000 kg/ha/yr	1,000 kg/ha/yr

In addition to the above nutrient loading limits, for areas proposed to be accessed by the public and where irrigation is proposed to be at surface (not sub-surface), an E.coli limit of 1 cfu/100 mL applies.

Where a regional plan enables discharges of treated wastewater to land, a consenting authority cannot grant a resource consent that imposes requirements that are different from those in the standards. This includes treatment limits for key contaminants, as well as monitoring and reporting requirements. Where a consent is approved, it must be issued for a 35-year duration.

4.1.3 WEPS application to disposal options

As the WEPS do not practicably include disposal to land via vertical methods such as boreholes and soakholes, they are not applicable to the key land disposal methods of the shortlisted options. Options C (boreholes) and Option D (soak holes). The WEPS do however include sub-surface irrigation of treated wastewater to sports and recreation areas which is included in the shortlisted options where a small component of treated wastewater, equating to approximately 1,500 m³/day is irrigated across approximately 20 ha.

²⁴ WEPS 2025, Part 4 r 87 Exceptions

²⁵ WEPS 2025, Part 4 r 96 Discharge concentratin limits: slow-infiltration discharges

²⁶ WEPS 2025, Part 4 r 97 Discharge concentratin limits: rapid-infiltration discharges

The application rates proposed for the sub-surface method are in the order of 10-15 mm/day, providing a maximum potential application of approximately 5.5 m/year. Under these conditions the limits for slow-infiltration are expected to apply to the irrigation activity.

At the proposed irrigation rates and the proposed long term consent limits (outlined in Table 3) the average nutrient loading across the 20 ha area would be:

- TN of approximately 275 kg/ha/yr.
- TP of approximately 28 kg/ha/yr.

As the proposed wastewater irrigation is sub-surface, the E.coli limit outlined in the WEPS would not apply.

With minor refinements, the nutrient application rate for the sports and recreational areas are expected to be consistent with the requirements for Class 1 and Class 2 sites. Detailed site assessment for the sports and recreation areas is required to provide the site classification for comparison to the WEPS. However, based on preliminary review of site conditions, it is considered likely that the indicated areas would meet the requirements of Class 1 or Class 2 sites.

5. Wastewater treatment implications

5.1 Current WWTP performance

The second Modified Ludzack-Ettinger (MLE) reactor and clarifier at Shotover WWTP was commissioned in October 2025, and has significantly improved the discharge quality, particularly in terms of total ammoniacal nitrogen (TAN), total nitrogen (TN) and total phosphorus (TP) concentrations. The MLE upgrade was designed to achieve an average TN limit of 10 mg/L and an average TP limit of 8 mg/L, based off the original land-based discharge consent.

Refer to the following Table 6 for recent MLE clarifier effluent results, upstream of the UV unit where the blending with pond effluent occurs.

Table 6 Recent MLE clarifier effluent results (Sept 2023 to Oct 2025)

Parameters (as median, unless stated specifically)	Shotover WWTP clarifier effluent results (2023 to 2025 data) ¹	Short term consent proposed limits	Long term consent proposed limits
TAN (mg/L)	0.1 (as median) 2 (as 90%ile)	1.5 (annual mean)	1.5 (annual mean)
TN (mg/L)	6.7 (as median)	10 (annual mean)	10 (annual mean)
TP (mg/L)	0.9 (as median)	1.5 (annual mean)	1.5 (annual mean)
Biological oxygen demand (BOD ₅) (mg/L)	6.0 (as median)	10 (annual mean) 20 (90%tile)	5 (annual mean) 10 (90%tile)
Total suspended solids (TSS) (mg/L)	8 (as median)	10 (annual mean) 20 (90%tile)	5 (annual mean) 10 (90%tile)

1. MLE Clarifier results from Sept 23 to Oct 25 excluding samples related to process upsets in Nov 23 to Jan 24, and July and Aug 2024.

5.2 Treatment transition period

The WEPS provide for transition arrangements with the consenting authority allowed to provide up to five years for upgrades to meet the new performance requirements.

5.3 Comparison for long-term discharge

The WEPS for wastewater discharge to water are relevant to all short-listed options of the long-term solution, due to each having a Kawarau River discharge component. However, confirmation that the Kawarau River water quality is consistent with the pristine water quality threshold is required to determine whether the WEPS will formally apply for consenting.

For comparative purposes, the following Table 7 summarises the WEPS limits for contaminants of concern for discharge to water. The colour coding shows the significance for the WWTP and categories where augmentation of the plant through dosing and optimisation could meet the limits, or where investment in upgrades and additional treatment is required. Also outlined is the range of WEPS limits that an Option A or Option B discharge to the Kawarau River is likely to align with, should the WEPS apply. Until the periphyton risk and the river dilution categories are confirmed through formal assessment, the specific category which may be relevant for comparison remains **uncertain**.

Table 7 Discharge to Water WEPS limits and treatment influence

Periphyton risk category	Parameter	Unit, statistic	Very low dilution	Low dilution	Moderate dilution	High dilution
Low risk	TN	mg/l, annual median	4	5	10	35
	TP	mg/l, annual median	0.5	1	3	10
	TAN	mg/l, annual 90 th %	1	1	3	25
Medium risk	TN	mg/l, annual median	4	4	7	20
	TP	mg/l, annual median	0.3	0.7	1	5
	TAN	mg/l, annual 90 th %	1	1	3	25
High risk	TN	mg/l, annual median	4	4	4	10
	TP	mg/l, annual median	0.25	0.5	0.5	1
	TAN	mg/l, annual 90 th %	1	1	3	25
Very high risk	TN	mg/l, annual median	4	4	4	4
	TP	mg/l, annual median	0.25	0.25	0.25	0.25
	TAN	mg/l, annual 90 th %	1	1	3	25

Notes:

1) Significance for WWTP treatment:

-  Within proposed consent limits, or able to be met without changes or upgrades.
-  Augmentation of current WWTP and likely dosing with additives to improve treatment (alum, carbon, etc.).
-  Upgrade of WWTP to improve biological process including modification and/or additional treatment structures.
-  Likely classification range for long term discharge Options A and Option B, based on current environmental understanding:

Option C and Option D provide for multiple disposal mechanisms which reduces the volume of wastewater needed to be discharged to the river and the WEPS provides a calculation method for dilution ratio class for

mixed discharge systems²⁷. This has the effect of realising greater dilution of discharge wastewater for these options, such that Option C and Option D may meet higher dilution categories than Option A and Option B and so align with less stringent limits were the WEPS to apply.

The WEPS for discharges to land are expected to apply to Option C and Option D for the small component of wastewater irrigated to sports fields and recreation areas. Current understanding of the site conditions in these areas suggests that the discharge to land would comply with the WEPS limits or could be readily modified to do so.

Where an effects-based assessment is applied and the dilution achieved within a reasonable mixing distance is considered most relevant, categories within low to medium dilution range may be considered as more appropriate for comparison.

The following Table 8 summarises scenarios and the likely implications for the WWTP for scenarios reflecting the upper bound, lower bound of TN, TP, and TAN limits under the WEPS, and the same for the likely dilution and periphyton risk scenario.

Table 8 Impact of different risk categories on the long-term option of disposing to the Kawarau River

Scenario	WEPS limits ¹	Impact	Treatment significance
Upper bound limits – low periphyton risk with high dilution	TN < 35 mg/l (median) TP < 10 mg/l (median) TAN < 25 mg/l (90%ile)	None	Currently proposed consent limits meet the WEPS limits. The plant currently achieves the requirement.
Lower bound limits –very high periphyton risk with low dilution	TN < 4 mg/l (median) TP < 0.25 mg/l (median) TAN < 1 mg/l (90%ile)	Medium	Current proposed consent limits do not meet the WEPS limits and treatment upgrades would be required: <ul style="list-style-type: none"> – Higher TN removal efficiency and consistency via supplementary carbon dosing and aeration control – Increased alum dosing to achieve the lower TP limit of 0.25 mg/L (note: this will result in more sludge generation at site and therefore additional sludge processing). – Improve TAN removal efficiency and consistency via aeration control improvement and online instrumentation <p><i>Note: If TN removal after implementing additional carbon dosing is not consistently below 4 mg/L as a median due to cold temperature and seasonal loads, future plant augmentation (currently in 2040s) could be brought forward to further address the need of more plant improvements.</i></p> <p><i>Where an exception to the WEPS is confirmed, an adaptive approach could be explored as the dilution calculation is currently based on 2060 discharge flows.</i></p>
Most likely – med periphyton risk with moderate dilution	TN < 7 mg/l (median) TP < 1 mg/l (median) TAN < 3 mg/l (90%ile)	Low	Current proposed long-term consent limits do not meet the standards, however, the recent plant performance suggests the discharge is within the WEPS limits. TAN limit (2 vs 3mg/L 90%ile), TP limit (0.9 vs 1mg/L median) and TN limit (6.7 vs 7 mg/L median). To ensure consistent compliance with the WEPS limits, similar plant augmentation as stated in the above lower bound scenario should be added, although the quantity of chemicals usage and sludge generation (and disposal) will be lower under this most likely scenario, than the lower bound scenario.

1. Units are mg/l, annual median for TN and TP, 90%ile for TAN. All other criteria are met by currently proposed consent limits

²⁷ WEPS 2025 Part 3 r 72-76 Mixed discharge systems

5.4 Comparison for short-term discharge

Assuming that the effluent discharge into a braid of the Shotover River is considered, rather than the full river extent, the WEPS limits of low or very low dilution may be applied for comparison. The short-term consent application does not meet the WEPS standards for these categories, nor for the range of periphyton risk categories. While these standards do not apply to the current consent application because it is already “in play,” they may provide a relevant comparison for decision-makers.

Of particular note is that the WEPS allows the consenting authority to provide for an up to a 5-year transition period, to allow for the implementation of any treatment improvements required to meet the relevant WEPS limits. Given that the application for discharge to the Shotover River is seeking only a short-term consent for an equivalent period, it is not expected that the treatment will need to be improved for the purpose of meeting the WEPS limits. Given this, the periphyton risk assessment proposed to be undertaken for the Shotover River, unlike the Kawarau River assessment, is not proposed to be peer-reviewed.

The following Table 9 summarises the significance for treatment for the likely upper bound, lower bound and most probably WEPS categorisation for the current discharge to the Shotover river.

Table 9 Impact of different risk categories on the short-term option of disposing to the Shotover River

Scenario	WEPS Standards ¹	Impact	Commentary
Upper bound limits – low periphyton risk with low dilution	TN < 5 mg/l (median) TP < 1 mg/l (median) TAN < 1 mg/l (as 90%ile)	Medium	Current proposed short term consent limits do not meet the standards for the parameters. However, the recent plant performance suggests the discharge is within TP limit (0.9 vs 1mg/L). Plant optimisation could be carried out to achieve the TN and TP targets. – Improve TAN removal efficiency via aeration control improvement and online instrumentation. – Higher TN removal efficiency via supplementary carbon dosing and improved aeration control; – More consistent TP removal efficiency via alum dosing (note: this will result in more sludge generation at site and therefore additional sludge processing).
Lower bound limits – high or very high periphyton risk with very low dilution	TN < 4 mg/l (median) TP < 0.25 mg/l (median) TAN < 1 mg/l (as 90%ile)	Medium	Current proposed short term consent limits do not meet the standards for the parameters. Similar plant improvements to the above ‘upper bound limits’ scenario to improve the plant performance. However, there is still a risk of non-compliance due to cold operating temperature and tight discharge limits, if the WEPS limits are adopted.
Most likely limits – Low periphyton risk with low dilution	TN < 5 mg/l (median) TP < 1 mg/l (median) TAN < 1 mg/l (as 90%ile)	Medium	Current proposed short term consent limits do not meet the standards for the parameters. Refer to the above two scenarios for additional augmentation.

1. Units are mg/l, annual median for TN and TP, 90%ile for TAN. All other criteria are met by currently proposed consent limits

6. Other relevant items

6.1 PFAS and other contaminants

For land discharges, contaminants like PFAS or heavy metals are not covered by the standard, so assessment of these may be required and the consent authorities may set limits for such contaminants.

6.2 Quantitative microbial risk assessment

The standard requires a quantitative microbial risk assessment (QMRA) to be undertaken where shellfish gathering areas may be influenced by the discharge, which is not applicable to the Shotover WWTP situation. A QMRA is a detailed analysis of public health risk, such as to recreational users of the water, and has been an area of interest to ORC technical reviewers for the Shotover River short-term consent application. If it is determined that the WEPS do not apply to the Kawarau discharge through an exception, a QMRA may be required to support the consenting process and stakeholder engagement for the long term consent. QLDC can opt for this analysis to be undertaken as a precautionary assessment or confirm the requirements for it with the consenting authority.

6.3 Diffusers

It is noted that standard requires discharges of treated wastewater to water bodies **other than rivers** to be fitted with a diffuser. A diffuser is a pipe that has multiple ports or nozzles attached to the outfall pipe and is used to disperse, dilute, and mix the wastewater into the receiving environment at the point of discharge. A diffuser may be suitable and preferable for the discharge to the Kawarau River as it provides improved mixing and less visual impact. Further investigation (including mixing assessment) is required to determine the practicalities and extent of mixing for the Kawarau River location.

6.4 Timeframes

There is an up to five-year transition period for Council to be able to meet the required standard. Where a consent is approved, it must be issued for a 35-year duration. The consent authority may also impose interim conditions that differ from the standards (e.g. temporary discharge limits)

7. Next steps

The following summarises the next steps required to complete the WEPS assessment for the discharges, and confirm the appropriate standards before proceeding with the preliminary design and consent application:

1. Undertake summer water quality monitoring of Kawarau and Shotover Rivers to determine the river status as meeting the pristine water quality requirements (NPSFM Attribute Band A for relevant parameters). This is currently planned for February and March 2026.
2. Carry out river substrate (riverbed materials) sampling to confirm whether it comprises more than 50% gravel, and so meet the requirements for a hard bottom rivers.
3. Carry out the periphyton risk assessment, as outlined in the WEPS, to determine the risk category.
4. Undertake Kawarau River hydrological and morphological assessment and mixing zone modelling, to confirm dilution category and performance of the discharge methods.
5. Confirm the discharge method.
6. Confirm the treatment standard requirements under WEPS.
7. Complete the preliminary design. This is currently underway and will support the consent application due in May 2026.

8. Complete assessment of effects, and associated technical studies, and prepare consent application.

Regards



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