Appendix 4

8.1.3.3 Assessment of alternatives

In addition to section 105(1)(c) of the RMA, section 6(1)(d)(ii) of the Fourth Schedule of the RMA requires that applications for discharge consents must include a description of *"any possible alternative methods of discharge, including discharge into any other receiving environment*". A summary of these investigated options is outlined in Section **Error! Reference source not found.**, and this section provides the assessment performed on these alternative solutions.

A number of alternative actions to the direct discharge of treated effluent to the Kimi-ākau/Shotover River were considered prior to emergency works being undertaken.

The alternative disposal options considered included buffer storage, DAD field expansion, adjustments to the existing DAD field operation, alternative disposal via previous drains (channels) and a combination of these. The previous channels which have both been used as discharge paths in the past are outlined in Figure 42 below.

Appendix 4

Figure 42: Shotover WWTP previous channels

Appendix 4

The following factors were used as benchmarks to determine the key success criteria of the short-term treated effluent disposal solution:

- No ponding: Ponding poses significant concerns for airport operations because of increased birds and hence the risk of bird strike, necessitating careful management to avoid disruptions.
- Localised impact near the DAD field: Given the DAD field has a limited capacity, and hydraulic performance has deteriorated over time. An overflow bund has been created. Overland or visible flows are a major concern for the community, requiring solutions that minimise these occurrences.
- Continuous treatment from the WWTP: The WWTP must maintain continuous treatment discharge and cannot be held back under any circumstances. There is currently negligible storage volume available in Ponds 2 and 3 until the second MLE reactor and clarifier are operational by the end of 2025.
- Fast implementation: Due to the potential aviation risk, the implementation of the short-term disposal solution must be timely.
- Land based discharge: Efforts made to minimise the effects on the receiving environment wherever possible, ensuring that the disposal solutions are environmentally responsible. Ie Land based discharge best case scenario.
- The feasibility of each option must be considered - this is dependent on if the option can actually be implemented ie cost, timeline to implement, physical nature of solution etc.

The following table (Table 14) presents a summary of assessing various short term disposal alternatives.

Table 14: Shotover WWTP short-term disposal options assessment summary

Option	Description & Comments	Key Criteria				Feasible	
		No ponding	Minimise localised impact near DAD	Continuous treatment from the WWTP	Fast implementation	Land based discharge	
1	Do Nothing	No	No	Yes	N/A	Only partial	No
2	Public access restriction of the uncontrolled discharge area beyond DAD	No	Yes	Yes	Yes	Only partial	No
3a	Increase DAD Field Footprint, say expand by 30%	Maybe – deterioration may still occur	Yes	Yes	No	Yes	Rate of deterioration is unknown
3b	Limit discharge volume to DAD field, and pump overflows from DAD field back to the treatment plant.	No	No	No	No	Yes	No – limited

Appendix 4

Option	Description & Comments	Key Criteria				Feasible	
		No ponding	Minimise localised impact near DAD	Continuous treatment from the WWTP	Fast implementation	Land based discharge	
							by DAD capacity
3c	Similar to 3b, to pump overflows from post-DAD back to a buffer pond (pond 2 or 3).	No	No	No	No – Pond 2/3 only available from end of 2025	Yes	No – limited storage vol in Ponds 2 and 3
3c	Similar to 3b, to pump overflows from post-DAD back to a buffer pond (pond 2 or 3).	No	No	No	No – Pond 2/3 only available from end of 2025	Yes	No – limited storage vol in Ponds 2 and 3
3d	No expansion to the DAD field, however infill depressions downstream of DAD and at the Shotover Delta to reduce daylighting.	No	Yes	Yes	No	Yes	Yes (large quantity of gravel reqd)
3e	Similar to 3e, to continue using the DAD field, but only infill up to the Training Wall.	No & daylighting near river	No	Yes	No	Yes	No
3f	Raise existing DAD field to reduce ponding	Yes	No - more daylighting	Yes	No	Yes	Rate of deterioration is unknown
3g	Utilise DAD to its maximum capacity and use raw wastewater storage pond to avoid DAD overflow.	No	Yes / partial depends on DAD capacity recovery	No - minimal storage in Pond 1, also odour risk	No – require PS installation	Yes	No
4a	To divert excess treated effluent from upstream of UV to buffer storage ponds 3 and/or 2 when the DAD lacks sufficient capacity. Require draining and dewater of the ponds, removing sludge from Pond 3 over a 18-24 months period. Remediated Pond 3 only available from end of 2027.	No – Pond 3 could be full of water at times	Yes / partial depends on DAD capacity recovery	No	No	Yes	No
4b	Similar to 3d, but do not drain or dewater the ponds. Instead, use some of the available pond volume above the sludge level. This can commence once the ponds are out of service after December 2025.	No	Yes / partial depends on DAD capacity recovery	No	No – Pond 2/3 only available from end of 2025	Yes	No – even less storage volume than 3a
5a	Utilise DAD to its maximum capacity and direct overflow to the Kimi-ākau/Shotover River via a historical drain/channel	No	Yes	Yes	No	No	Low – high % of

Option	Description & Comments	Key Criteria				Feasible	
		No ponding	Minimise localised impact near DAD	Continuous treatment from the WWTP	Fast implementation	Land based discharge	
							bypass likely
5b	Implement a partial bypass to the Kimi-ākau/Shotover River using the historic channel 2, while utilising the existing DAD field to its maximum capacity.	No	Yes	Yes	Yes	Partial only	Low – high % of bypass is likely
6a	To decommission the existing DAD field and divert the treated effluent following the UV to the Kimi-ākau/Shotover River via the drain/discharge channel	Yes	Yes	Yes	Yes	No	Yes
6b	To use the bypass through the historic channel 2 to temporarily drain the existing DAD field and undertake remediation works to restore its higher infiltration capacity.	Maybe	Yes	Yes	No	Partial only	Low – high % of bypass is likely

As seen from the above table, diversion of treated effluent into the previous discharge channel north of the DAD disposal field (Option 6a) was found to be better than other alternatives considered.

8.1.4 Section 107

Section 107(1) of the RMA governs the grant of consents for the discharge of contaminants into water. Section 107(1) outlines specific criteria that must be met to ensure that discharges do not result in significant adverse effects on the receiving environment.

Under Section 107(1) of the RMA a consent authority may not grant a consent for the discharge of a contaminant into water, or onto or into land, if after reasonable mixing the discharge (either by itself or in combination with the same, similar or other contaminants or water) is likely to give rise in the receiving waters, to:

> *(c) The production of conspicuous oil or grease films, scums, foams, floatable or suspended material:*
> *(d) Any conspicuous change in the colour or visual clarity:*
> *(e) Any emission of objectionable odour:*
> *(f) The rendering of fresh water unsuitable for consumption by farm animals:*
> *(g) Any significant adverse effects on aquatic life.*

Each of these effects has been considered with respect to the proposed discharge of contaminants to water.

Oil, Grease, Scums, Foam, Floatable or Suspended Material

The wastewater treatment process is generally designed and managed to minimise the formation of oil, grease, scums foam, floatable or suspended material however, some level of these may still be present in the discharge. Visual monitoring of the effluent throughout the treatment process and prior to discharge occurs on a daily basis with formal water quality testing undertaken weekly. Should any issues be identified through this monitoring they can be rectified through modifications at the WWTP and if necessary, re-direction of the flow to calamity storage.

With the level of treatment and monitoring proposed, and the available mixing within the receiving environment, it is not anticipated that this discharge will result in the production of conspicuous oil or grease films, scums, foams, floatable or suspended material, both by itself and in combination with other discharges, after reasonable mixing.

Change in Colour of Visual Clarity

The treated effluent discharge is visibly different in colour and clarity compared to the Kimi-ākau/Shotover River receiving environment. The influence of treated wastewater from the oxidation pond on colour and clarity of the treated effluent is evident in the current discharge, however downstream of the first mixing zone (approximately 200m), there is no discernible influence on colour and clarity of river water. The clarity will continue to improve, and the reasonable mixing zone shorten considerably, following the completion of the second MLE clarifier by the end of 2025 as the oxidation ponds will no longer be required.

Objectionable Odour

As discussed in the FIDOL assessment (section 5.7), considering the relatively low frequency of light winds that can cause effects, low intensity of odours discharged and distance to receptors, odour emissions from the outfall are unlikely to cause offensive or objectionable effects at off-site receptor locations.

Suitability for Animal Consumption

The discharge into the Kimi-ākau/Shotover River will not affect the suitability of the water for consumption by farm animals. There are no farm animals that currently drink this water in proximity to the mixing zone. The key contaminants in the discharge of sediment and nutrients, such as nitrogen and phosphorus, at low concentrations following reasonable mixing. Overall effects on water quality and ecology the receiving environment is expected to be less than minor and therefore also likely to be suitable for consumption by farm animals.

Monitoring of downstream water quality in the Kimi-ākau/Shotover River and below the Kawarau confluence since the recent discharge began, and at times when the previous discharge occurred, indicates that contaminant levels will remain within acceptable thresholds for livestock drinking water in the Kimi-ākau/Shotover River at that point.

Significant Adverse Effects on Aquatic Life

Aquatic ecosystems in the Kimi-akau/Shotover River could be sensitive to increased nutrient loading, sedimentation, and changes in water clarity.

Completion of plant upgrade works by the end of 2025 will result in an improved level of wastewater treatment. This, together with the more typical flow rates that occur in the river, and the proposed mitigation measures to improve mixing of the treated wastewater during low flow periods is expected to limit potential effects to water quality, such that they are less than minor. The concentration of nutrients in the discharge is expected to be low, and the length of the minor braid within which ammonia toxicity effects occur is within a reasonable mixing zone which will minimise the risk of adverse effects in the broader receiving environment of the Kimi-ākau/Shotover and Kawarau Rivers. The river is naturally high in sediment and therefore water clarity is lower than the Kawarau River at the confluence 1km downstream of the discharge point.

The applicant will undertake ongoing water quality monitoring, and appropriate locations for the continued monitoring have been proposed, to ensure that any unforeseen effects are promptly identified and mitigated.

Based on the assessment above, no significant adverse effects on aquatic life are expected and are not known to have occurred in the past, evidenced by the monitoring data and instream evaluations from the previous consented discharge period, noting that the quality of the discharge is now significantly better.

8.2 Proposed Wastewater Standards

The Taumata Arowai proposed wastewater standards are a relevant 'other regulation' (section 104(1)(b)(ii)) to consider. Taumata Arowai are currently proposing new wastewater standards. If the new standards are adopted as currently presented, the receiving environment is categorised based on high-level environmental context (sea, rivers or streams, lakes and estuaries, land). In the case of rivers and streams, sub-categories are provided based on a potential dilution ratio. The discharge of treated effluent into the Kimi-ākau/Shotover River fits within the moderate rate category. This is where the river dilution ratio falls between 50 and 250 (moderate rate category).

The following Table 15 compares the different discharge limits as specified in the current consent (RM13.215.03.V3), Stage 3 WWTP upgrade (2008.238.v1) and the proposed limits under the moderate rate category by Taumata Arowai with the recent MLE/Clarifier Effluent Results (from the monthly consent sampling data).