QUEENSTOWN LAKES DISTRICT COUNCIL

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www.qldc.govt.nz

23 June 2025

[redacted]
Sent via email to [redacted]

LG25-0122 - Bird Strike Correspondence

Dear [redacted],

REQUEST FOR OFFICIAL INFORMATION – RELEASE OF INFOMATION

Thank you for your request for information held by the Queenstown Lakes District Council (QLDC). On 5 May 2025 you requested the following information under the Local Government Official Information and Meetings Act 1987 (LGOIMA):

- **Please provide copies of all email correspondence and meeting minutes between QAC and QLDC that discussed the bird strike concern from July 2024 to April 2025.**

On 29 May 2025, we contacted you by email to advise that, due to the substantial volume of official information requiring review and the need for consultation, the response deadline had been extended to 20 June 2025.

On 19 June 2025, we contacted you by phone to advise that, due to the public holiday on 20 June 2025, our response would be provided on 23 June 2025.

QLDC RESPONSE

Release of information

In response to your request, we consulted with the QLDC Property and Infrastructure Team and carried out a search of our email archives for correspondence dated between 1 July 2024 and 30 April 2025. The search focused on emails containing the phrase 'bird strike' sent to or received from Queenstown Airport Corporation.

Following a review of the content and removal of duplicates, seven emails were identified as falling within the scope of your request. Please note that parts of document 001 have been withheld, as they relate to matters outside the scope of your request.

With respect to the meetings, no formal minutes or action points were recorded. However, high-level discussions primarily focused on growing concerns regarding ponded water at the disposal field, the associated attraction of wildlife near the flight path, and potential mitigation options.

Please note that the enclosed links will expire on 23 July 2025, 4:12 PM (UTC+12:00) Auckland, Wellington.

Right to review the above decision

Note that you have the right to seek an investigation and review by the Ombudsman of this decision. Information about this process is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

If you wish to discuss this decision with us, please contact Naell.Crosby-Roe@qldc.govt.nz (Stakeholder and Democracy Services Manager).

We trust the above information satisfactorily answers your request.

Kind regards,

[redacted]

Democracy Services Team
Corporate Services | Queenstown Lakes District Council
P: +64 3 441 0499
E: information.request@qldc.govt.nz

From: "Gavin Flynn" <gavin.flynn@qldc.govt.nz>
Sent: Mon, 28 Apr 2025 16:44:51 +1200
To: "Rebecca Macfarlane" <rebecca.macfarlane@qldc.govt.nz>; "Simon Mason" <simon.mason@qldc.govt.nz>; "elizabeth.franks" <elizabeth.franks@veolia.com>; "Alex Gorrie" <alex@aukaha.co.nz>; "Dean Whaanga" <dean@tami.maori.nz>; "Wayne Stiven" <wayne.stiven@queenstownairport.co.nz>; "Chris McSweeney" <Chris.McSweeney@orc.govt.nz>; "Casey Pilkington" <Casey.Pilkington@orc.govt.nz>; "Shelley Reed" <Shelley.Reed@orc.govt.nz>; "Andrew Hart" <andrew.hart@qldc.govt.nz>; "Brian Fitzpatrick" <b.fitzpatrick@remarkablespark.com>
Cc: "Iain Partington - External" <Iain.Partington@qldc.govt.nz>; "Andrew Hill" <andrew.hill@qldc.govt.nz>; "Dean Alsop" <dean.alsop@qldc.govt.nz>
Subject: April Shotover WWTP Reference Group Meeting Minutes + attachments
Attachments: Project Shotover Reference Group Meeting Minutes 250408.pdf, Shotover OMP Jan2025_V10.pdf, Shotover Stakeholder Reference Group - Status Update_250408.pdf

Kia ora koutou,

Thank you for your attendance at the recent meeting.

Please see the minutes and presentation from April's Shotover WWTP Reference Group meeting. In addition, the updated Shotover Wastewater Treatment Plant Odour Management Plan (January 2025) is also being circulated for reference and information.

If there are any questions from the above, please come back to me.

Ngā mihi nui,

Gavin Flynn | Senior Infrastructure Compliance Advisor Property & Infrastructure
Queenstown Lakes District Council
M: +64 021 704 332
E: gavin.flynn@qldc.govt.nz

QUEENSTOWN LAKES DISTRICT COUNCIL

Project Shotover Reference Group Meeting Minutes

Date:	22 October 2024
Time:	11am-12pm
Location:	Microsoft Teams

In Attendance:

Name	Organisation
Rebecca Macfarlane	QLDC
Andy Hart	QLDC
Ian Parrington	QLDC
Brian Fitzpatrick	RPL
Simon Mason	QLDC
Casey Pilkington	ORC
Elizabeth Franks	Veolia
Alex Gorrie	Aukaha
Shelley Reed	ORC

Apologies:

Name	Organisation
Dean Whaanga	TAMI
Chris McSweeney	ORC

Agenda Item		Who
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	

QUEENSTOWN LAKES DISTRICT COUNCIL

[redacted]	[redacted]	
[redacted]		

[redacted]

Shotover Wastewater Treatment Plant Odour Management Plan

January 2025

QUEENSTOWN LAKES DISTRICT COUNCIL

www.qldc.govt.nz

DOCUMENT CONTROL SHEET

Project	Shotover Wastewater Treatment Plant (Resource Consent RM13.215.01 Condition 2)
Report	Shotover Wastewater Treatment Plant Odour Management Plan
Date	January 2025
Document Reference:	

Version	Author	Reviewed	Signature	Date	Distribution
Draft v1	M. Heather/ S. Pile	R. Potts, S. Smith (CPG), R. Cudmore (Golder) & M. O'Malley (QLDC)		08/11/10	CPG, Golder Associates, QLDC and United Water
Draft v2	M. Heather (QLDC)/ S. Pile (VW)	ORC and SPL, RPL		10/11/10	Otago Regional Council, SPL and RPL
Working Version 10/11		N/A		25/01/11	QLDC and Otago Regional Council
Working Version 15 March 2012 Rev1	S. Smith (CPG)	R. Potts (CPG), M O' Malley		15/3/2012	SPL/ RPL
Working Version 15 March 2012 Rev2	M. Heather (QLDC)	-		21/5/2012	Otago Regional Council
Working Version 1 July 2015 Rev3	M. Heather (QLDC), R. Dawson (Downer)	L. Vermaas (QLDC), R. Potts (LEI), J. Crawford (Opus)			
Working Version 1 July 2015 Rev3.X		R. Cudmore (Golder)			
Final Rev4 August 2018	Jennifer McGirr (QLDC) David Wilson / Simon Mackenzie (Downer)	S J Smith (Envira), Rob Potts (LEI)			QLDC, Otago Regional Council, Reference Group (SPL, QA, PHS, TAMI)
Draft Rev 5 January 2020	Jen McGirr (QLDC) David Wilson (Downer)	Rob Potts (LEI)		13/03/2020	QLDC, Otago Regional Council, Shotover WWTP Reference Group

Final Rev 6 March 2020	Jen McGirr (QLDC) David Wilson (Downer)	Rob Potts (LEI)		27/03/2020	QLDC, Otago Regional Council, Shotover WWTP Reference Group
Updated QLDC contact details V7	Rebecca McLeod (QLDC)			28/02/2022	QLDC, ORC, Shotover WWTP Reference Group, Downer
Updated Downer contact details V8	Rebecca McLeod (QLDC)			14/02/2023	QLDC, ORC, Shotover WWTP Reference Group, Downer
Final Rev 9 February 2024	Rebecca Macfarlane (QLDC) Liz Franks (Veolia)	Liz Franks		29/02/2024	QLDC, ORC, Shotover WWTP Reference Group, Veolia
Final Rev 10- updated contact details January 2025	Rebecca Macfarlane (QLDC) Liz Franks (Veolia)	Liz Franks		8/01/2025	QLDC, ORC, Shotover WWTP Reference Group, Veolia

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1. Purpose of the Odour Management Plan

1.1 Consent Details

Queenstown Lakes District Council (QLDC) was granted a number of staged discharge permits by the Otago Regional Council (ORC) for the continued operation of the Shotover Wastewater Treatment Plant (WWTP) in June 2015.

The discharge permits that the WWTP is currently being operated within are as follows:

(a) Discharge permit RM13.215.01 permits the discharge of contaminants to air, and

(b) Discharge permit RM13.215.03.V2 permits the discharge of treated wastewater to land.

A summary of relevant details of both permits is shown in Table 1.

Table 1: Discharge Permits

Consent No.	Description	Issue Date	Expiry Date
RM13.215.01	To discharge contaminants to air for the purpose of operating the Queenstown wastewater treatment plant	5 June 2015	18 March 2044
RM13.215.03.V2	To discharge treated wastewater to land	5 June 2015	31 December 2031

Copies of both permits are included in Appendix A.

Condition 3 of Discharge Permit RM13.215.01 requires QLDC to prepare an Odour Management Plan (OMP). Condition 3 states the following:

"The consent holder shall adopt the best practicable options (BPO) to prevent or minimise odour discharges from the site. The BPOs shall be set out in an Odour Management Plan that is to be peer reviewed by a suitably qualified air quality specialist appointed in consultation with the Consent Authority.

The peer reviewed Odour Management Plan shall be provided to the consent authority and the reference group within 4 months of the first exercise of this consent for review and comment.

The Odour Management Plan shall include, but not be limited to:

(a) Details of the best practicable option(s) to prevent or minimise odour discharges from the site;

(b) A description of the potential sources of discharges of odour to air on the site;

(c) Methods adopted to minimise odour including, but not limited to, the operation and ventilation of the wastewater treatment system, and the storage and management of screenings and sludge;

(d) Method(s) for complying with conditions;

(e) Management and operational procedures and contingency plans to prevent or minimise odour;

(f) Decommissioning and construction odour management plan.

This is to be updated at least 3 months prior to the decommissioning of any of the existing wastewater management and disposal facilities at the site, or any significant upgrade works.

The plan shall include, but not be limited to:

i. A description of the proposed decommissioning or upgrade works;

ii. Proposed work schedule;

iii. An assessment of the likely odour effects of the work including, but not limited to, any temporary or permanent ponds, any screening or pre-treatment processes, any facilities for receipt of material other than through the sewage pipe network, any tanks and any processing facilities and ultimate disposal of treated wastewater and sludges (if on-site);

iv. Consideration of where dispersion modelling of odours is required to better understand the potential effects of odour emissions including consideration of katabatic winds;

v. Where upgrade works are proposed, identification of the best practicable options to control odours from each potential odour source taking into consideration the sensitivity of the receiving environment and risk of adverse effects;

vi. Consideration of alternative odour-minimising, decommissioning and construction methodologies and their respective odour generating potential;

vii. Management, of sludge from the ponds and channel;

viii. Proposed changes to the odour management plan; and

ix. Any other issues considered relevant by the consent holder.

(g) Management and operational procedures and contingency plans to minimise odour during the commissioning phases;

(h) Method(s) for recording and responding to complaints from the public;

(i) A description of the monitoring required to comply with the conditions of this consent;

(j) Assignment of responsibility for implementing and updating the odour management plan; and

(k) A plan showing the legal boundary of the Queenstown wastewater treatment and disposal system site. The consent holder shall ensure that the consent authority and the reference group have the most recent copy of the Odour Management Plan at all times."

1.2 Plan Objectives

The objectives of this OMP are:

- To ensure that the requirements of Condition 11 of discharge to air permit RM13.215.01 are met and adhered to.

  Condition 11 states that:

  "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 site boundary, in the opinion of an authorised officer of the consent authority. This shall include but not be limited to:

  a. Ensuring offensive or objectionable odour emissions from stored septage waste and primary screening facilities are treated via and appropriate odour treatment system to ensure compliance with condition 11;

  b. Ensuring that there are no objectionable odour emissions as a result of storage and/or handling of sludge generated from any wastewater treatment processes, including within the existing wastewater treatment ponds, to ensure compliance with condition 11;

  c. Ensuring that there are no objectionable odour emissions as a result of any disposal of effluent to land or as a result of any seepage of effluent ponding that may occur; and

  d. Condition 11 does not apply during a period of up to six weeks for the initial commissioning of the plant. The consent holder shall take all practical steps, as required in condition 3, to minimise odour during this period.

  e. Ensuring that there are no offensive or objectionable odour emissions as a result of any flow or load balancing or temporary storage of raw influent wastewater under any future upgrade."

- To set out the physical and procedural measures that must be implemented to mitigate odour to acceptable levels.

- To enable the Shotover WWTP to be operated and maintained in a manner which employs best practicable options to prevent the discharge of objectionable or offensive odours.

1.3 Review Provisions

QLDC will review the OMP once each year, as per Condition 4 of Resource Consent RM13.215.01.

There will be continued 6-monthly consultation with the Shotover WWTP 'Reference Group' regarding the annual OMP review as per Condition 9 of Resource Consent RM13.215.01. The Reference Group consists of key stakeholder representatives from Remarkables Park Limited (RPL)/Shotover Park Limited (SPL), Public Health South (PHS), Queenstown Airport (QA) and Te Ao Marama Incoporated (TAMI).

Lowe Environmental Impact Ltd (LEI) was confirmed by the ORC as a suitably qualified air quality specialist to peer review the OMP.

2. Description of the System

2.1 General

The Shotover WWTP provides wastewater servicing for wastewater generated within Queenstown (including Frankton), Arrowtown and Arthurs Point. The WWTP is located at Frankton Ladies Mile Highway, Queenstown. Access to the WWTP is off Tucker Beach Road on the northern side of Frankton Ladies Mile Highway. The legal boundary of the wastewater treatment and disposal site is in Figure 1 below.

Figure 1 : Legal Boundaries of the WWTP

2.2 Process Details

Downer New Zealand Limited (Downer) was awarded the contract to design, build and operate (for a period of 5 years) Stage 1 of the upgraded wastewater treatment facility in May 2015. The accepted design combines a new high rate treatment facility (a Modified Ludzac-Ettinger (MLE) nutrient reduction activated sludge plant with the existing pond based system allowing the capital investment to be aligned with the projected population growth and resource consent requirements. The system is illustrated in Figure 2.

The upgraded plant has been designed to treat an average daily flow of 9,960 m^3/day, with a typical flow split of 63% to the new activated sludge plant and 37% through the existing pond system.

The upgrade for the plant consists of the following key items:

- A grit removal system at the existing inlet works;
- Rotary drum screens in parallel;
- A distribution chamber at the existing inlet works to split flow between the ponds and the activated sludge plant;
- A new activated sludge reactor (approx. dimensions 83 m x 26 m x 6 m deep);
- A new 34 m diameter suction dredge clarifier;
- A new Ultraviolet (UV) disinfection plant;
- A new pump station to convey pond effluent into the UV plant for disinfection;
- A new sludge dewatering facility consisting of WAS holding tank, sludge pump systems, poly bins;
- A new septage reception facility and storage tank (following decommissioning of the previous septage pond system);
- Two pump stations to convey waste streams to the head of the works; one located adjacent to the dewatering plant and the other at the inlet works;
- A new odour treatment system which collects and neutralises foul odours generated by the dewatering process and septage reception facility;
- A new service (clean) water boosting pump station;
- A new treatment system and booster pumping station for recycled effluent used as process water around the facility;
- Modifications to the existing inlet works including; modifications to the odour management system to accommodate the new grit facility and MLE Distribution chamber, the addition of a second high pressure booster pump for the existing screens and the installation a carbon filtration system for the existing MCC room; and
- Overarching electrical, control and telemetry systems for the new plant.

A new land dispersal system was constructed during the latter part of 2018 and after a commissioning period the discharge to land under consent RM13.215.03.V2 formally commenced in January 2019.

The land dispersal system consists of a series of dispersal zones that have been installed below the ground surface, allowing the treated wastewater to drain through a layer of unsaturated silts, sands and gravels prior to discharge into groundwater closely associated with the Kawarau and Shotover Rivers.

The Downer's contract came to term, Veolia Water was awarded the contract in July 2023. Veolia Water are the current contractors who operate and maintain the wastewater treatment plant.

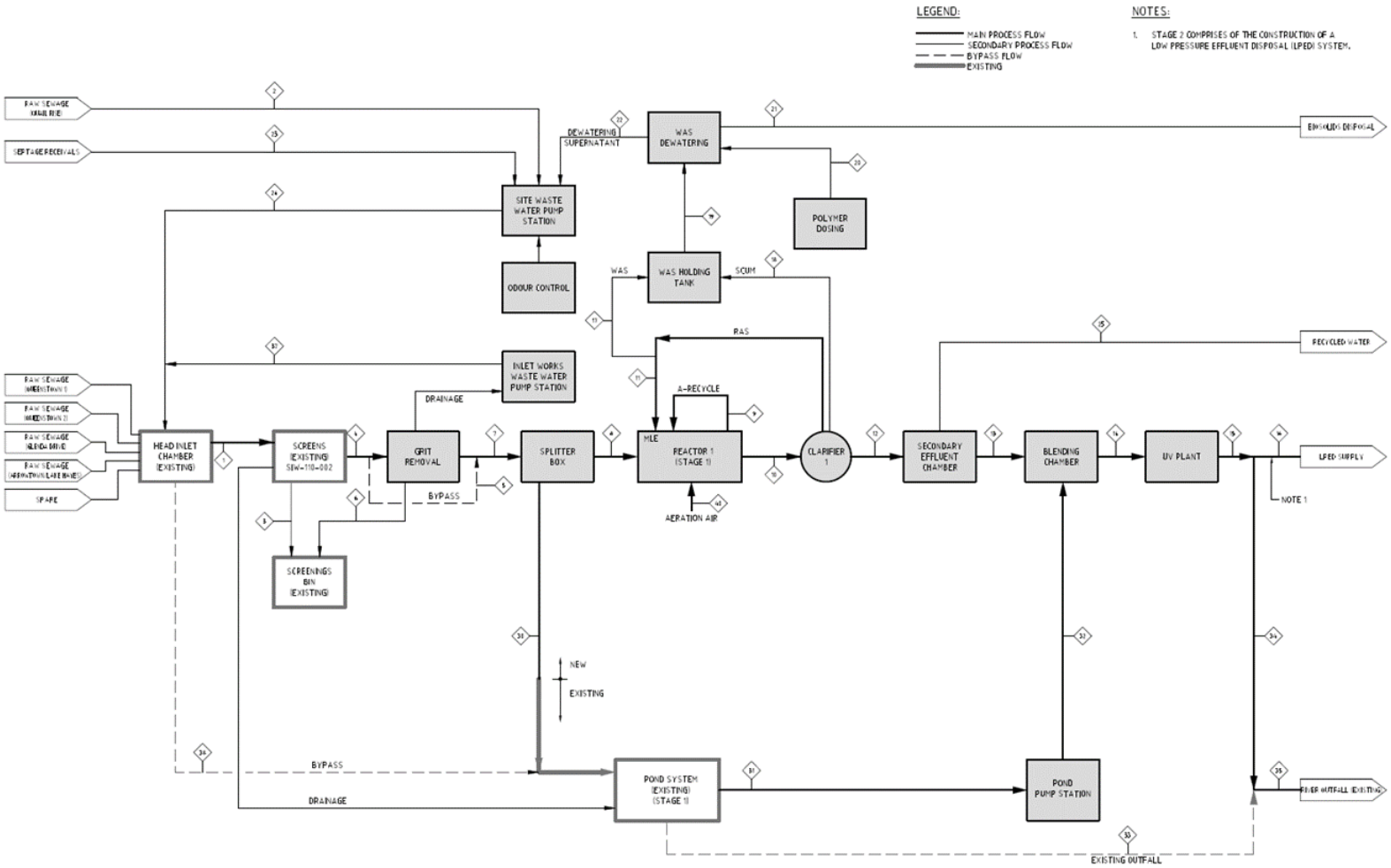


Figure 2 : Treatment System

3. Key Personnel

3.1 Contact Details

3.1.1 QLDC Staff

The contact details of key personnel responsible for implementing this plan are listed in Table 2:

Table 2: Contact List

Organisation	Name	Email	Phone	Cell
QLDC – Chief Engineer (Acting)	Simon Leary	simon.leary@qldc.govt.nz	(03) 450 9119	
QLDC – Infrastructure Operations Manager	Simon Mason	Simon.Mason@qldc.govt.nz	(03) 441 1785	027 643 1913
QLDC- Three Waters Contract Manager	Andy Hart	Andrew.hart @qldc.govt.nz	+6434410483	
QLDC- Three Waters Contracts Engineer	Jason Thorburn	Jason.thorburn@qldc.govt.nz	(03) 443 4792	027 410 0289
QLDC – Senior Compliance	Rebecca Macfarlane	rebecca.macfarlane@qldc.govt.nz	(03) 450 0328	027 323 6789
Veolia – Contracts Manager	Marcus Warren	Marcus.warren@veolia.com		021 506 063
Veolia – Wastewater Operator	Celeste Lado	maria.lado@veolia.com		027 463 3261
SJ Allen	Simon Spark	manager@sjallen.co.nz	(03) 688 5669	027 437 7087
Queenstown Engineering		info@queenstownengineering.co.nz	(03) 442 3036	
Pumptech	Steve Columbus			027 250 7874

For details of specific assigned responsibilities, please refer to **Section 3.2** of this Plan.

3.1.2 Otago Regional Council

Contact details for the ORC are shown in Table 3.

Table 3: Relevant ORC Contact Details

Organisation	Name	Address	Phone
Otago Regional Council	Pollution Hotline		After hours phone (pollution incidents): 0800 800 033

	Chris McSweeney (Environmental Officer)	Wanaka	027 281 2057

3.2 Specific Responsibilities

3.2.1 QLDC Management

The QLDC is the sole asset owner of the WWTP and has overall responsibility for ensuring staff are available, appropriately trained and funded. The QLDC's Consent and Compliance role within the Operations and Maintenance team is responsible for the following:

- Ensuring that Resource Consent conditions are adhered to;
- Ensuring that the OMP is reviewed annually and that TAMI, PHS, RPL, SPL and the ORC are consulted and provided with copies of any updates to the OMP, as required; and
- Notification to the ORC of any consent condition breaches.

3.2.2 Shotover Wastewater Operations and Maintenance Contractor (Veolia)

The Shotover Wastewater Operations and Maintenance Contractor (currently Veolia) is responsible for the following:

- Day to day responsibility for the management and maintenance of the wastewater treatment plant,
- Manage and control potential odour sources,
- Response to complaints.
- Making, recording and reporting regular measurements associated with treatment plant operations, including regular inspections and maintenance,
- Removal of screenings to landfill,
- Preventative maintenance and urgent repairs to ensure treatment performance of plant is not compromised,
- Maintain existing effluent discharge channels,
- Attend to Plant Emergencies and Call Out,
- Advise QLDC of any serious and concerning issues.

3.2.2 Shotover Wastewater Sludge Removal Contractor (SJ Allan)

The Shotover Wastewater Sludge Removal Contractor (currently SJ Allan) is responsible for the following:

- Supply and operate self-levelling bins; and
- Transport dewatered sludge to landfill.

4. Odour Sources

The following section describes the main potential sources of odour emission from the WWTP site.

1.1 *Inlet Works*

4.1.1 Process Details

The inlet works provides primary treatment to all flow entering the wastewater treatment plant. The inlet works are pictured in Figure 3.

The inlet works consists of the below sub-systems:

- Inlet flume;
- Rotary drum screens;
- Screenings Compactors;
- Grit Removal and Classification;
- Flow splitting; and
- Odour Treatment.

Figure 3 : Treatment Plant Inlet Works

Inlet Flume

Influent arrives at the Shotover WWTP via four pipelines from different areas of the reticulation network. These pipelines consist of 2 x 450 mm diameter lines from Queenstown / Frankton, 1 x 160 mm from Glenda Drive and 1 x 355 mm from Arrowtown. In addition to these flows, the activated sludge plant returns various waste streams from around the treatment plant to the inlet works via a separate 1 x 300 mm diameter connection. The largest contributor to this flow being the centrate from

the sludge dewatering process and the sewage from the Quail Rise subdivision which is plumbed into the site wastewater pump station.

Each pipeline into the inlet flume has a flow meter which is recorded on the PLC and recorded via the SCADA network. The flow meters record the instantaneous and totalised flow.

All five pipelines connect into a rectangular inlet flume; the flume has two outlets which are controlled via motorised isolating gate valves. The control of the gate valves is set via the PLC based on inflow and influent height within the flume. If the inflow is unable to pass through the screens the inlet trough includes a 75 0mm overflow pipe coming from the flume which discharges directly into Pond 1 (first of the facultative ponds).

Figure 4 : Inlet Flume

Rotary Drum Screens

Following the inlet flume, the influent goes through one of two rotary drum screens. The drum screens are Farra 1000P rotary milliscreens which operate on a duty /assist arrangement. The screens have recently been reconditioned. Each screen is able to process 420 L/sec of influent. If the inflow is greater than 420 L/sec the duty screen takes 75% of the inflow and the other screen the reminder.

Figure 5 : Inside one of the drum screens

The washing of the screens is an automatic process set on the PLC and can be adjusted by the operator. The cleaning /process water is divided into two flow types; high and low pressure. The water used for cleaning the screens is from the high pressure system, which has a pressure rating of 14 bars. The washing of the screen is not a continuous process and is based on time, which is set / controlled by the PLC as only one screen on either the inside or outside can be cleaned at a time. The maximum cleaning flow for the screen is 6.7 L/sec, but the flow is adjusted to meet the set pressure on the pumps. The high pressure water system is conveyed via two dry multistage vertical Lowara (SV3012F220) Pumps which operate in a duty/standby arrangement.

The low pressure process water is used for irrigating the bio-filter, washing down the screening compactor and the wash down hoses. The low pressure system is conveyed via two dry multistage vertical Lowara (5SV13F022T) pumps which operate on a duty / standby arrangement.

The cleaning / process water is supplied to the WWTP via a dual feed system. The primary supply is via a DN63 PE feed from the main plant reticulated recycled effluent supply and the backup supply is via a 50 mm water supply main which is drawn off the Queenstown reticulated water supply. The water is stored in two 30,000 L tanks that operate on a ballcock arrangement. The tanks also contain level floats which shut down the three process water pumps when set levels are triggered (high / low).

Screening Compactors

The screenings from the rotary screens drop down a chute into the corresponding screening compactors. The screening compactors are Huber WAP/2 screw wash type compactors, which have 2.2 kW motors. Each compactor has an electronic current shear pin relay. On detection of a current (stall /jam), the compactor motor is immediately stopped and then operated in reverse for a set period of time. If an over current is detected more than three times within five minutes, the compactor is locked out and fault alarm is generated. Following the compactors, the dewatered screenings drop

into a skip bin arrangement. Once the skip is full, the screenings are transported to landfill; this occurs normally once a week.

Figure 6 : Screening Compactors

The dewatering liquid from the screenings is discharged into the inlet works waste pump station, which returns the liquid into the inlet flume.

Grit Removal and Classification

The screened wastewater leaving the screens enters a Smith & Loveless Pista vortex grit removal system to remove sand, grit and other fine inorganic materials. The chamber is designed to induce a vortex in the flow of wastewater which encourages the inorganic material to settle to the bottom of the chamber.

The collected grit is then pumped through to a Smith & Loveless grit classifier where the grit is dewatered prior to being conveyed into the shared screenings bin. The water separated from the grit is conveyed by gravity through to the inlet works wastewater pump station from where it is returned to the inlet flume.

The pumping cycle occurs on a timer set by the operator from the PLC. The grit laden water from the grit chamber passes through the cyclone concentrator on the inlet to the classifier. After a set duration the pump is stopped and the water allowed to settle within the classifier for another set duration. Following settlement, the drain valve is opened and the supernatant drained away; the dewatered grit is then conveyed out of the classifier.

The git system is designed to process up to 525 L/s of screened wastewater.

Flow Splitting

The screened and de-gritted wastewater is conveyed into the MLE Distribution Chamber which divides the flow between the activated sludge treatment stream and the pond based system. The distribution chamber is designed to accommodate a second future MLE process train and as such includes two primary flow paths; one with an actuated downward opening penstock gate (to the current MLE train) and one with a manually operated downward opening penstock gate (for the future process train). The chamber also includes a high level overflow from the main chamber which directs the influent to the pond.

At this stage, while there is only a single activated sludge process train, the second chamber (referred to as the MLE 2 gate) with the passive gate is connected via a third penstock to the overflow channel allowing this flow to be directed to the pond system. The chamber is set up for a nominal flow split of 63% to the activated sludge process and 37% to the pond system. This flow split is achieved by a castellation in the MLE 2 gate decreasing the weir length in comparison to the MLE 1 gate. The flow split can be altered by adjusting the normal position of either the MLE 1 or MLE 2 gates. In addition to this, the PLC will automatically adjust the height of the actuated MLE 1 penstock to prevent the inflow rate exceeding an operator defined value (recommended value of 215 L/s).

Inlet Works Pump Station

The Inlet Works Pump Station comprises of a GRP wet well, duty/standby submersible pumps (9 kW Sulzer) and above ground valves. The inlet works pump station collects waste flows from the following locations:

- Contaminated wash water from the screenings compactors;
- Contaminated wash water from the grit classifier;
- Biofilter leachate; and
- Drains from the inlet works area.

Each pump line has a DN100 non-return valve and manual isolation valve. The DN100 lines are coupled and pass through a common flow meter, prior to joining with the DN180 Site Wastewater rising main and discharging into the screen's inlet channel.

The pumps are designed to deliver up to 24 L/s each.

Figure 7 : Inlet Works Pump Station

4.1.2 Potential Odour Sources

Potential odour generation occurs from two locations in this area:

- The Inlet works structure, including screens, grit removal and screening compactor; and
- The Inlet works pump station.

The odour emission risk from the inlet works component of the treatment system is moderate but the odour generation is high. Incoming sewage to the plant can be anoxic or anaerobic on arrival. When exposed to air and turbulence, sulphides and other odorous compounds can be released.

Odour generation cannot be directly controlled by any measures taken at the inlet works. Odour emissions are entirely due to the nature of the incoming sewage, so measures to contain and treat these odour emissions are necessary.

Factors influencing odour generation include:

- Total residence time and temperature of wastewater in the sewerage reticulation system; and
- Turbulence at the inlet structure, which creates conditions suitable for odours to escape.

The influent flume, screen, screen compactors, grit removal system, and inlet work pump station are connected to the odour treatment system so the risk of odour emission is low but the screenings are

collected and stored in a open skip bin at the inlet works. Once the skip is full, a cover is placed over the skip that is then removed from the premises and taken to the QLDC Victoria Flats municipal landfill by a contractor once per week. This is monitored closely and if necessary, the screenings are removed more often. If this part of the process is not monitored closely, there is risk of odour emission.

4.2 Pond Treatment System

4.2.1 Process Details

Facultative Ponds (Ponds' 1 & 2)

The facultative ponds are compacted silt lined ponds with concrete wave bands which are approximately 1.35 m in depth. Pond 1 has an area of 5.5 Ha and Pond 2 has an area of 3.9 Ha. Both ponds were desludged in November 2012.

Both of the facultative ponds have mechanical aerators to add additional oxygen to the ponds to assist in the breakdown of the organic matter. Pond 1 has seven Tornado 3 kW horizontal mixing aerators with subsurface propellers which are mounted on floating platforms and four fixed position 3 kW caged rotor aerators. Pond 2 has five Tornado 3 kW horizontal mixing aerators with subsurface propellers which are mounted on floating platforms and three fixed position 3 kW caged rotor aerators.

Figure 8 : View to the East at the division between Pond 1 and Pond 2

Based on oxidation ponds being able to process on average 84 kg/Ha/day of organic loading and the Shotover facultative pond system being 9.4 Ha in size, the Shotover facultative ponds are able to

process on average an organic loading of 790 kg/day or the loading from 11,300 people before aeration. The ponds have 18 x 3 kW of mechanical aerators, which theoretically produce 1 kg/hr of oxygen per kW, therefore the 18 aerators could produce up to 1,296 kg/day of oxygen. Therefore, the Shotover facultative ponds should have capability to process approximately 2,092 kg/day of organic loading or the loading from 30,000 people. Please note actual oxygen transfer of pond aeration can be substantially less than the theoretical values, meaning the actual treatment capacity of the pond system is likely to be lower than stated above.

The outlets from both ponds are weirs contained in a concrete structure which have adjustable boards for altering the pond level. Periodically the boards in the weirs need to be cleaned which can be performed from the access platform without requiring access into the structure.

Maturation Pond (Pond 3)

Following the facultative ponds, the effluent is polished in a single 6.5 Ha maturation pond which has a depth of 1.5 m. The pond contains a rock groyne which is used to direct the flow, increasing the retention time in the pond. The maturation pond is used to reduce faecal coliform levels via treatment from the sun light and the retention time allows algae passed over from the facultative ponds to settle out before being blended with activated sludge plant effluent and pumped through the UV disinfection system and on to land dispersal..

Pond Pump Station

The Pond Pump Station is designed to lift effluent from the maturation pond (Pond 3) to the blend chamber at the head of the UV channel.

The inlet to the pond pump station comprises of a concrete headwall and two DN450 stainless steel pipes. Each inlet pipe is open to the atmosphere, while the downward facing intakes are located approximately 550 mm above the floor of the pond to limit the amount of sludge or solids drawn into the pump station. The vertical pipes to atmosphere serve as baffles to prevent the top 500 mm of algae rich water being drawn into the pump station. An isolation valve has been placed on both DN450 pipe lines entering the pump station.

The pump station comprises of two 22 kW Sulzer pumps operating in a duty/assist configuration. The pump station is capable of conveying up to 240 L/s to the UV channel. Each pump discharges into a DN300 stainless steel line with a non-return valve and manual isolation valve. These lines are then coupled into a DN400 line and pass through a single flow meter prior to entering the UV blend chamber.

4.2.2 Potential Odour Sources

Potential odour emissions can be generated from the pond system via the following:

Mechanical Aeration

The physical process of aeration can generate aerosols, which have odours associated with them.

"Turn-over" Event

A "turn-over" event occurs when excessive sludge build up within the ponds coincides with warmer air temperatures (which occur during late spring/summer), which encourages increased microbial activity. Anaerobic gas production within the sludge layer encourages it to float to the surface, which results in odorous sludge being directly exposed to air.

The most recent "turn-over" event recorded for the WWTP pond system was in 2003. The ponds were desludged in April 2012. This should eliminate this risk in the short to medium term.

Biological Process Upsets

Biological process upsets within the ponds can be brought on by:

- Overloading of the ponds' organic capacity. Overloads lead to excessive oxygen demand, which result in anoxic pond conditions;
- Algal population die-off due to a parasitic fungal attack;
- Following an algal bloom event; and
- A slowdown in algal activity, due to lack of sunlight and oxygen in the pond.

It is worth noting that turn-over of the ponds does not necessarily mean they are at capacity, but is rather an indication that they may need to be de-sludged.

4.3 Septage Reception System

4.3.1 Process Details

Figure 9 : Septage reception tank

The septage receival facility consists of a 100 cubic metre tank with discharge to the site pump station and has a proprietary septage rock trap, macerator, pump and flow meter. The storage tank is fitted with a mixing pump to ensure that any solids that are remaining are kept in suspension and not allowed to settle.

Inlet Arrangement

The septage trucks couple to the tank at a male camlock fitting on the inlet to the rock trap. The rock trap is designed to capture heavy debris. The collected material is dumped manually by actuating the valve beneath the rock trap, into a basket. The truck driver is responsible for emptying the rock trap at the completion of each discharge, and should also check the trap is empty (and the valve shut) prior to making a discharge.

The inlet arrangement consists of the following equipment:

- Rock trap; a 100 Litre vessel with a lockable lid and a bottom exit maintenance discharge valve. The maintenance valve allows the contents within the bottom of the rock trap to be dropped into a sump that can be emptied by a spade as required and washed out into the drainage system.
- A motorised isolation valve that closes when not activated by the tanker operator, via swipe card, or if the septage tank, odour system or any equipment along the receival line is not available.
- Macerator; a Xylem Honey Monster grinder has been provided to normalise the liquid grease and other components by breaking up the clumps into an easy to pump slurry.
- Septage inlet pump is an inline pump that transfers the septage through the system and into the storage tank. This has a large throat to reduce blockages and can handle changes in speed as the contents from the septage tanker vary or get caught up within the grinder. The pump is a dry mounted sewage pump with a maximum capacity of 20 L/s.

Access to the system is via a swipe card system. Upon swiping a legitimate card, the actuated valve will open, the macerator will start and the inlet pump will also start. At this point the flow meter will commence logging such that a disposal record can be created against the card ID.

Tank Washing

The facility includes a washing system to allow the tank walls to be washed down, to prevent the buildup of fats and grease. The spray sparges are installed around the perimeter of the tank. The system is manually initiated by the operator.

Septage Discharge

The septage discharge pump transfers septage to the site waste pump station, allowing the fluids to get mixed with site wastes prior to transferring to upstream of the inlet screens. The Septage return pump is a positive displacement pump to assist with keeping a constant flow rate of 2 L/s being pumped from the septage tank.

Tank Mixing

The system includes a mixing pump to keep the solids in suspension and therefore avoid settlement and build up in the tank. The pump is identical to the septage inlet pump to aid with commonality of spare parts.

4.3.2 Potential Odour Discharge

The risk of odour emissions from this component of the treatment plant is very low due to the system being a sealed unit and odorous gases being extracted via fans to the MLE Odour treatment system, but the risk of odour generation is high.

The odour generation from the septage system is from the anaerobic nature of the material brought in from septage trucks. If this anaerobic influent is mixed with an air source, it can release sulphides and other odorous compounds. There is no way of preventing odour from this influent source but there are steps in place to mitigate the odour through the treatment system.

4.4 *MLE Reactor*

4.4.1 Process Details

The Activated Sludge treatment stream utilises the Modified Ludzack-Ettinger (MLE) process. The main reactor consists of the following zones:

- Three Pre-Anoxic Zones – 6.94 x 4.65 m, average depth approximately 5.6 m, each with a dedicated mixer;
- Anoxic Zone – 22.5 x 21.42 m, average depth approximately 5.6 , with two mixers;
- Swing Zone – 12.58 x 21.42 m, average depth approximately 5.54 m, with two mixers and an aeration grid;
- Aeration Zone – 40.13 x 21.42 m, average depth approximately 5.54 m, with two aeration grids.

MLE receives screened sewage into the Pre-Anoxic Zone 1 and return activated sludge (RAS) from the Clarifier, with the two streams perpendicular to each other to promote mixing. The exit from each Pre-Anoxic zone has a 900 x 900 mm undershot port which transmits approximately 80% of the flow, with the remaining portion passing over a 2m wide drowned overflow. The A-Recycle discharges in front of the undershot port from Pre-Anoxic Zone 3, again to promote mixing of the two streams. Approximately 83% of the flow from the Anoxic Zone discharges through a 1.7 x 1.7 m undershot port in the diametrically opposed corner, and the remaining portion passes over a 6 m wide drowned overflow above. There is a similar undershot and overflow arrangement between the Swing Zone and the Aeration Zone.

Mixed liquor flows over the outlet weir and is transferred to the clarifier via a DN900 pipeline.

Figure 10: View across MLE reactor tank, viewed from anoxic zones

Mixing System

Each of the three pre-anoxic zones includes a single 1.2 kW compact Grundfos mixer. The main anoxic zone includes two 5.6 kW 'flow maker' style Grundfos mixers and the swing zone mixer includes two 2.5 kW 'flow maker; style Grundfos mixers.

A boxed spare is held on site for each of the three mixer types utilised in the plant. The installed davits allow the mixers to be removed from the process whilst keeping the plant in operation.

Aeration System

Process air is provided by four 55 kW Longtech rotary lobe blowers, configured in a duty/assist/assist/standby configuration. The blowers are designed to produce up to 34 m^3/min at 650 mbar and 20 degC. The anticipated maximum demand is 5,306 m^3hr.

Figure 11: MLE Reactor aeration zones

A-Recycle Pump

A partially buried DN900 HDPE pipe carries flow from below the outlet weir to the A-Recycle Chamber; the volume of the A-Recycle chamber allows the mixed liquor to de-bubble before the low-head axial flow pump forwards the flow to the Anoxic Zone. The volume of the A-Recycle line allows the flow to de-aerate before it reaches the Anoxic Zone. A strap on flowmeter allows the A-Recycle flow to be monitored, without the need for isolation valves associated with an inline magnetic flowmeter.

The A-Recycle pump is designed for a maximum capacity of 750 L/s.

4.4.2 Potential Odour Sources

The risk of odour emission and generation at the MLE reactor is low as the reactor is aerated via blowers and mixers and the DO concentrations are closely monitored. In addition, there are redundancies of the blowers and mixers, so mechanical failure of individual components will not affect the performance of the system.

With the reactor being open to the atmosphere, potential odour can be emulated at the MLE, if the mixed liquor / activated sludge turns anaerobic. There are two possible events which could cause this situation:

- Full mechanical failure of the blower system; or
- The Suspended Solids loading of the reactor (MLSS) is greater than design loading of the reactor meaning that the oxygen demand is greater than the blowers capacity.

4.5 *Clarifier*

4.5.1 Process Details

Clarifier Mechanism

The Clarifier is 34 m in diameter, 5 m side wall depth, and equipped with a syphon lift RAS withdrawal system.

The clarifier includes the following equipment:

- Suction Arm Sludge Collector tapered from approx. 600 mm diameter to 100 mm at the end of the arm;
- Centre column;
- Energy Dissipation Well;
- Flocculation Well;
- 1 1/3 radius Bridge including:
- Neoprene scraper blades;
- Scum skimmer;
- Launder spray wash pump and launder trough spray nozzle system;
- Bearing cradle and bearing;
- Drive trolley assembly;
- Launder components include:
- Stamford sludge density baffles;
- Scum baffle;
- 'Dry beach' scum box actuated by bridge striker arm;
- Adjustable weir plates; and
- Sludge Blanket meter.

The clarifier has been designed for an average flow rate of 6,902 m^3/d and a peak wet weather flow of 17,651 m^3/d. The design maximum MLSS is 4,000 mg/L and SSVI of 112 mL/g.

Figure 12 : Clarifier tank with RAS pump station in the foreground

Scum System

Scum on the clarifier surface is carried to the scum box by the scum skimmer. The scum box opens when the bridge and skimmer passes and the Scum Pump delivers scum to the waste activated sludge (WAS) Holding Tank. Scum may be diverted back to the MLE reactor if not of a filamentous nature, reducing the water content of the WAS to centrifuge. Selection of return route is manually selected by the operator depending on the nature of the scum.

The scum system includes the following equipment:

Scum beach box, approx. 900 L withdrawal per revolution;

Scum tank, open top with storage volume of ~1000 L; and

Progressive cavity screw scum pump.

The scum return pump transfers scum to either the WAS tank or the MLE tank. Selection of discharge point is manually determined (by the operator) by opening/closing the respective isolation valves on each of the discharge points. Typically the scum will be returned to the MLE, however, in the event the scum becomes of a filamentous or excessive nature it would be beneficial to remove the scum from the process via the dewatering plant.

The Scum return pump is a Mono progressive cavity positive displacement pump with a design flow rate of 2 L/s. This will pump out each scum discharge within 8 minutes. Due to the nature of the fluid pumped, the pipe size is ~100 mm ID to prevent blockages and for easy maintenance.

Figure 13 : Scum Pump Station

Return Activated Sludge (RAS) System

The RAS Pumps return mixed liquor from the Clarifier syphon withdrawal system back to Pre-Anoxic Zone 1 of the Bioreactor. WAS is split from the RAS line and directed to the WAS Holding Tank (refer Section 6.5).

There are two RAS Pumps, which operate in a duty/standby configuration. The pumps are Sulzer dry mount centrifugal pumps fitted with VSDs. Maximum design capacity of the pumps is 210 L/s and 56 L/s at minimum speed.

Flow detection is provided by the RAS Flowmeter at the pump station, as only a single pump operates at a time. Part of the RAS flow is split as WAS and directed to the WAS Holding Tank.

Figure 14 : RAS Pump Station

4.5.2 Potential Odour Sources

The risk of odour emission and generation from the clarifier is very low as the odour producing sludge settles to the bottom of the clarifier leaving treated aerated effluent above preventing odour emission from the sludge. There are two possible events which can cause odour generation from the clarifier and these are as follows:

- Mechanical failure of scrum removal and excessive build-up of scum of the top of the clarifier which starts break down aerobically and anaerobically; or
- Clarifier turning over / flipping - this can be caused by failure of the WAS / RAS system or excessive sludge age and sludge burn out and filamentous bacteria forming.

4.6 *Waste Activated Sludge System (WAS)*

4.6.1 Process Details

Part of the RAS flow is split as WAS and directed to the WAS Holding Tank. The WAS flow rate and volume is controlled by a WAS line actuated valve and a RAS line actuated valve, with measurement by the WAS Flowmeter and RAS Flowmeters. The system wastes each day to achieve a daily volume set by the operators via the PLC. When the system is asked to waste, the WAS actuated valve opens and the RAS control valve restricts to a set position to encourage flow to the WAS tank.

WAS Holding Tank

The WAS tank is a glass coated steel tank with a top water depth of 5.3 m, giving a working volume of 100 m^3. The tank is intended as a holding tank to keep a store of WAS to allow for continuous WAS processing.

The WAS Tank comprises of the following equipment:

- 100 m^3 working volume open top glass coated steel tank;
- Coarse air aeration supplied via a rotary lobe Robuschi Robox blower to provide air for mixing and odour minimisation;
- Dual level instrumentation utilising pressure transmitters installed at the base of the tank acting as a master/slave arrangement linked to centrifuge run signal, WAS operation and WAS tank air mixing controls;
- Inlet pipes for WAS 1, WAS 2, scum and aeration;
- Overflow pipe which discharges to the site waste water pump station;
- Drain to empty the tank. Note that the WAS pumps are intended to be used to drop the level in the tank to minimum prior to draining through the site waste pump station.

The WAS tank is installed with two man ways on the side wall to provide access once empty. A permanent access ladder is also provided for access to the top of the tank.

Figure 15 : WAS tank

WAS Pumping Station

The WAS pump station comprises of the following:

- Duty and standby progressive cavity pumps that feed the dewatering centrifuges. Pumps are operated with VSD and have a maximum flow rate of 20 L/s;
- Sludge solids meter inline to monitor and control solids and polymer dose; and
- Pipework valves and fittings to enable either of the pumps to pump to either of the two centrifuges.

Figure 16 : WAS Pump Station

Decanter Centrifuges

Sludge is pumped from the WAS feed pump station into either GEA centrifuge unit. As the sludge pipework enters the dewatering building, polymer is dosed into either of two locations along the pipework; one located just inside the building, and the second just prior to the WAS entering the centrifuge feed chamber (normal dosing point). This provides operators with the ability to select the most suitable dosing point for the polymer depending on the sludge quality. Each polymer dosing point has its own manual isolation valve.

As the sludge enters the centrifuge feed chamber through a central pipe, the denser solids settle against the bowl wall under the influence of the centrifugal force implied on it by the rotating bowls of the centrifuge. The lighter liquid is clarified from the bowl by flowing to the liquid discharge port via an adjustable weir, which determines the clarifier pool depth. Solids deposited on the bowl wall are transported towards the conical end of the bowl by the internal conveyor scroll to the discharge ports.

On completion of a dewatering run, the centrifuges automatically run through a flushing process where recycled effluent is run through the machine for a set period. The purpose of this is to completely clean the centrifuge bowl allowing the machine to start up under minimum loading next time around, as well as avoiding blockages. The equipment also includes a secondary flush into the solids discharge chute. On completion of a processing run, and once the torque figure reduces to a set value through the flush phase, the slide gate on the solids chute closes and recycled effluent is flushed into the chute (flush water drains to the site waste pump station).

The centrate produced by the process is drained under gravity to the site waste pump station.

A fixed gantry is provided to allow the components of any centrifuges to be lifted out of the dewatering building. Good access is provided below the mezzanine floor for maintenance of screw conveyors and polymer systems.

Tools unique to the centrifuges are mounted on the wall of the mezzanine floor.

A lift out mezzanine floor panel has been allowed for so the centrifuge scroll and bowl, motors and components can be lowered onto a trolley on the ground level. This is placed directly in front of a double access door on the ground level.

The centrifuges are designed to process at a rate of up to 550 kg/hr, with a feed solid of 0.8%.

Sludge Conveyors & Self Levelling Bins

A series of three shaftless screw conveyors, conveys the dewatered sludge from the dewatering building into one of two self levelling bins.

The first conveyor sits directly beneath the centrifuges, and draws the solids centrally from where they drop onto the second inclined conveyor. To achieve the central draw off point, the drive motor is by-directional and the direction of rotation is selected to suit the centrifuge in operation.

The final conveyor is a horizontal conveyor located at high level above the bins. The conveyor includes two discharge points connecting to each of the bins. The first discharge port includes a pneumatically actuated slide gate, and the second is an open discharge (such that in the event of a failure of the first gate the sludge will always have a path to discharge, so as avoid equipment damage).

The conveyors are designed with a volumetric capacity of 12 m^3/hr.

The two bins are fully enclosed and provide plugged connections for the power and instrumentation on board. The bin slab includes guides to aid with lining up the connection points with the conveyor discharge. The connection to the bins from the conveyors is pneumatically actuated such that it can be lifted/dropped without the operator having to climb onto the bin. The bins each have a capacity of 12.5 m^3.

When the bins are full, the dewatered sludge is removed from site by QLDC sludge removal contractor SJ Allan and transported for disposal to Landfill.

Figure 17 : Sludge conveyors and bins

4.6.2 Potential Odour Sources

The risk of odour emission from the WAS system is low due to all of the mitigation measure in-place, such as the WAS storage tank being fully enclosed and connected to an odour treatment system but the risk of odour generation is high due to nature of the sludge.

The WAS from settled sludge at the bottom of the clarifier is drawn off at a controlled rate for disposal. The sludge by nature and can easily become anaerobic if left without an oxygen source for an extended time. The mostly likely cause of this scenario would be a failure of the WAS / RAS pumping system.

The dewatering / centrifuging of the sludge agitates the sludge and introduces air to the sludge thus generating an odour. This cannot be eliminated but is mitigated by being housed in a sealed building with an extraction system which discharges to the MLE odour treatment system

4.7 *Site Wastewater Pump Station*

The Site Wastewater Pump Station comprises of a GRP wet well, duty/standby submersible pumps (16 kW Sulzer) and above ground valves. The site waste pump station collects waste flows from the following locations:

- Overflow and drain from the WAS Tank and pump station;
- Centrate from the Dewatering Building;
- Contaminated floor drains from the Dewatering Building and sludge cake skip area;
- Condensate from the odour control system;
- Overflow and drains from the Septage facility;

- Pumped septage flows;
- Sewage from the Administration Building; and
- Quail Rise subdivision wastewater.

Each pump line has a DN200 non-return valve and manual isolation valve. The DN200 lines are coupled and pass through a common flow meter, prior joining with the DN225 Site Wastewater rising main and discharging into the screens inlet channel.

The pumps are designed to deliver up to 54 L/s each.

Figure 18 : Site Wastewater Pump Station

4.7.1 Potential Odour Sources

The risk of odour emissions from this component of the treatment system is low due to the pump station being enclosed and connected to the MLE odour treatment system. The odour generation risk is high due to the nature of the waste streams being discharged to the pump station with most being anaerobic and these include the centrate from the sludge dewatering, influent from Quail Rise Subdivision and the waste from the septage system.

5. Odour Prevention & Minimisation Measures

The operating and preventative measures to be implemented at the WWTP to minimise odour generation are detailed in this section.

Several assets and odour mitigation equipment are used on the WWTP site and these are listed in Project Shotover WWTP O&M Manual.

5.1 Personnel

Ensure appropriately trained staff:

- Are available 24 hours per day, 7 days per week to respond to plant malfunctions and odour complaints;
- Are competent and knowledgeable about all aspects of the operation and maintenance of the treatment plant and processes;
- Continually review the performance of the wastewater treatment plant and understand how to respond to changes in the sampling results, effluent quality and/or levels of odour generated from the site;
- Are trained to operate the WWTP SCADA system which sends alarms out of any faults, allows remote viewing and operation; and
- Staff are trained to perform laboratory testing of the influent and effluent.

5.1.1 House Keeping Measures

To minimise fugitive odour sources from around the site, personnel should:

- Keep the plant and surrounding area clean and free from rubbish;
- Ensure collected screenings and grease is stored in an appropriate, covered container and removed to landfill at least once per week. The collected screenings are to be monitored and, if necessary, the screenings removed more often;
- Endure all surfaces where spillage can occur is washed down daily;
- Check all processes and system daily; and
- Manually clean the clarifier decanting trough and ensure it is free of algae growth.

5.2 Inlet Works

5.2.2 Screen Cleaning & Maintenance

- Ensure the screen is cleaned periodically (at least once per month) with high pressure water to remove accumulated solids and debris. Refer to the Shotover Ponds O&M Manual for details on cleaning the interior and exterior of each screen.
- A high pressure pump is housed in a shed next to the Milliscreen Room, to supply washwater for cleaning the Milliscreen drums.
- Isolate the interior and exterior sparge isolation valves, to prevent any high pressure water spray occurring whilst cleaning the screens.
- Using a soft edge spade or paddle scrape or cut through rag build up and scoop to the discharge hopper.
- Use a stiff bristled plastic yard broom to broom the screen clean.

- Do not use hard metal implements that could become stuck or damage the screen webs.
- After exiting the drum, close all doors and reopen all switches and valves in reverse order.
- Operate screen for several revolutions and manually activate a sparge cleaning cycle.
- Carry out Programmed Maintenance (PM) as per the Project Shotover WW O&M Manual and summarised in **Appendix B**, with monthly inspections and maintenance on the rotary mill screen, valves and screen chain.
- All screenings (accumulated material) are to be removed into a skip bin for removal by the contractor to the QLDC municipal landfill.

5.3 Inlet Works Odour Treatment System

The inlet flume, screen and screening compactors are sealed units which don't let odour escape from the system, therefore these process require an odour control system to extract the odour from the units. The odour control system consists of two air blowers which operate on a duty standby arrangement. The two fans have variable speed drives and have a common flowmeter and separate pressure transducers. The operation of the two fans is controlled by the PLC. The air blower forces the contaminated air through a bio-filter bed which consists of bark chip and other organic media.

To operate optimally, the bio-filter moisture content needs to be maintained around 60%. To achieve this, incoming air needs to be artificially wetted using the pre-humidification system. The bio-filter bed also has an irrigation system which operates on a timer.

Figure 19 : Bio-filter

Each extraction point is fitted with a damper to balance the flows from each point. The design flow rates from each point are listed below (to provide 8 air changes per hour):

Screens – 150 m^3/hr (each screen)

Inlet Trough – 60 m^3/hr

Grit Chamber – 220 m^3/hr

MLE Distribution Chamber – 195 m^3/hr

Process Overview

The objective of this process unit is to assist with managing odour which is generated from the inlet works area.

Air is extracted from the inlet works, with each source including a manual butterfly valve for fine-tuning extraction rates. A duty and standby odour fan are provided for air extraction to the bio filter.

The biofilter includes the following:

- Spray system for humidification;
- Bark bed for odour removal; and
- Irrigation system to maintain the moisture levels in the bark bed during summer.

Process Importance and Interrelationships

The following problems can arise if the odour control process is not efficient:

- Increased odour levels from the various unit operations; and
- Odour complaints from neighbouring residents.

Operational Parameters

Operational parameters for the unit process are listed in the Table 4 below. The parameters are utilised for the control of the odour control fans.

Table 4 Inlet Works Odour System Operational Parameters

Parameter	Units	Range	Target/Set point
Biofilter			
Odour control discharge flow rate (measured via 01-FIT-363)	L/s	0 - 750	375

Monitoring

The following items, listed in the Table 5 below, are to be monitored to ensure efficient operation of the process unit.

Table 5: Inlet Works Odour System Monitoring Requirements

Parameter/Condition	Possible cause	Possible solutions
'High' discharge pressure alarms	Causes include - Associated discharge valves for each fan are closed or the bark within the bark bed has deteriorated to the extent that excessive head loss is resulting through the media.	Check valve positions and open 'closed' valves. Reset fault alarms. Manually start the associated fan via HMI. If pressure fault alarms are still present then manually isolate fan If bark has deteriorated then a sample of the bed will need to be analysed and the bed needs to be replaced.
Elevated noise levels from the fan room	Excessive resistance in the system is causing the fans to operate at elevated speeds Fan bearings are faulty	Check discharge pressure from fans and review fan speed. If fan speed is excessive then locally isolate and adjust accordingly. If bearings are faulty then fan will need to be serviced – contact maintenance contractor
Biofilter under drain low pH . (pH < 6.7) and Media pH. Check this quarterly.	Low under drain pH resulting from excessive rotting of the media producing acetic and other organic acids. or Loss of alkalinity buffer Ideal pH is neutral or higher.	Inspect the media. If there is standing water or what appears to be significant quantities of 'puggy' soil, then the media is to be replaced. If the media seems OK, then it will probably be necessary to apply and mix in some supplementary alkalinity. A small amount of sodium bicarbonate or lime can be used short term but long term, crushed sea shell is more appropriate, at about 5% by media volume.
Media moisture content – dry. (< 40% moisture content)	Media has dried out due to: Surface irrigation not working,	Check and remove any nozzle blockages.

Parameter/Condition	Possible cause	Possible solutions
Check this daily (moisture probe within bed – calibrated 6-monthly)	or Irrigation insufficient to dampen lower media levels	Adjust irrigation timer at PLC. Turn on and adjust the pre-humidifier nozzle in the foul air feed line just upstream of the Biofilter inlet.
Media moisture content - wet (>80% moisture content) Check this daily (moisture probe within bed – calibrated 6-monthly)	Media moisture content is too high and inhibits biomass growth or oxygen transfer.	Reduce irrigation frequency and or duration at PLC.

5.4 Oxidation Ponds

5.4.1 Operating procedures

The aeration of the ponds is undertaken with mechanical surface or sub-surface aeration equipment. Minimum aeration capacity is indicated by electrical power inputs for aeration within the order of 3 watts/m^3. Maintaining the ongoing and continuous aeration within this range is necessary to assist the natural algal population to maintain adequate DO within the water column in the order of 2 mg/L as normal day time operating level. This level reduces close to zero at night time when the algae expire CO_2 and consume oxygen. Therefore, monitoring of DO levels within the pond discharge should be at similar times of the late morning or early afternoon. To ensure routine reliable operation the following measures are required:

- Ensure the aerators are operating correctly on a daily basis and remedy if there is a fault.
- On a weekly basis check the aerators for excessive cavitation, vibration and damage, and remedy as per the Project Shotover WW O&M Manual.
- Carry out monthly planned maintenance on the aerators.
- During the winter months, inspect the caged rotor aerators for ice build-up that may sink, jam or off balance them.
- Undertake weekly monitoring of DO that discharges to the maturation pond and daily during peak summer months of November to February.
- Inspect ponds on a daily basis for any floating scum and debris and remove any that is found. Scum accumulation can interrupt sunlight penetration which the algae need to produce oxygen. Also check for pest damage or erosion to banks.
- Analyse effluent from final Maturation pond.
- Monitor pond levels closely during high rainfall events. The stop logs controlling the flow of water between ponds and at the outlet to Pond 3 often have to be altered in order to drop the levels of the ponds when high rainfall events can increase the potential for ponds overflowing.

- Check effluent quality results are within ranges specified within WWTP operating configuration, and if not, the operations and maintenance contractor will investigate why not and instigate remedial actions to return the plant performance to normal operating ranges.

5.4.2 Causes of Dissolved Oxygen Depletion

When working under aerobic conditions within the water-column of each pond, the oxidation ponds would have a relatively low odour potential. The scenarios that lead to depleted oxygen levels for a number of days or more are those that lead to significant odours being released and therefore management of the ponds to avoid and mitigate these scenarios is the key to successful odour management of the WWTP site. There are a number of typical and not so typical causes of the dissolved oxygen levels being depleted in the ponds. These are listed in Table 6 alongside the measures to avoid or mitigate these scenarios.

Table 6: Cause and Prevention of Pond DO Depletion

Cause of O_2 levels in Pond to deplete	Mitigation measures/ responses
Pond "Turn-over"	Maintain sludge levels below 1/3rd pond depth is a key contingency measure to avoid pond "turn over" scenarios. Undertake sludge survey every 2 – 5 years, with 5 yearly for first 20 yrs then 2-yrly. Break up floating sludge layer with intense agitation e.g. jet boat, running an out board motor on fixed structure within the pond. Leave broken up sludge layer to settle and re-establish normal aeration gradually as sludge layer is re-established.
High benthic loading of Biochemical Oxygen Demand (BOD)	Detect during summer months by more frequent DO monitoring of discharge. Increase aeration if max daily DO levels fall below 2 mg/L. This can be avoided by monitoring BOD loadings and DO levels within the water column and ensuring sufficient aeration is provided to the ponds to maintain positive oxygen content within the water column. **Note:** Monitoring DO within Pond 1 or 2 or the discharge from Pond 3 is undertaken at set times of the day to avoid variation in DO results due to the diurnal variations in algal activity.
Inadequate aeration capacity for peak BOD loads to the system	Often a summer time issue with increased tourist population and higher temperature that also increases benthic oxygen demands. Same actions as per above.
Inadequate aeration capacity during normal BOD loads to the system	Detected during normal routine monitoring of pond outlet and assessing trends in daily Maximum DO. Pond nominal aeration capacity needs to be increased in response.
Algal population changes/instability	It is hard to avoid these, and algal blooms and population changes cause sudden losses of natural aeration and high BOD burden due to dead algal mass. Similar mitigation required as for Pond "turn over" scenarios – that is intense agitation to break up the mats as they begin to occur. The use of mechanical aerators with spare capacity can break up algae

	mats as they begin to form. Other agitation methods, such as boats, can be used as necessary.
Operation problems/aerator failure preventing aeration of pond	• Identify root cause of fault (i.e. electrical, mechanical). • Electrical fault: Check condition of the main catenary wire carrying the aerator power cable to the appropriate post mounted junction box. • Electrical: Check condition of socket junction box and that PDL plug is firmly fitted into socket. • Mechanical: Disconnect the aerator motor by pulling the plug from the socket and proceed to tow the aerator to the shore for maintenance. Note that the fault relay disables the aerator on a motor overload of earth leakage fault. • Technical problems relating to aerator operation should be referred to Pumptech –Tel: 027 250 7874.
All up-set scenarios	• For all of the above upset conditions, monitoring of operational parameters such as BOD loading, discharge quality and DO levels is important to avoid such events occurring. Furthermore, ensuring adequate management of the sludge layer depth can be important to avoid this building up excessively.

5.4.3 Pond Turning Anaerobic

Anaerobic conditions occurring within any of the ponds will result in significant odour emissions if not rectified within one to two days. When monitoring during normal daytimes of sampling return zero DO readings (that is anoxic), then the pond maybe only hours to one day away from becoming anaerobic if not already. Undertake actions as for operation problems/aerator failure in Table 6 as well as the following steps:

- Check all aerators are functioning. Remedy any faults.
- Re-test the DO level in all ponds and record.
- Measure inflow temperatures at each pond and record. Record daily high and low temperature from Met office or site station and record.
- Check the surface grease condition; if heavy add a surface degreasing agent.
- If one pond is still aerobic (good positive DO levels), then transfer waste as a seed liquor to the anaerobic pond. A temporary pump is a preferred method as liquor can be discharged to the warmest location.
- Reconfigure pontoon aerator directions to allow early sunlit water to move to cooler shaded water.
- If insufficient aeration continues, use of a jet boat or circulating pump discharging aerially can be considered. Noise and odour discharge may cause nuisance; advise Regional Authority.
- Worst case scenario may dictate increasing the outflow discharge and dropping the depth level of the pond to allow sunlight penetration and aeration depth to come closer to anaerobic sludge.
- Alternatively check the algal state to ensure the right type of algal growth is occurring. It should not be Blue Green alga which will show a high DO level.
- If Sulphur levels are too high, addition of Sodium Nitrate to Pond 1 & Pond 2 will encourage good algae growth and better oxidation.

5.4 MLE Odour Treatment System

The activate sludge plant includes a BioAir odour removal system for treatment of foul air extracted from the following areas:

Sludge thickening / dewatering centrifuges (2 No.);

Sludge out loading conveyor / bins (2 No.);

Site Wastewater Pump Station; and

Septage Facility Septage Holding Tank.

The connection to each extraction point includes a damper valve to enable the volumes extracted from each source to be balanced.

The unit includes a biological scrubber followed by a carbon bed for polishing. The facility is intended to operate continuously. The scrubber may be shut down for short periods and for maintenance, but must be re-started as soon as possible to maintain biomass on the scrubber media and prevent potentially harmful and corrosive gas build up.

The lower section of the scrubber contains media that supports a film of biomass. Sprays distribute recycled effluent across the media which trickles down in the opposite direction to foul air and exits

via the drain. Above the sprays is a layer of carbon media which adsorbs remaining odorous compounds. The top of the unit is formed into a vent, where treated air exits to the atmosphere.

A panel is provided for adjustment of recycled effluent flow to the odour scrubber. To supplement nutrients in the recycled effluent, a dosing pump doses nutrient from the nutrient tank into the effluent. A temporary start up pump is provided to recirculate scrubber drainage through the scrubber. At start up, this speeds the establishment of biomass on the scrubber media. Once the scrubber is established, drainage is directed to the Site Pump Station.

The system is designed to treat up to 1,280m^3/hr.

Figure 20 : Odour treatment plant

Process Overview

The Main Odour Control Unit (OCU) provides odour control for the Septage Facility, Site Pump Station and Sludge Dewatering. These are the likely main sources of potential odour on the treatment plant site, apart from the inlet works that has its own odour management via a biofilter.

Foul air is drawn from the field ductwork to the OCU where the foul air enters the base of a single bio-scrubber. The foul air flows up through a packed bed, providing treatment of the foul air by contact

with the biological mass. After air is treated in the biological section, it enters the carbon polishing stage. In this area of the system, activated carbon media adsorbs any odorous compounds that remain after treatment by the biological section. Carbon does not require any process control.

Components of the inlet gas, such as hydrogen sulphide (H_2S), dimethyl sulphide (DMS), ammonia (NH_3) and other odorous compounds are absorbed into the liquor which forms a film on the surface of the packing. Within the liquid film attached to the packing is the bio-film, a layer of active micro-organisms forming a biological community. These micro-organisms biologically oxidise the absorbed components. A by-product of the oxidation process is sulphuric acid (H_2SO_4) in solution.

Bio-Scrubber by-products pass into the liquor, which is continuously purged automatically from the Bio-scrubber to remove biological material and to maintain optimum conditions for biological activity. Make-up water is added to top of the Bio-scrubber to maintain the removal of Bio-scrubber by-products.

Air is continually extracted from the sources of odour through a series of GRP ducts. Local manual damper valves are provided to balance air flow rates from the different areas and ensure extraction is even across all areas.

Air is extracted by duty/standby extraction fans (STSD-01-FAN-263 / STSD-01-FAN-264). The air from the fans pass through the Odour Scrubber (STSD-01-SCB-010) where rising foul air contacts the wetted media as described above. The media is periodically wetted with Recycled Effluent when the Recycled Effluent Actuated Valve (STSD-01-VCA-353) opens.

In order to achieve optimum system performance, moisture and pH levels in the media must be properly controlled. This is achieved by regulating the total amount of water supplied to the bio-trickling filter via the spray nozzle system(s).

The spray nozzle is designed to uniformly supply water across the top surface of the media. The uniformity of the spray pattern is dependent on the water flow rate, so it is critical for the flow rate to remain near the nozzle's design flow rate during irrigation. Therefore, adjustments to the total amount of water supplied to the system, as required for process control, are accomplished by varying the percentage of time that irrigation takes place, NOT by adjusting the instantaneous water flow rate.

This is done by setting a *cycle time* and an *irrigation time*. The *cycle time* is defined as the amount of time between an irrigation event and the next repeated occurrence of that event. Each irrigation event takes place once per cycle. The *irrigation time* is the amount of time that one nozzle's automatic ball valve is open to allow irrigation water to flow to the nozzle.

When potable water, or effluent water with insufficient nutrients, is used for the irrigation water supply, nutrient addition is required. This is accomplished by activating the nutrient dosing pump during each bio-trickling filter irrigation sequence. The PLC will also give the operator the ability to set a *nutrient dose time* for each bio-trickling filter. At Shotover, recycled effluent is utilised for irrigation and supplementary nutrient addition should not be required, however, the infrastructure to allow dosing is installed if this is deemed beneficial at a future time.

The above control sequences are the normal operating mode of the system, which will take place when switches controlling the automatic ball valve(s) controlling irrigation and nutrient pump(s) are in *AUTO* mode. The switches can also be placed in *OFF* and momentary *ON* position for convenience during maintenance, priming, or other necessary functions.

Drainage from the Odour Scrubber drains to the Site Pump Station.

The activated carbon is expected to have a useful life of approximately two years, depending on loading and the optimisation of the biological odour removal stage. The volume of activated carbon is approx. 2.5 m^3.

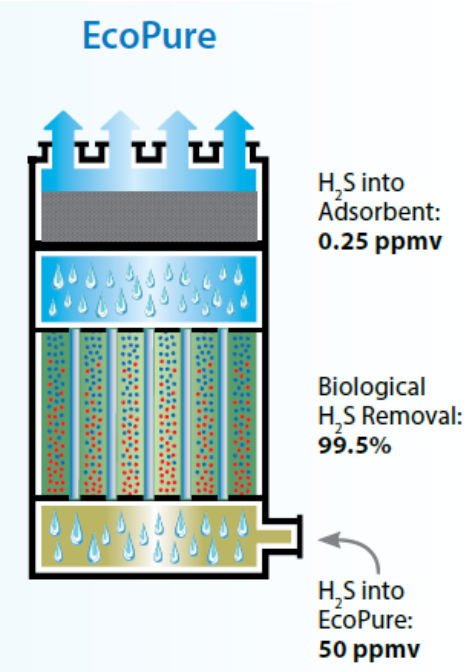


Figure 21 : Diagram of Ecopure Odour Control Unit

Process Importance and Interrelationships

The key interrelationships to this process are listed below:

- The Main Odour Control System draws air from the Septage Tank on the Septage Reception Facility.
- The Main Odour Control System draws air from Site Wastewater Pumping Station Sump.
- The Main Odour Control System draws air from Sludge Dewatering Centrifuge Outlet hoppers.
- Drainage from the Odour Scrubber unit drains to the Site Pump Station.
- The Main Odour Control System draws air from the Dewatered Sludge Cake Sludge Bins.

Process Control Strategy

The Site Odour Control Unit can be run under two operational modes; 'Local' control and 'Auto' control.

Local control is possible from the local odour control panel, by turning the auto/off/manual switch into manual and by pressing the start button. Stopping the system is done by pressing the stop button.

The Odour Control Unit (OCU) is provided as a Vendor package, which is controlled by its own control system, which includes an Allen-Bradley MicroLogix PLC. The following is a description of the Odour Unit system controls in Auto Control mode:

The OCU is supplied with recycled effluent supplied by the Recycled Water Pumps to keep the media moist. The recycled effluent contains nutrients beneficial to the OCU biomass.

Recycled Water is provided by the OCU Top Up Actuated Valve (STSD-01-VCA-353) with monitoring by a flow meter (STSD-01-FIT-352). The valve operates on a 10-minute cycle as follows:

Open – 1 minutes (Nominal)

Closed – 9 minutes (Nominal)

At start-up of the OCU, the valve commences with the open phase of the cycle to keep the media moist and remove any accumulated OCU by-products.

The valve is configured for fail closed operation. The OCU Top-up Actuated Valve (STSD-01-VCA-353) is inhibited from opening during particular operational conditions within the Site Pump Station, i.e. High High Level in the pump station sump.

In the event of the Site Wastewater Pump Station reaching high level, the operation of the OCU Top-up is stopped and inhibited until the high level has cleared. This prevents further water entering the pump station which would cause flooding of the local area.

Also in Auto mode, the Nutrient dosing pump (STSD-01-PMP-262) operates whilst the OCU Top-up Actuated Valve is open during the cycle above. The dosing rate of the Nutrient Dosing Pump is set manually by the plant Operators using the local control, and if required the stroke volume of the pump could be set to 100%.

Also in Auto Control mode for the Odour Control Unit, the Odour Control Fans operate in a duty/standby arrangement (STSD-01-FAN-262 / STSD-01-FAN-263) and run continuously with control by the Odour Control System Panel.

The fans draw foul air from the field ductwork and discharge to the Odour Scrubber (STSD-10-SCB-010), which vents treated air to the atmosphere via the exhaust system.

If neither Fan unit is available a *No Fan Available* alarm is raised and the OCU is shutdown.

At least one Fan must be available for the OCU to run.

The typical settings for the system are described in Table 7 below (these should not be varied from without consultation with Bio Air).

Table 7 Typical Bio Air System Set Points

Setting Number	Cycle Time (min)	Irrigation Time (s)	Nutrient Time (s)	Approx. Water Use (Lpd)	Approx. Nutr. Use (Lpd)	Nutr. Tank Will Last (days)
1	10	20	5	1600	0.32	188
2	10	30	7	2400	0.48	125
3	10	45	12	3600	0.72	75
4	10	60	15	4800	0.96	58
5	10	90	23	7200	1.44	39
6	10	120	30	9600	1.92	30
7	10	180	45	14400	2.88	20
8	10	240	61	19200	3.84	15
9	10	300	75	24000	4.80	12
10	10	360	90	28800	5.76	10

- *Normal Start Up Procedures*

The system is started from the local control panel and runs continuously once started. The system is self-governing, automatically looking after the irrigation of the media.

- *Normal Shut Down Procedures*

To shut down this sequence the operator is required to stop the devices at the local panel.

- *Emergency Operation*

In the event the Odour Control system suffers a significant failure, which requires the process unit to be taken off line to rectify there is no redundant system to replace it. The system does include a redundant odour fan which will be started automatically in the event the duty fan becomes unavailable.

In the event of a complete power failure, all electrical equipment will cease operation. If the power remains off for an extended period of time, odours could become an issue. If it is possible to run the unit in manual this should be done periodically to ensure the media in the Bio-trickling remains wetted. This will help to maintain optimum conditions for biological activity within the odour scrubber unit.

Operational Parameters

Table 8 : Odour Control Unit Operational Parameters

Parameter	Units	Range	Target/Set point
Odour Control Unit			
Cycle Time	Minutes	0 – 60	2 minutes
Irrigation Time	Seconds	0 – 1000	30 Seconds
Nutrient Time (Not Used)	Seconds	0 – 1000	14 seconds

Monitoring

The following items, listed in the Table 9, are to be monitored to ensure efficient operation of the process unit.

Table 9 : Odour Control Unit Monitoring Requirements

Parameter/Condition	Possible cause	Possible solutions
Low flow to Irrigation system on the Odour Scrubber	No flow from the Recycled water system. Valves incorrectly positioned	Check Recycled water pumps are in operation. Check valve positions against P&ID.
Odours are not eliminated by the Odour scrubber	Odour Control Unit is overloaded. Carbon Filter has reached the end of its useful life.	Operational changes required to try and reduce loading to the Odour Control unit e.g. reduce overloading on plant processes. Carbon Filter needs replacing.

Prior to replacing the activated carbon, the actual condition of the carbon can be assessed through the use of a clean bright copper tube (1/2" plumbing tube) pushed down into the carbon bed and left for 8 hours to get a gauge of how much of the bed is used up. The copper will turn black where it reacts with H_2S gas. If copper tubing has any blacking (greater than 5% of the tubing) after 8 hours, further investigation of the system will be required as the system at optimum removes 99% of H_xS gas. To undertake this, will require access into the top of the unit and as such will require removing the high level access hatch and shutting down the fans. This will enable to operations team to gauge a far more accurate estimate of the useful life of the carbon media.

5.5 MLE Reactor and Clarifier

As previously mentioned the risk of odour emissions from the MLE reactor is low as the mixed liquor / activated sludge would need to go anaerobic. The main way to prevent odour emissions at the reactor is via the aeration system and managing the MLSS concentration and the biomass health.

The plant's power supply is backed up by a 1 MVA generator with auto-change which means the plant is able to run at full capacity in the event of power outage. All pumps and blowers have a standby which means in the event of losing one asset there is another asset which can become the duty and keep the process operating without any loss of performance.

The aeration system operates on a feedback control logic based on the dissolved oxygen concentration in each zone of the reactor. The blowers adjust their speed / oxygen output to maintain the dissolved oxygen set points. This ensures that the reactor is sufficiently aerated at all time.

The sludge age of the mixed liquor is carefully managed by the operators to ensure that the sludge is age is between 12 to 18 days and the MLSS is maintained between 2,400 – 4,000 mg/L. In the office / administration building at the plant, there is a laboratory where the operators are able to perform a number of tests including suspended solids, COD, and nutrients. The MLSS is tested three days a week in the onsite laboratory and based on the MLSS, the influent inflows and the sludge settleablility, the WAS wasting rate is set to maintain the optimum sludge age and MLSS.

On top of this, the laboratory has a microscope which is of sufficient quality to perform biomass health checks on the activated sludge including checking higher life forms and filaments. The operators have been trained to perform these checks. A sample of the biomass is sent away once a month to The Wastewater Specialist who are consultant who specialises in activity sludge biomass health and they provide a report on the biomass health and provide recommendations on ways to improve the system performance.

5.6 WAS Holding Tank

The WAS holding tank is a 100 m^3 open top glass coated steel tank and due to the sludge being anoxic or even at times anaerobic, and the tank is open, there is an odour emission risk. The odour emission prevention measures with the WAS holding tank is that the tank has an aeration system which operates when the tank has sludge in it. Sludge is only held in the tank short term during the wasting process which is only during normal working hours when the operators are onsite. The tank has a drainage system which ensures any WAS left in the tank after the dewatering process is completely drained from the tank following dewatering.

5.7 Discharge to Land

The only potential source of odour from the land dispersal fields is if a dispersal field is overloaded with treated effluent due to a mechanical failure or very high groundwater levels and groundwater mounding breaks through to the surface, cannot drain way and goes anaerobic. The operator checks the fields on daily basis for groundwater mounding, the groundwater depths are continuously monitored via the SCADA system and alarmed, and the fields are automatically dosed based of discharge volume and groundwater depths. In the event of an issue with the system, the operator can manually control the amount of effluent discharged to any of the eleven zones. Additionally, the

organic (BOD) strength of the effluent is low, and once mixed with groundwater is unlikely to go anaerobic on the ground surface.

6. Ambient Odour Monitoring

6.1 Boundary Assessments

Boundary assessments (i.e. Plant Odour Surveys, Appendix D) are used to confirm the presence of odour from the site and the likely source. They require less intensive and formal procedures compared to compliance assessments that are usually undertaken at the location of complainant's residential dwellings or place of work that are aimed to establish whether the odour is objectionable and/or offensive.

These types of surveys are appropriate as Plant Odour Survey's that aim to confirm the likely source of an odour complaint and the measures that may be necessary to eliminate this source. These types of assessment are the primary self-monitoring tool that is used by the QDLC site operators.

6.2 Compliance Assessments

Compliance assessments are more formal and are undertaken in accordance with the Ministry for the Environment's Good Practice for Assessing & Managing Odour in New Zealand (June, 2003). These assessments are too time consuming for diagnostic type assessments at the site in response to odour complaints. They are most relevant when the aim is to assess the extent to which an odour incident represents a breach of the objectionable/offensive threshold, rather than to assist with day to day management and mitigation of odour emissions from the site.

6.3 Other Assessments

Other assessments may occur throughout the WWTP upgrade. For example, during the desludging process in 2012, the contractor (Conhur) carried out weekly site safety and environmental inspections and recorded on the Safety Inspection Checklist sheet in accordance with Conhur Health and Safety Management Plan procedures.

7. Odour Assessment Procedures

7.1 Complaint Logging

Resource Consent RM13.215.01 Condition 8 requires QLDC to keep a record of any complaints received regarding discharges of odour from the WWTP. Complaints may reach QLDC from complainants via a number of channels:

- Otago Regional Council compliance staff.
- Direct complaints made to QLDC customer service which is logged in the Request for Service (RFS) system.
- Directly to WWTP operators (Veolia).
- QLDC Staff who are known to complainants.

All complainants should be encouraged to use the QLDC customer service number, 03 441 0499, as this activates the appropriate response within QLDC and directs a response from the appropriate contractor.

All complaints are to be recorded in the QLDC TechOne RFS system. This will generate an email notification to the QLDC Operations and Maintenance Team and to Veolia (contractor).

As per Condition 8, the following information shall be obtained and recorded on the complaint form (included in **Appendix D**). Information to record includes:

- the date, time and place at which the complaint was generated;
- address of complainant (if they are prepared to provide this);
- the description of the odour incident provided by the complainant including;
  - frequency of odour incidents *(e.g. continuous, fluctuating, infrequent etc)*
  - duration (*mins, hours, days etc*)
  - strength (*very weak, weak, distinct, strong, very strong or extremely strong*)
  - character (e.g. *sewage, sewer, sulphury, pond smell, musty, acrid etc*); and
- weather conditions at the time of the complaint (e.g. fine, wet, windy, still and cold, snowing);
- wind direction (N, NE, E, SE, S, SW, W, NW).

7.2 Assessments/Investigations by QLDC

6.2.1 Odour Walkover Surveys (boundary investigations)

Once a complaint is received, an email notification will be sent by the RFS system to the QLDC Environmental Manager and to Veolia (contractor). This will then trigger the undertaking of Odour Walkover Surveys (to be recorded on the survey form contained in Appendix E) at the following frequency, in accordance with Condition 6 of Resource Consent RM13.215.01:

- at least once per day for 30 days following the completion of any upgrade works that may result in discharge of odour;

- at least once per day for 3 days following any external complaints received and confirmed as coming from the site; and
- at least once per day for 3 days following any off-site odour identification as coming from the site during the Odour Walkover Survey.

Each Odour Walkover Survey should be conducted by driving to different sections of the site boundaries and walking along these in an attempt to detect odour coming from the plant. Having assessed the wind direction, boundary locations downwind of the milliscreens and ponds would be the first locations to assess.

As per the requirements of Condition 6, the Odour Walkover Surveys shall be undertaken by a person employed by QLDC or the treatment plant operator but who does not work on the site.

Details of all Odour Walkover Surveys are to be recorded in accordance with Resource Consent RM13.215.01 Condition 7 and kept for a minimum of six years. Details required to be recorded are:

- the date, start and finish times of the survey;
- the wind direction and strength, and weather conditions throughout the survey period;
- the location and strength/intensity, character and duration of any odours observed;
- investigations into the source of any odour identified, whether from the site or elsewhere; and
- plant operating conditions at the time of the survey.

The completed Odour Walkover Survey forms are stored electronically in the Record of Complaints Register which is held in the QLDC computer network folder system, specifically on the (T:) drive along with all other records related to consent compliance.

6.2.2 Optional Compliance Assessment

Having obtained information from the complainant, then QLDC staff or contractors may on occasion undertake a full FIDOL (Frequency, Intensity, Duration, Offensiveness, Location) assessment of odour from the complainants' location or nearby to assess the ambient odour and record the following:

- the date, time and place of assessment;
- the description of the ambient odour including;
  - frequency of odour incidents *(minutes/hr, hours/day, days/month etc);*
  - duration (*mins, hours, days etc*);
  - strength (*very weak, weak, distinct, strong, very strong or extremely strong*);
  - character (*sewage, pond smell, musty, acrid etc*);
- weather conditions during the assessment (fine, wet, windy, still and cold, etc);
- wind direction (N, NE, E, SE, S, SW, W, NW);
- Undertake a 360^{o} assessment of the WWTP site to confirm is any other sources of ambient odour can be identified. This requires and upwind and downwind assessment of the WWTP site;
- Provide an opinion whether the odour was considered to be objectionable and/or offensive; and
- Plant operating conditions at the time of the assessment.

Note: This type of formal 360° assessment of the odour beyond the boundary is not required, but this more formal assessment can be used at the discretion of the QDLC to confirm whether or not odour discharges from the QLDC WWTP is likely to be causing objectionable and/or offensive effects.

7.4 QLDC Actions

QLDC, working together with the operational contractor (currently Veolia), will take any remedial actions necessary to mitigate odour emissions that complaints and/or site investigations indicate to be causing discernible and nuisance WWTP type odours to be experienced off-site. If necessary, the contractor will update any relevant procedures that have been modified to further minimise the chance of reoccurring odour problems.

7.5 Recording and Incident Reporting

Upon receiving a complaint, QLDC/ Veolia staff shall fill out a complaint form, as per the information requirements outlined in **Section 7.1**.

The following information relating to each complaint will be stored in the Record of Complaints Register which is held in the QLDC computer network folder system, specifically on the (T:) drive along with all other records related to consent compliance.:

- Information collected from complainant (**Section 7.1**);
- Information collected by QLDC and contractors (**Section 7.2** and (if needed) **Section 7.3**), including completed Odour Walkover Survey forms;
- Operating conditions at the time of the complaint, including any malfunctioning or breakdown of control equipment;
- Corrective action taken by the consent holder to minimise the risk and extent of the recurrence of the causes of the complaint; and
- Any feedback from the complainant following corrective actions.

The complaint may have been received via the ORC and all this information above may not be provided to QLDC. QLDC will endeavour to collect as much information from the ORC as possible to update the Record of Complaints Register.

7.6 Odour Reporting and Follow-up

If QLDC or Veolia receives a complaint directly, QLDC shall forward to the ORC a record of that complaint and corrective action within two weeks of receiving the complaint in accordance with Condition 8 of Resource Consent RM13.215.01.

Once an odour complaint has been investigated and action agreed between QLDC and Veolia, QLDC will contact the complainant and advise them of the action to be taken and when that action has been completed.

8. System Review and Reporting Procedures

This OMP is a "living document" and is to be reviewed on an annual basis as per Resource Consent RM13.215.01 Condition 4, or as required. The objectives of the OMP are to enable the WWTP to be operated and maintained in a manner which employs best practicable options to prevent or minimise the discharge of objectionable or offensive odours. QLDC will also consult PHS, TAMI, RPL and SPL during the annual review process. The annual review, which will be undertaken by QLDC, will take into account the following:

(a) The implications of any actual anticipated increases in flow, organic load and sludge generation (such as due to new industry or increases in population) on the performance of the treatment plant over the next 12 months, having particular regard to preventing generation of any offensive or objectionable odours;
(b) The recommendations of any odour performance reviews undertaken; and
(c) The recommendations of any decommissioning and construction odour management plan.

The updated OMP (when amended annually, or as required) will be submitted to the ORC and the Shotover 'Reference Group; which will consist of PHS, TAMI, RPL/ and SPL.

Glossary of Terms

Effluent	Discharge from the WWTP (in this case, treated effluent).
g/m^3	grams per cubic meter, equivalent to milligrams per litre (mg/L). In water this is also equivalent to parts per million (ppm).
Influent	Raw wastewater stream coming into the WWTP.
Resource Consent	refers to Section 87 of the RMA. Resource consents include land use consents, coastal permits, water permits and discharge permits.
RMA	Resource Management Act 1991 and subsequent amendments.
Sludge	is a generic term for solids separated from suspension in a liquid. Commonly sludge refers to the residual, semi-solid material left from industrial wastewater, or sewage treatment processes.
WWTP	Wastewater Treatment Plant (WWTP) is the process of removing contaminants from wastewater and household sewage, both runoff and domestic. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce a waste stream (or treated effluent) and a solid waste or sludge suitable for discharge or reuse back into the environment.

References

ORC, 2015: Resource consents RM13.215.01 and RM13.215.03.

Conhur, 2012: Contract No. CT 12-008 Shotover Ponds Desludging 2012 OPERATIONAL MANAGEMENT PLAN, February 2012.

MFE, 2003: Good Practice Guide for Assessing and Managing Odour in New Zealand, Ministry for the Environment, 2003.

Downer, 2017: Project Shotover Ponds Operations and Maintenance Manual, April 2017.

Appendix A Resource Consents

Appendix B Operations and Maintenance Procedures

Refer to Project Shotover WW O&M Manual Ver1 April 2017, and the separate Operations and Management Manual for the land dispersal system version 1 December 2018.

Appendix C Odour Complaint Form

QUEENSTOWN LAKES DISTRICT COUNCIL
www.qldc.govt.nz

ODOUR COMPLAINT FORM

Facility	Date Recorded	Reference Number
Shotover Ponds Wastewater Treatment Plant Hansen ID: STSP-SHOTOVER PONDS	Dd/mm/yy hh/mm	RFS# **TRIM#** **Complaint #**
Source of Complaint (ORC, UW, other)		
Name & Address of Complainant		
Telephone Number		
Details of Complaint		
Date and time		
Duration of odour *(how long did it last)*		
Location of where odour noticed		
Odour strength *e.g. strong/ weak*		
Odour frequency *e.g. continuous/ fluctuating*		

Odour character *e.g. sour, sewer, woody, compost, silage etc*	
Weather conditions *(e.g. dry, rain, fog, snow, cold, mild, warm)*	
Wind strength and direction *(e.g. light, steady, strong, gusting)*	
Any other previous complaints relating to this odour?	
Date and time plant checked/ odour survey	
Potential odour sources that could give rise to odour	
Operating conditions at the time offending odour occurred	
Future investigation required?	
Follow-up	
Date and time complainant contacted	
Action taken	
Amendment needed to Odour Management Plan?	Yes/No
Form completed by	**Signed**

Appendix D Odour Survey Form

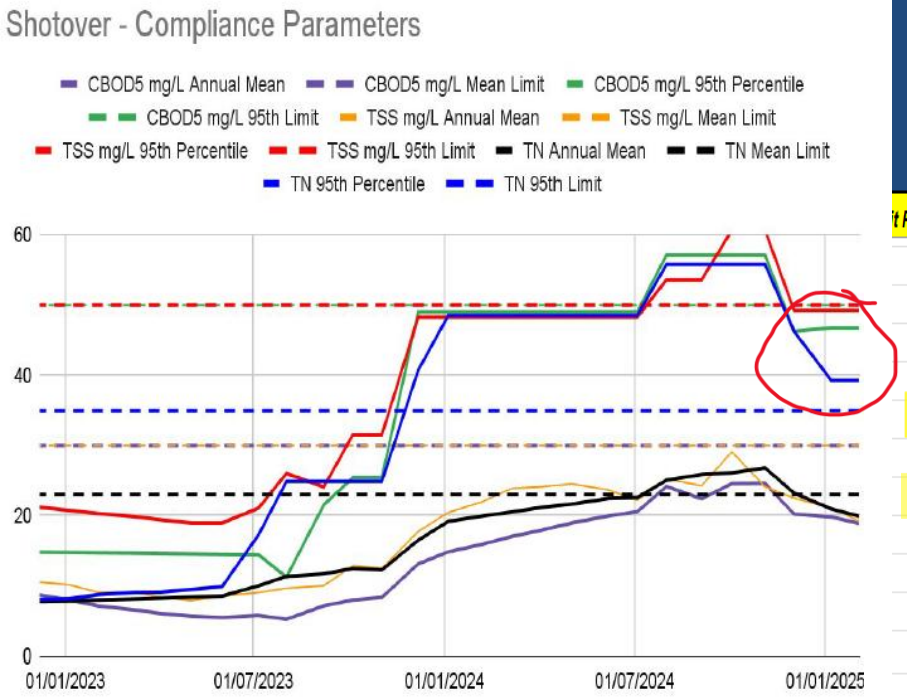
Shotover WWTP Stakeholder Reference Group Status Update

Tuesday 8th April 2025

QUEENSTOWN LAKES DISTRICT COUNCIL

Detail of overall compliance

Due to two months significantly failing, the 95th percentile will be non-compliant for the next 2 quarters



SHOTOVER WWTP effluent results

Daily discharge volume		BOD_5 (g/m³)			TSS Total Suspended Solids (g/m³)			TP Total Phosphorus g/m³			NH_4-NO_3 Total Ammoniacal Nitrogen g/m³			TN Total Nitrogen g/m³			E. coli	
	m³	g/m³	Annual Mean	95 Percentile	g/m³	Annual Mean	95 Percentile	g/m³	Annual Mean	95 Percentile	g/m³	Annual Mean	95 Percentile	g/m³	Annual Mean	95 Percentile	90th Percentile	Geomean
t RM13.215.03			30	50		30	50								23	35	260	260
4/04/2024	11399	12.9	17.9	49.1	6.9	22.5	48.3	2.3	3.8	6.7	10.4	14.3	40.0	17.0	22.0	48.5	230	19
2/05/2024	11121	14.7	19.0	49.1	19.3	23.7	48.3	2.6	3.5	6.6	7.8	13.9	40.0	15.5	22.0	48.5	230	19
6/06/2024	9974	15.3	20.0	49.1	10.0	23.3	48.3	1.9	3.4	6.6	11.4	14.3	40.0	19.6	22.5	48.5	230	19
4/07/2024	10961	16.5	20.6	49.1	13.5	22.8	48.3	5.9	3.6	6.9	20.2	15.0	40.0	27.6	22.6	48.5	230	20
1/08/2024	11749	51.6	24.2	57.1	43.5	24.0	53.6	4.2	3.8	6.9	34.4	17.1	40.0	53.5	25.1	55.8	230	25
4/09/2024	13344	16.0	22.4	57.1	23.1	25.1	53.6	2.1	3.8	6.9	12.0	17.4	40.0	21.7	25.9	55.8	230	25
3/10/2024	15738	41.9	24.6	57.1	56.0	26.9	60.5	2.5	3.6	6.9	8.9	17.3	40.0	20.2	26.1	55.8	230	29
4/11/2024	11819	6.9	24.6	57.1	11.3	27.6	60.5	2.4	3.6	6.9	7.9	17.9	40.0	13.4	26.8	55.8	222	26
2/12/2024	12136	11.2	20.2	46.3	14.4	23.3	49.1	2.6	3.1	5.7	7.1	14.7	35.2	15.6	23.2	46.2	139	18
7/01/2024	9428	74.0	24.3	61.7	11.0	21.5	49.1	2.4	2.9	5.0	7.9	12.4	26.6	13.2	21.0	39.3	39	13
3/02/2025	10140	3	23.3	61.7	2.5	19.5	49.1	0.8	2.7	5.0	0.2	11.6	26.6	5.6	19.9	39.3	38	13
5/03/2025	9920	8.63	22.7	61.7	5.1	18.1	49.1	2.6	2.7	5.0	7.6	11.3	26.6	14.1	19.7	39.3	38	12

Summary of overall consent compliance

QUEENSTOWN LAKES DISTRICT COUNCIL

- Effluent quality limits
  - Effluent quality results exceeded the 95th percentile in March 2024 for TN
  - BOD and TSS also exceeded the 95th percentile in March 2024
  - Current effluent results meet all requirements of Resource Consent
- Odour complaints
  - No odour complaints
- Annual Report Submission was submitted in January 2024. The Odour Performance Review will be submitted in June 2025.

Disposal point change - emergency works

Current Status

> Due to disposal field ponding QAC requests QLDC to act to prevent bird strike

> QLDC invoked RMA emergency powers to re-open its access channel, re-directing highly treated effluent direct to the Shotover River receiving environment

> Discharge of treated effluent to Shotover River commenced 31/3/25.

> Treated effluent discharge to disposal field was stopped 2/4/25.

> Additional works in the discharge channel (to upgrade/harden areas) and the Shotover River (to ensure sufficient mixing of river and channel water) is currently being planned.

> Ponding levels in disposal field are reducing – These will be monitored over the coming days to reduce bird habitat. Further works may be required if shallow ponding persists.

Regulatory Position

> Application for retrospective consent for discharge to Shotover River is due within 20 working days from 2/4/25. Extension to time may be agreed with ORC.

> This consent will cover the direct discharge to the Shotover River of treated effluent for a period of up to 5 years (until Dec 2030). This allows time for a long-term solution for the disposal to land design, construct and commission.

QLDC Communications with the Community

- Publishing monthly monitoring
- Description of how WW is processed at Shotover & other plants

Monitoring discharge to the Shotover River

- Veolia are undertaking daily observations for visual changes in clarity, including photos
- Veolia provide weekly monitoring at the 5, 6 & 9 points on map & send to Eurofins
- Additional monitoring equipment, including continuous river level monitoring and a camera is proposed to be installed in the discharge area in near term

SHOTOVER WASTEWATER CAPEX UPGRADES CURRENT AND PLANNED

QUEENSTOWN LAKES DISTRICT COUNCIL

WWTP Upgrade - Purpose

Purpose:

> Increase plant capacity to meet indicated 2048 design horizon.

> Fully utilise MLE treatment technology, and decommission pond treatment.

WWTP Upgrade - Progress

Current Status:

> All structural concrete works are complete.

> Mechanical and electrical installation is 85% complete.

> Earthworks to form basins in old Pond 1 are 50% complete.

> Pre-commissioning work has started.

Next Steps:

> Commissioning phase underway. Will progress through Pre-, Cold and into Hot Commissioning over the period April to July 2025.

> Operational Trial Period starts in August 2025.

> Expected to be fully operational in October 2025, or earlier.

Disposal Field Long Term project

Current Status:

> MCA workshop to score 13 long list options and determine short list of options was held 13/3/25.

> Short List of 5 options currently undergoing internal approvals.

Next Steps:

> ECG/PCG Endorsement 7th and 15th April 25.

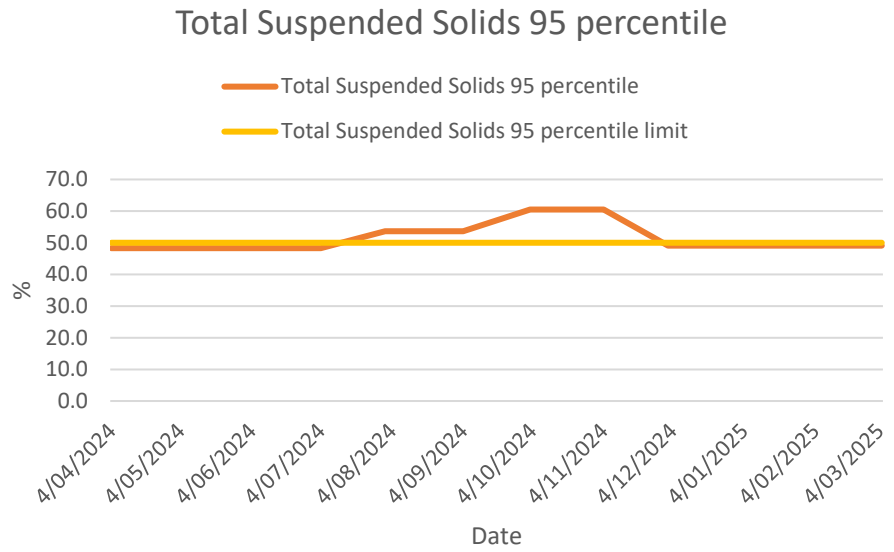
> Infrastructure Committee Briefing 1st May 25.

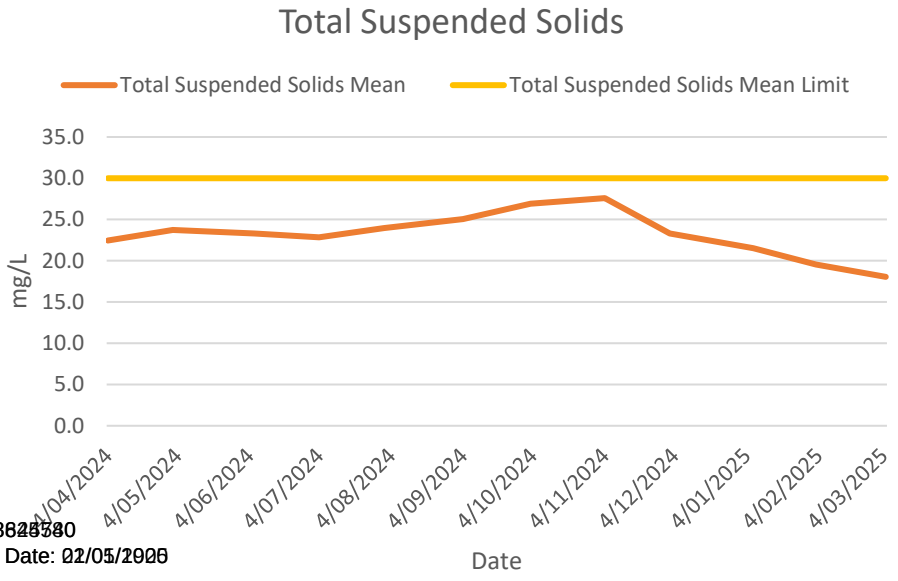
> Ongoing Short List Investigations commencing.

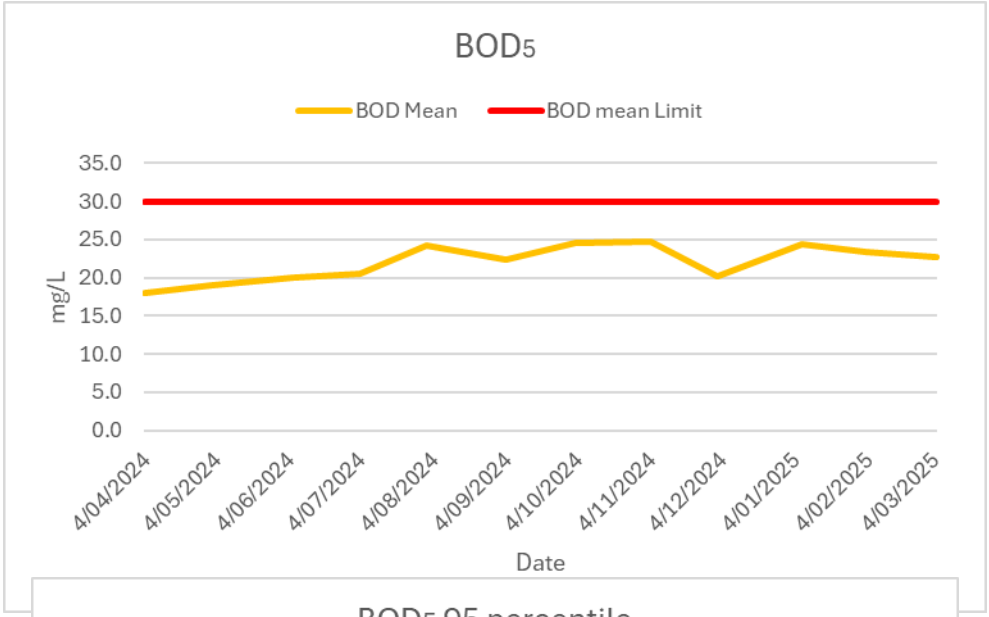
> Preferred Option Selection circa August 25.

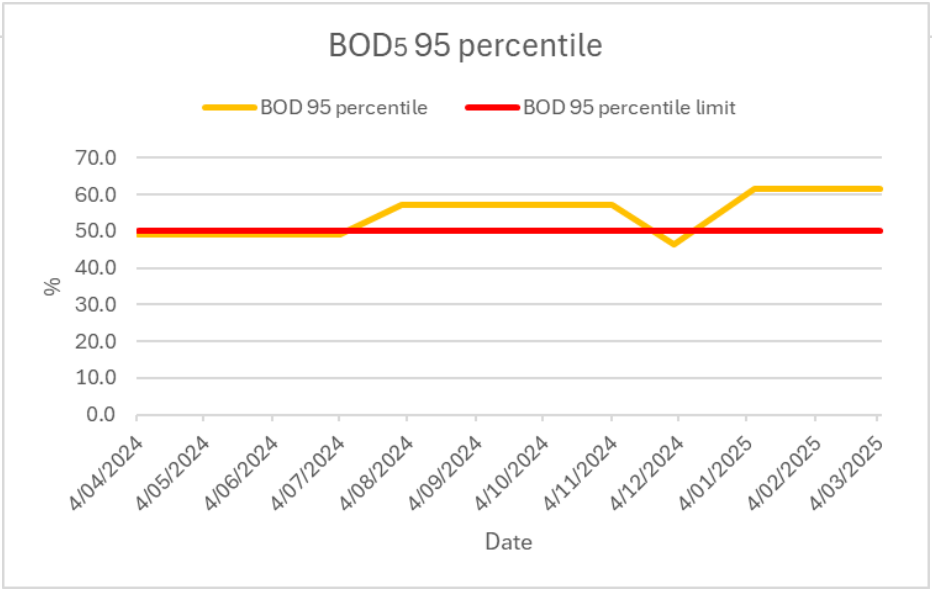
> Consent for preferred option submitted May 26.

Detail of overall compliance









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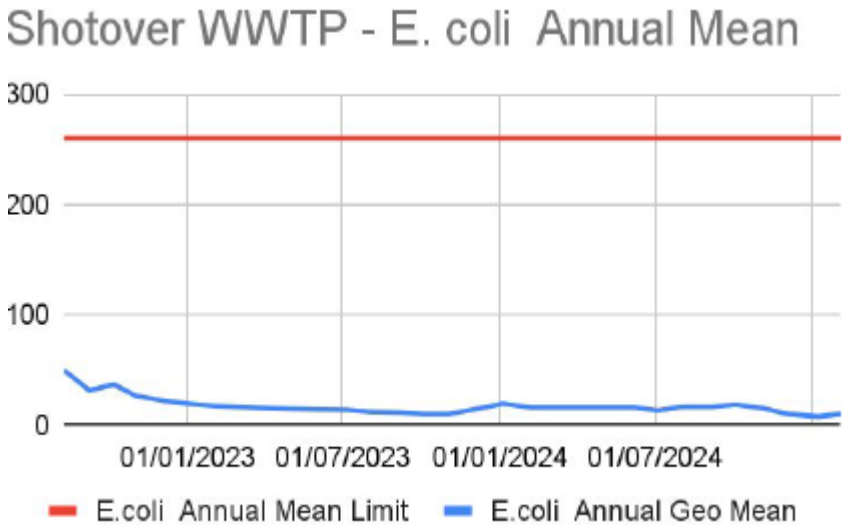

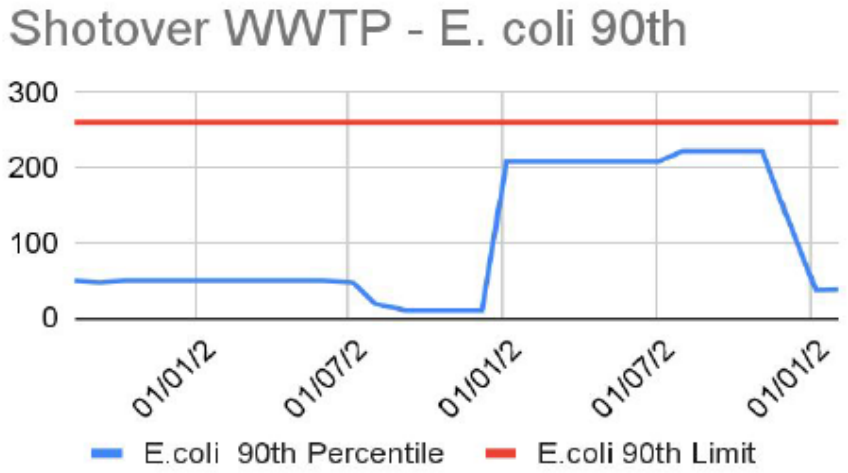

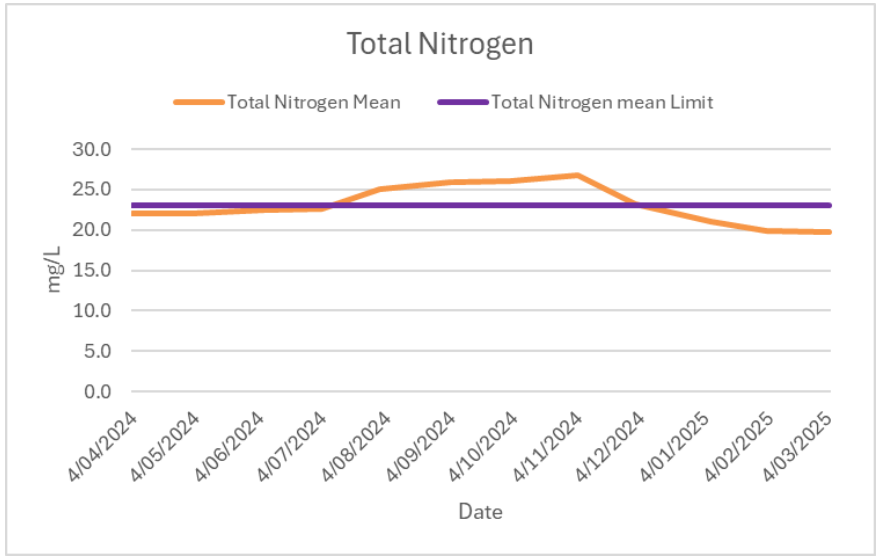

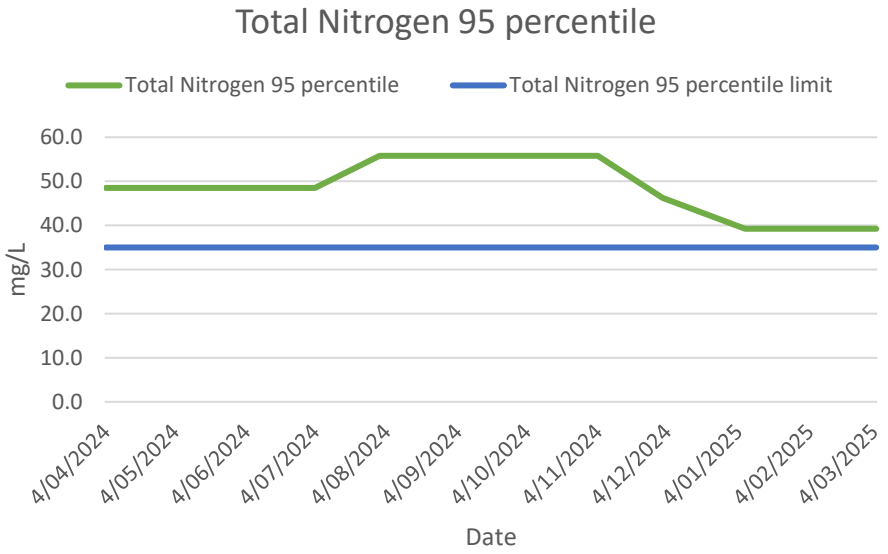

From: "Simon Mason"
Sent: Mon, 16 Dec 2024 07:39:17 +1200
To: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>
Subject: Accepted: Phone call Catch Up Juliet and Simon

From: "Simon Mason"
Sent: Tue, 11 Mar 2025 15:26:48 +1200
To: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>
Subject: Accepted: Catch Up - Dispersal Field

From: "Simon Mason"
Sent: Tue, 11 Mar 2025 15:13:38 +1200
To: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>
Subject: RE: Dispersal Ponds

Perfect. Thanks.

From: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Sent: Tuesday, 11 March 2025 4:12 PM
To: Simon Mason <simon.mason@qldc.govt.nz>
Subject: RE: Dispersal Ponds

Let's arrange for Thursday. Does 9am suit you?
Regards
Juliet

Juliet Breen (She/Her)
Head of Operations, Compliance & Safety

+64 21 663 915
juliet.breen@queenstownairport.co.nz

ZQN
Queenstown Airport

Queenstown Airport
Sir Henry Wigley Drive, Queenstown 9300

www.queenstownairport.co.nz

From: Simon Mason <simon.mason@qldc.govt.nz>
Sent: Tuesday, 11 March 2025 1:50 pm
To: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Subject: RE: Dispersal Ponds

Hi Juliet,

My day tomorrow is looking awful! Would either of 2.30pm or 4.30pm work? Otherwise I'm pretty flexible on Thursday up until midday.

Cheers,
Simon

Simon Mason | Infrastructure Operations Manager Property & Infrastructure
Queenstown Lakes District Council
M: +64 27 643 1913
E: simon.mason@qldc.govt.nz

QUEENSTOWN LAKES DISTRICT COUNCIL

From: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Sent: Tuesday, 11 March 2025 10:59 AM
To: Simon Mason <simon.mason@qldc.govt.nz>
Subject: Dispersal Ponds

Hi Simon
Are you free tomorrow for a Teams catch-up on the dispersal fields? Let me know of any times that suit and I'll send through a request.
Kind regards
Juliet

Juliet Breen (She/Her)
Head of Operations, Compliance & Safety

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juliet.breen@queenstownairport.co.nz

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From: "Simon Mason"
Sent: Wed, 5 Feb 2025 09:48:04 +1200
To: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>
Subject: Accepted: WWTP - Dispersal Field QAC-QLDC Discussion

From: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>
Sent: Wed, 11 Dec 2024 16:10:13 +1200
To: "Simon Mason" <simon.mason@qldc.govt.nz>
Subject: RE: e-introduction - Juliet Breen, Head of Operations, Compliance & Safety, QAC

Hi Simon
Yes I can make 11am on Monday work. I'll pop something in our calendars and will give you a call then.
Many thanks
Juliet

Juliet Breen (She/Her)
Head of Operations, Compliance & Safety

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juliet.breen@queenstownairport.co.nz

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From: Simon Mason <simon.mason@qldc.govt.nz>
Sent: Wednesday, December 11, 2024 4:49 PM
To: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Subject: RE: e-introduction - Juliet Breen, Head of Operations, Compliance & Safety, QAC

Hi Juliet,

Apologies, the balance of this week is chocka. Would 11am Monday suit?

By way of an update we are actively exploring what we can do to alleviate the ponding at the site – but the situation is complex and options somewhat limited. I should have some further insight to offer by Monday.

Thanks,
Simon

Simon Mason | Infrastructure Operations Manager Property & Infrastructure
Queenstown Lakes District Council
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E: simon.mason@qldc.govt.nz

QUEENSTOWN LAKES DISTRICT COUNCIL

From: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Sent: Wednesday, 11 December 2024 8:57 AM
To: Simon Mason <simon.mason@qldc.govt.nz>
Subject: FW: e-introduction - Juliet Breen, Head of Operations, Compliance & Safety, QAC

Hi Simon
Do you have time today or tomorrow morning for a conversation about the dispersal fields and wildlife management? I am flexible prior to 11am on both days.
Kind regards
Juliet

Juliet Breen (She/Her)
Head of Operations, Compliance & Safety

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juliet.breen@queenstownairport.co.nz

ZQN Queenstown Airport

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Sir Henry Wigley Drive, Queenstown 9300

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From: Rachel Tregidga <rachelt@queenstownairport.co.nz>
Sent: Thursday, November 28, 2024 11:49 AM
To: simon.mason@qldc.govt.nz
Cc: Juliet Breen <juliet.breen@queenstownairport.co.nz>
Subject: e-introduction - Juliet Breen, Head of Operations, Compliance & Safety, QAC

Hi Simon,

Hope you are well.

I wanted to e-introduce you to Juliet Breen, our Head of Operations, Compliance & Safety at QAC.

Juliet Breen (She/Her)
Head of Operations, Compliance & Safety

ZQN Queenstown Airport

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juliet.breen@queenstownairport.co.nz

Juliet would like to have a chat to you about the wastewater disposal fields in the Shotover delta. And in particular that this area is attracting a larger number of birds and has the potential to increase bird strike risk for aviation.

Juliet is copied in to the email and her contact details are above.

Kind regards,

Rachel

Rachel Tregidga
General Manager Property Planning
+64 27 494 7751
rachelt@queenstownairport.co.nz

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Queenstown Airport

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Sir Henry Wigley Drive, Queenstown 9300

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From: "Sara Irvine" <sara.irvine@queenstownairport.co.nz>
Sent: Wed, 23 Apr 2025 09:59:40 +1200
To: "Naell Crosby-Roe" <Naell.Crosby-Roe@qldc.govt.nz>; "Information Request" <informationrequest@qldc.govt.nz>
Cc: "Juliet Breen" <juliet.breen@queenstownairport.co.nz>; "Queenstown Airport Corporation" <media@queenstownairport.co.nz>
Subject: Information request - Community Action Group.
Attachments: Community group bird email.docx

Kia ora,
Just a heads up – we have met twice with the new community group to provide information about wildlife management and risk mitigation at QAC.
Attached is a copy of an email we will send today to follow up from our most recent meeting.
The discussions have been constructive.
I believe that they have put in info requests with QLDC so we wanted to provide you with a copy of our response.
Kind regards,
Sara

Sara Irvine (She/Her)
General Manager Sustainability & Corporate Affairs

+64 27 644 1341
sara.irvine@queenstownairport.co.nz

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Dear Nikki and Emma,

Hope you had a good Easter break.

Thank you for your interest in wildlife management processes and statistics at ZQN. Following on from our discussion last week, we are happy to provide some information in response to your queries.

As we mentioned when we met, the safety focus is on preventing /avoiding bird strike and monitoring risk, such as increased bird activity and behaviours, and/or changes in the local environment that might attract birds, such as new areas of standing water.

If you have further queries, we are happy to respond and/or clarify. I am back at work next week.

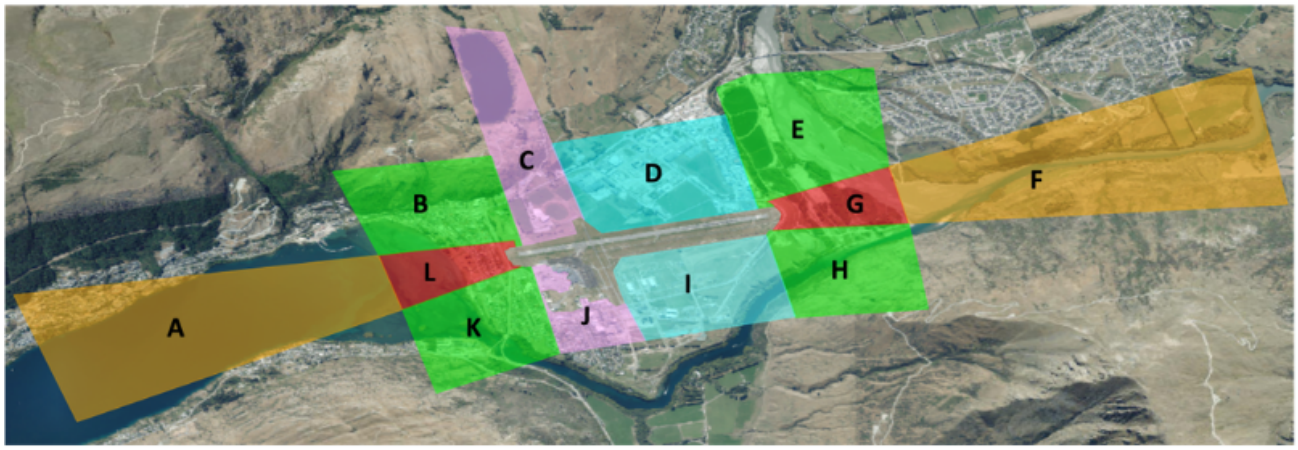
Kind regards,

Sara

General Manager, Sustainability and Corporate Affairs.

Off Aerodrome Monitoring

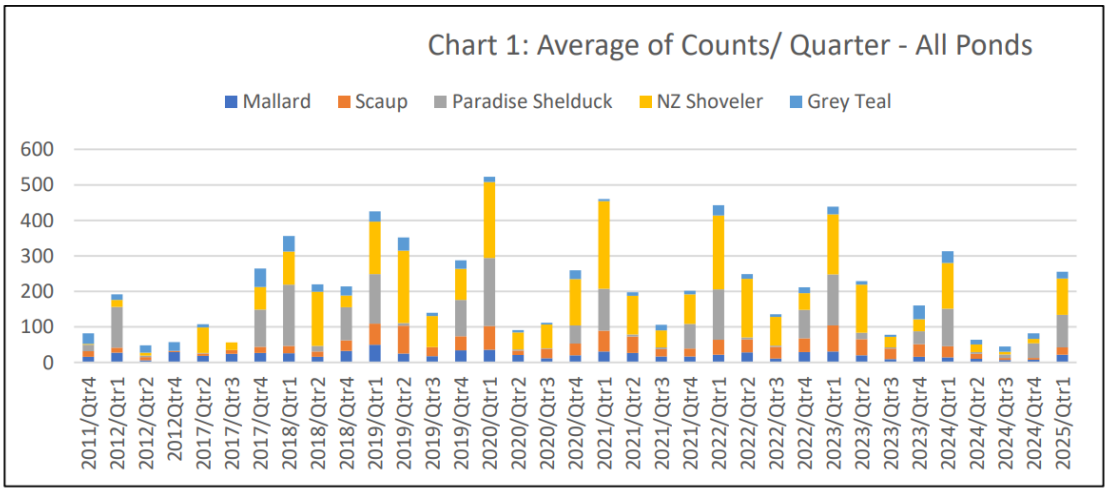
QAC engages a local ecologist to conduct monthly off-aerodrome monitoring. The areas monitored include the arrival and departure corridors of both runways and areas adjacent to the aerodrome. The purpose of the monitoring is to alert us to any changes in seasonal and year-to-year bird presence and activity, changes in bird presence and activity associated with land development and intensification and finally, changes in bird presence and activity associated with farming practices. The Wastewater Treatment Plant is within the Off Aerodrome Monitoring. Bird numbers and species are plotted at each monitoring area, A – L. This data is input directly into QAC's digital Safety System and followed by an email with general notes about activity. This information is provided to our Airport Emergency Services (AES) team to support their on-airfield monitoring and dispersal activities.

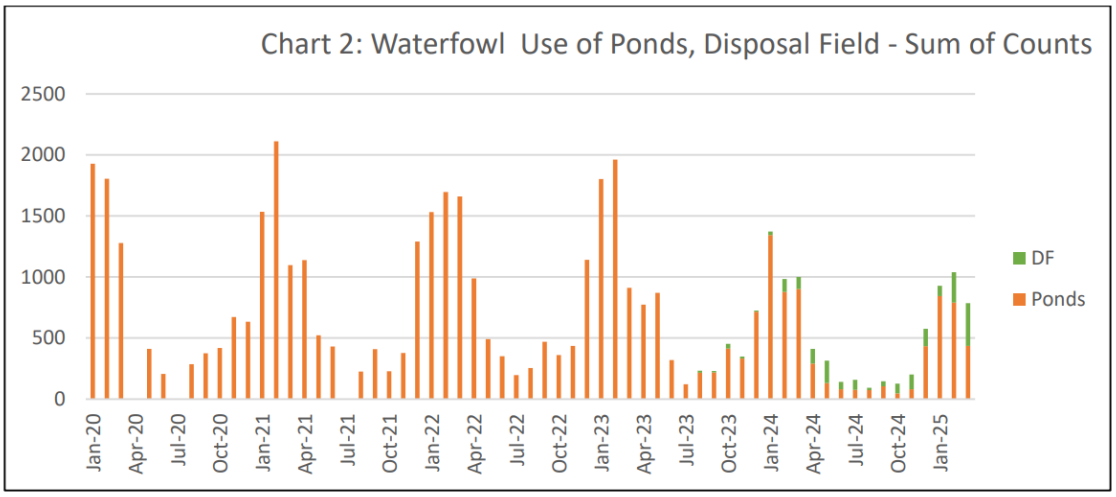


QAC is copied into monthly and quarterly bird monitoring communications specific to the Wastewater Treatment Plant provided to QLDC. We began receiving these reports in the last quarter of 2024.

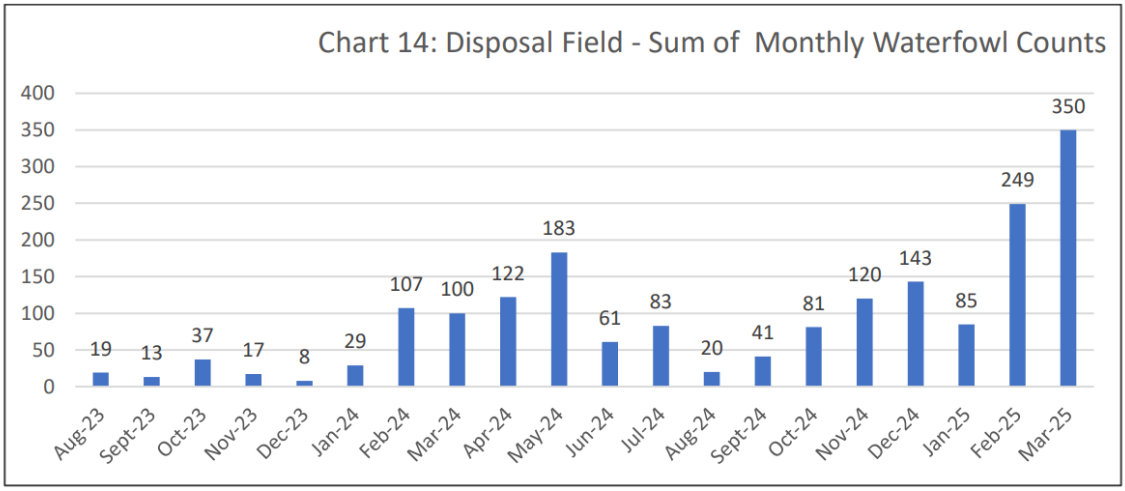
Here is snapshot of the increase in bird activity that was observed, as discussed last week.

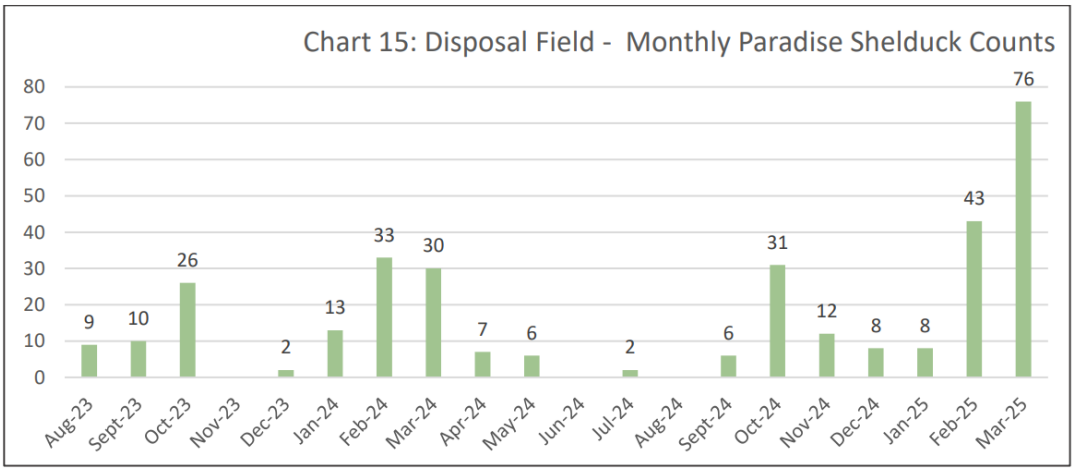
PONDS AND DISPOSAL FIELD WATERFOWL COUNTS

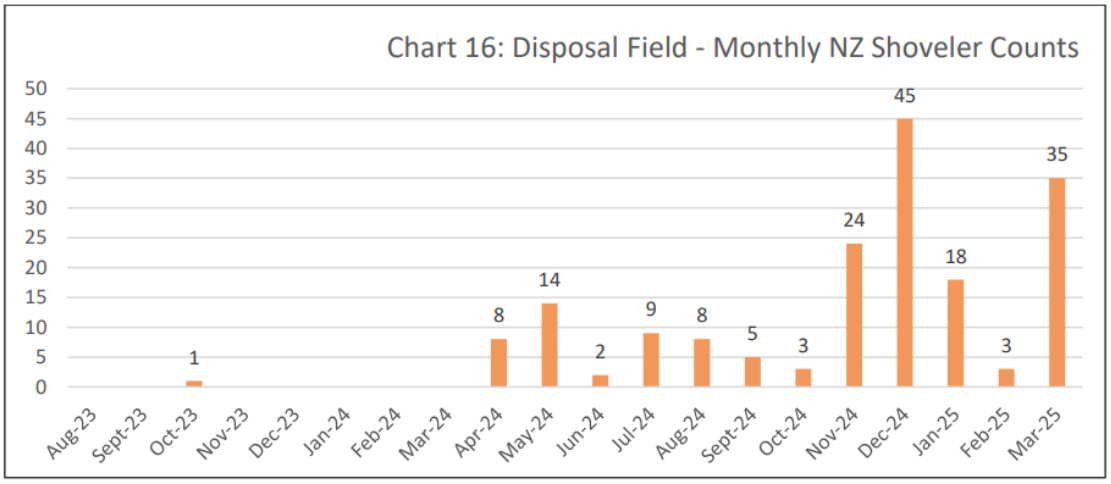


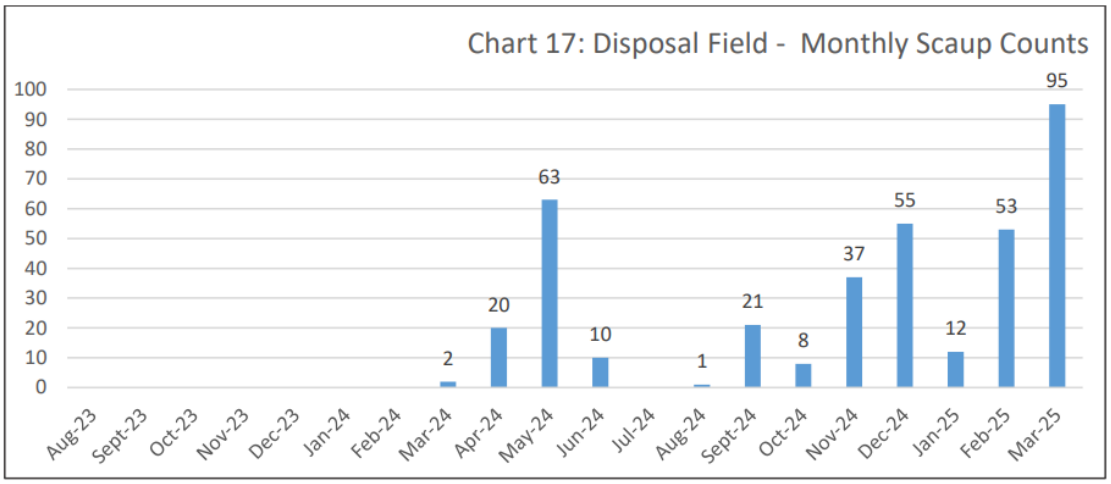


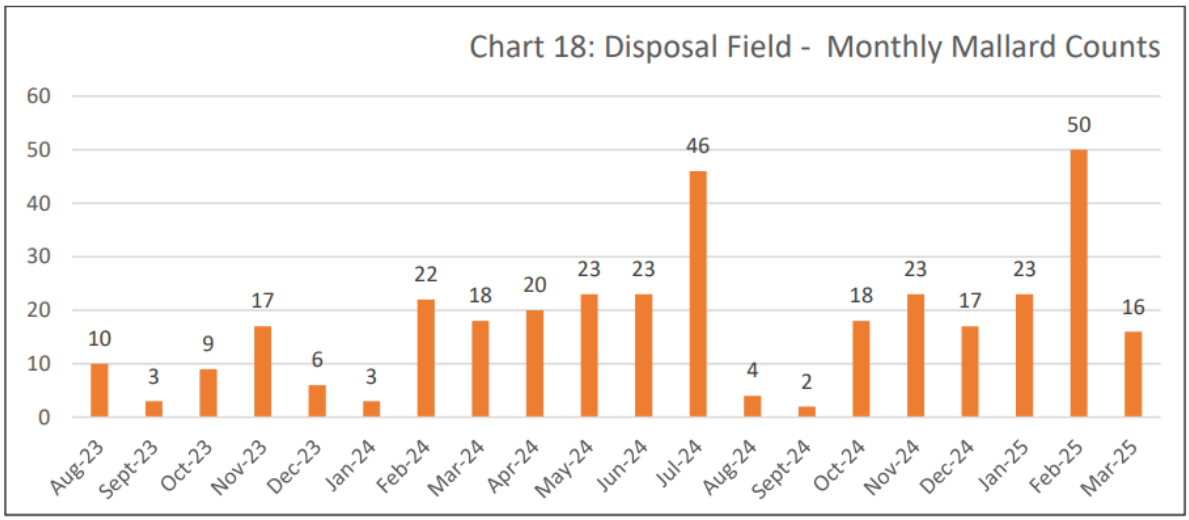
DISPOSAL FIELD CHARTS











Bird Strike Data

QAC collates bird strike data for ZQN Aerodrome. Information collected includes confirmed strikes, unconfirmed strikes and near strikes. An unconfirmed strike is where a pilot reports a possible strike; however, no bird remains, or evidence is located on either the runway or

aircraft. A near strike is where a bird or birds are sighted near an aircraft. Near strikes are included with the unconfirmed strike category for reporting purposes.

Aircraft operators are required to report bird strikes to CAA. CAA collates bird strike information received and sends monthly reports to each Aerodrome; we then reconcile these reports with our system.