Hays Creek Dam and pipeline
2024-2025 Annual Report

Final - November 2025

Watercare

QUALITY INFORMATION

Document	Annual Report
Date	7 November 2025
Name and position of originator	Emma Baker, Environmental Scientist
Report directory	\\water.internal\ORG\Ops\Water Supply\Headworks\SDGEN\00 - Site General\Compliance\Annual Reports\Annual Report 2024-25

REVISION HISTORY

Rev	Revision Date	Name	Position	Signature
1	DD/MM/YYYY	Michiel Jonker	Environmental Care Manager	
2	31/10/2025	Brendon Dockary	Operations Controller	
3	29/10/2025	James Talbot	Headworks Manager	

APPROVED

Date	Name	Position	Signature
DD/MM/YYYY	Michiel Jonker	Environmental Care Manager	

CONSENT CHANGE AND MONITORING HISTORY

Change type	Description	Effective date	Reference / condition	Reporting / monitoring implications
Monitoring site reinstatement	Site B environmental monitoring site moved from upstream of the road culvert, to below the compensation flow outlet.	January 2025	5	Long term analysis of this site must consider the change.
Annual report due date	Watercare requested all dam annual reports to be extended from 30 September to 31 October for 2025	15/09/2025	7	Hays Creek Dam report to be submitted by 31 October 2025.

EXECUTIVE SUMMARY

The 2024-2025 annual report for the Hays Creek Dam provides an overview of compliance and monitoring activities conducted over the reporting period from 1 July 2024 to 30 June 2025. The report covers various aspects, including water abstraction, reservoir levels, spillway discharges, compensation flows, environmental monitoring, and pipeline operations, as required under the respective resource consents.

Key findings and highlights from the monitoring activities include:

- Water usage: The total volume of water abstracted during the reporting period was 2,814,633 m^3 from the Hays Creek Dam, measured accurately with Magflow meters
- Reservoir levels: Both dams were continuously monitored, showing average daily reservoir levels within the expected range. The Hays Creek Dam ranged between 12.6 and 16.5 meters.
- Compensation flows: The required minimum flows of 10 L/s or 5 L/s to Hays Stream were met, when reservoir storage was greater than 70% or between 50 to 70% respectively.
- Environmental stream monitoring: Monitoring downstream of the dams highlighted stable water quality and nutrient levels. Macroinvertebrates show stable or improving condition, particularly at the control site.
- Fisheries management: 459 elvers and 5 galaxiids were transferred above the Hays Creek weir. Six migrating eels were caught in the Hays Creek Dam during the monitoring period.
- Scour discharge valve operations: A singular discharge occurred from the dam, with turbidity levels monitored before and after discharges to ensure compliance with environmental standards
- Network Efficiency and Conservation: Watercare continues its water efficiency efforts, identifying and repairing leaks across the region, reducing non-revenue water, and promoting residential and commercial water conservation initiatives

In conclusion, all resource consent conditions were compliant, and no equipment failures or maintenance activities resulted in adverse environmental effects.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

This report contains the monitoring results required annually by the following resource consents for Hays Creek Dam; WAT80317020, WAT80316391 and DIS80298308. These consents cover the damming, water take and discharge to water activities respectively.

The conditions of the consents requiring annual reports are listed in Table 1-1.

Table 1-1: Resource consent conditions requiring annual reports.

Reporting information	Consent conditions
Water use	1
Reservoir level	2
Stream flows	4
Fisheries management	4
Environmental monitoring	5
Free discharge valve monitoring	6
Network efficiency and conservation	10
Dam Safety	12

2 WATER USAGE

The daily quantity of water being taken from the Hays Creek Dam is measured by is measured by a Magflow meter located on the outgoing pipeline. The meters measure to an accuracy of at least ± 5% and are routinely verified.

Daily abstraction for the reporting period is shown in Figure 2-1. The full dataset is in Appendix A. Over the 12 months 2,814,633 m^3 was abstracted from Hays Creek Dam.

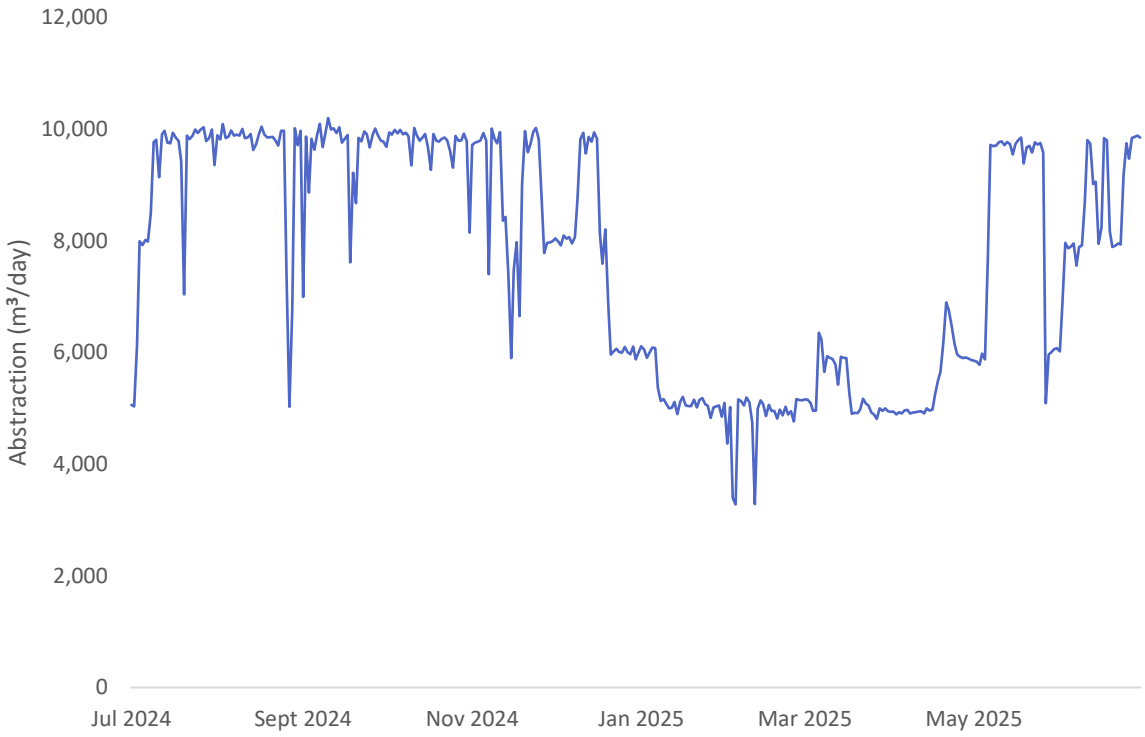


Figure 2-1: Total daily abstraction from Hays Creek Dam for 2024-2025.

3 RESERVOIR LEVEL

The reservoir level is monitored continuously on SCADA by a level transmitter located in the valve tower at Hays Creek Dam.

The daily average reservoir levels for the reporting period are shown in Figure 3-1. The full dataset is in Appendix B. The average daily lake level for Hays Creek Dam ranged between 12.6 – 16.5 m.

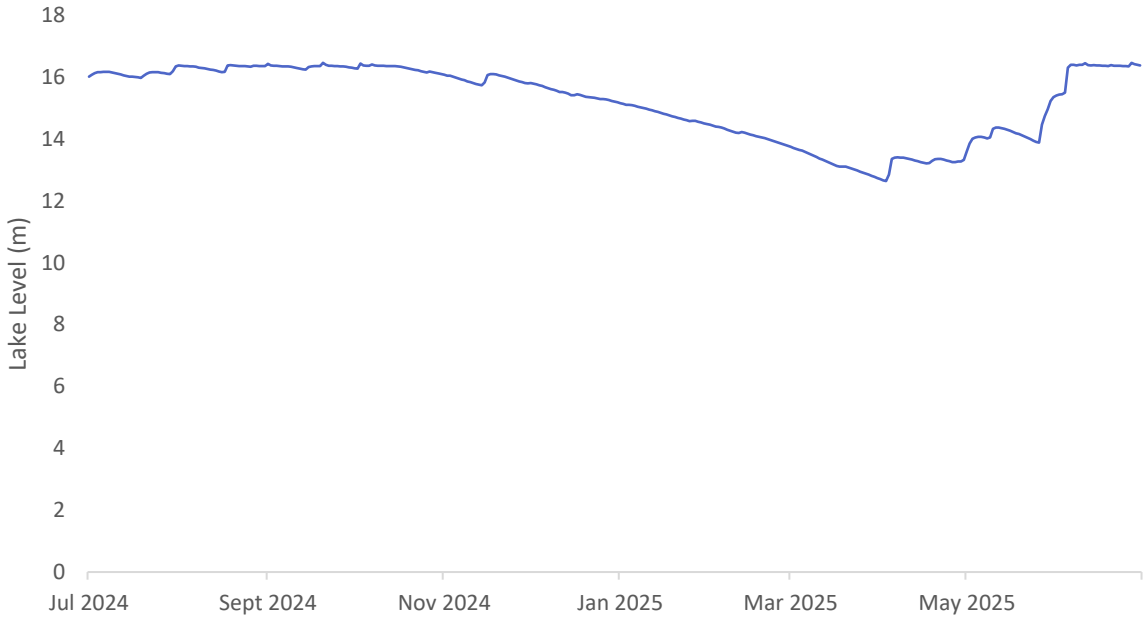


Figure 3-1: Reservoir daily average level for Hays Creek Dam for 2024-2025.

4 COMPENSATION FLOW

As required by condition 4(i) of the consent, a minimum residual flow (compensation flow) is required to be maintained in Hays Stream, dependent on the quantity of water in the Hays Creek Dam. Where the Hays Creek Dam's reservoir storage is greater than 70%, between 50% and 70% or less than 50%, the minimum residual flow must be 10 L/s, 5 L/s or natural flow respectively. Throughout the reporting period, the reservoir storage was primarily greater than 70%.

The compensation flows are shown in Figure 4-1. Compensation flow from Hays Creek Dam is shown in Figure 4-2. The complete dataset is in Appendix C. Throughout the reporting period, compensation flow was fully compliant.

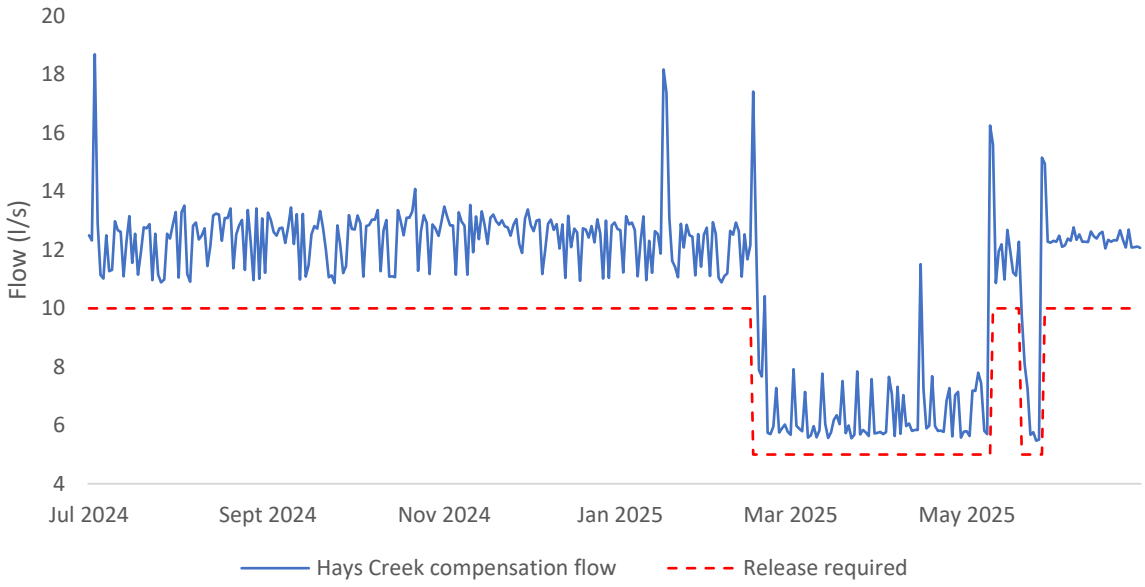


Figure 4-1: Hays Creek Dam daily average compensation flows for the reporting period 2024-2025.

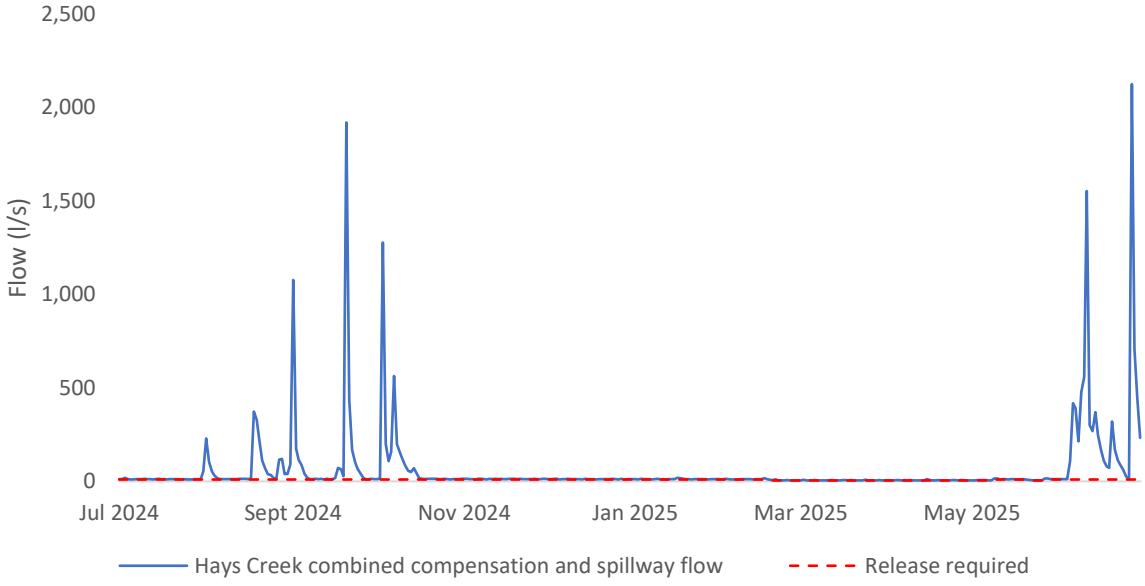


Figure 4-2: Hays Creek Dam combined compensation and spillway flows for the reporting period 2024-2025.

5 FISHERIES MANAGEMENT

Fisheries management for the upstream and downstream transfer of native fish is ongoing at Hays Creek Dam. Ministry of Primary Industries approval has been granted for this work under Special Permit 737. The records from the 2024-2025 trap and haul season are detailed in the annual report to the Ministry of Primary Industries, which is included in Appendix D.

During upstream migration, 614 elvers and 5 galaxiids were transferred above the Hays Creek Dam. Two migrating eels were caught in the Hays Creek Dam during the monitoring period. These results are consistent with previous years' catches.

6 SCOUR VALVE OPERATIONS

6.1 Hays Creek Dam

During the 2024-2025 reporting period, Watercare undertook one discharge valve operations from the dam as described in Table 6-1. Turbidity was measured downstream of the discharge point approximately 30 minutes before discharge commenced and between 60 and 120 minutes after the discharge valve has been opened. As shown in the table, no discharges caused an increase of turbidity >35 NTU and no adverse environmental effects were observed. Auckland Council was notified more than 24 hours in advance for the discharges.

Table 6-1: Discharge valve monitoring.

Date	Duration of discharge	Turbidity before (NTU)	Turbidity during/after (NTU)
15 October 2024	24 minutes	11.2	11.0

6.2 Hays Creek Dam raw water pipeline

The Hays Creek Dam Raw Water Pipeline is used to convey water from the dam to the Papakura Water Treatment Plant. To use this pipeline dam Watercare holds resource consent DIS60266833. This consent allows the discharge of raw water to land or water from seven scour valves and associated structures in the pipeline for flushing, maintenance, or other operational activities.

No discharges from the pipeline occurred in 2024-2025.

7 NETWORK EFFICIENCY AND CONSERVATION

Watercare has published the Auckland Water Efficiency Plan 2021 to 2025[1], which includes a section detailing its water efficiency programmes and achievements. In summary, Watercare's water efficiency strategy has four main pillars:

- **Municipal water efficiency programme**: related to reducing water use by Watercare itself, mainly through reuse at its treatment plants, and by Auckland Council, through initiatives targeted at saving 30% of water use.
- **Residential water efficiency programme**: includes working with schools and sports clubs to raise awareness and water-saving campaigns, and a partnership with EcoMatters to give households the opportunity to have their water use audited and receive a report on the water and dollar savings they can achieve through simple changes.
- **Commercial water efficiency programme:** involves working with key costumers to reduce demand from our largest users, through initiatives such as the digital meter roll-out project across high-use industrial users, schools and sports clubs.
- **Non-revenue water reduction programme**: related to initiatives focused on reducing three aspects of non-revenue water: leakage, under-reading of meters, and unauthorised use.

Watercare continues with its proactive leakage detection programme, which is effectively targeting areas for leakage surveying using its district meter areas and its Leakage Management System. We continue to optimise our water networks performance through our pressure management programme, which is reducing the number of leaks and their recurrence of them.

The average consumption of Aucklanders is 257 l/p/d which is within our target for water consumption.

More details on water efficiency initiatives, performance, challenges, targets, and strategies for the future are available directly in the Auckland Water Efficiency Plan 2021 to 2025.

8 DAM SAFETY

A Dam Safety Compliance Certificate signed by a Chartered Professional Engineer of sufficient experience is required to be submitted on an annual basis. This certificate was supplied to Auckland Council on 29 September 2025 and is attached in Appendix E. The dam has been operated, maintained and monitored to ensure that it is structurally sound and poses no undue risk to life, property or the natural environment.

[1] https://waterefficiencyplan.watercare.co.nz/

9 ENVIRONMENTAL MONITORING

9.1 Overview

Condition 5 requires water quality, macroinvertebrate and habitat monitoring of three established sites in the Hays Creek catchment, two located downstream of the Hays Creek Dam and a control site. Monitoring is undertaken by Watercare Laboratory Services.

9.2 Monitoring sites

The location of the monitoring sites is shown in Figure 9-4. All monitoring sites are in riffle habitat.

9.2.1 Site A (control)

37°04'34.9"S 175°01'00.6"E

The Site A control monitoring location shown in Figure 9-1 is located on Hays Stream in pastoral area. It is 0.13 km upstream of the confluence with the spillway discharge, 0.25 km upstream of the compensation flow outlet, and 0.26 km upstream of Site C.

Figure 9-1: Site A, looking downstream (December 2024).

9.2.2 Site B

37°04'39.9"S 174°59'30.9"E

The Site B monitoring location shown in Figure 9-2 is located on the Hays Creek Stream, 2.99 km below Site C and upstream of any active Winstone Aggregates Limited's stormwater discharge point.

Figure 9-2: Site B, looking upstream (December 2024).

9.2.3 Site C

37°04'30.5"S 175°00'52.7"E

The Site C monitoring site shown in Figure 9-3 is located on the Hays Creek Stream, approximately 0.27 km downstream of Site A and 0.1 km downstream of the compensation flow outlet. Site C is located between Site A and Site B.

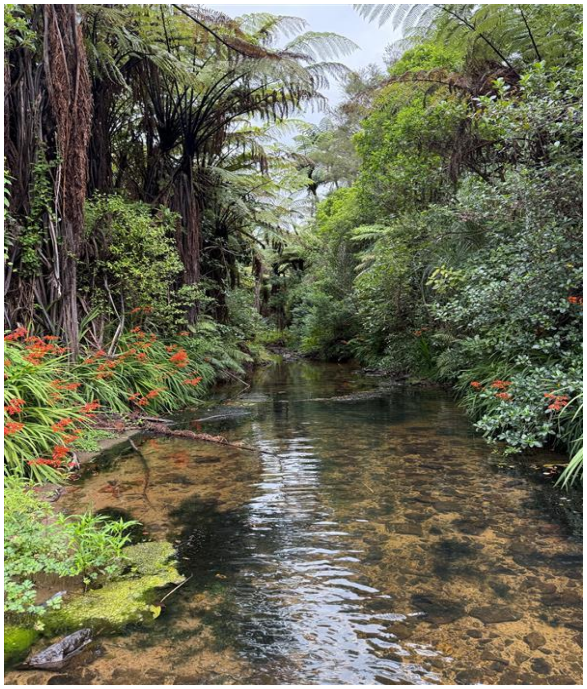


Figure 9-3: Site C, looking downstream (December 2024).

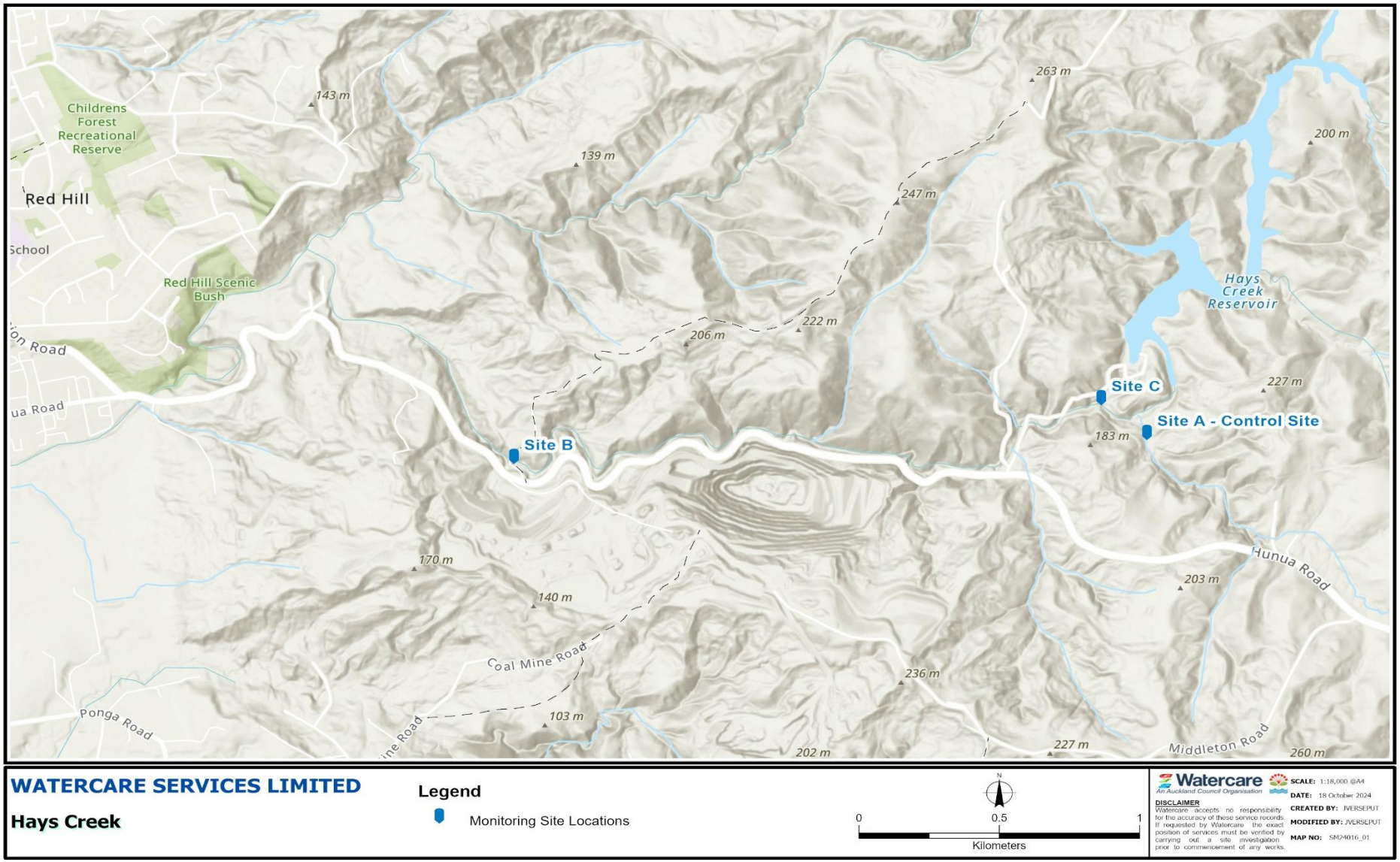


Figure 9-4: Hays Creek catchment monitoring locations.

9.3 Methods

9.3.1 Water quality – discrete monitoring

Discrete water quality samples are collected monthly over summer, between December and April of each year. The parameters analysed at these sites are listed in Table 9-1. Sampling methodology and analysis techniques were carried out in accordance with APHA Standard Methods for the Examination of Water and Wastewater (2011), as per condition 5(vii).

Temperature and dissolved oxygen measurements are taken in situ using a calibrated YSI ProDSS meter. Periphyton composite samples are collected by scraping periphyton from 10 randomly selected rock surfaces[2].

Table 9-1: Monthly water quality parameters

Parameter	Units	Monitoring sites
Temperature*	˚C	A, B, C
Suspended solids	g/m³	A, B, C
pH	pH Unit	A, B, C
Turbidity	NTU	A, B, C
Dissolved oxygen (DO)*	g/m³	A, B, C
Dissolved reactive phosphorus (DRP)	gP/m³	A, B
Ammonia nitrogen (NH4–N)	gN/m³	A, B
Nitrate nitrogen (NO3–N)	gN/m³	A, B
Periphyton (*Chlorophyll a)*	mg/m²	Not required

*Parameters recorded in the field (all others analysed at the laboratory)

Best endeavours are made to conduct sampling during periods of flow recession and when there had been rainfall of no greater than 2 mm over the previous 48 hours. When these conditions are unable to be met, sampling is completed before the end of the respective month. For the 2024-2025 monitoring period, the sampling dates and preceding rainfall totals are presented in Table 9-2.

Table 9-2: Discrete water quality sampling dates and rainfall for 2024-2025.

Date	Rainfall 48 hours prior (mm)
20 December 2024	0.0
21 January 2025	2.0
20 February 2025	1.5
6 March 2025	9.5
30 April 2025	28.0

[2] Biggs BJF, Kilroy C, 2000: Stream Periphyton Monitoring Manual. Prepared for Ministry for the Environment, Wellington, New Zealand.

The flow at the Mangawheau weir on the days of sampling are presented in Figure 9-5, in accordance with condition 5.

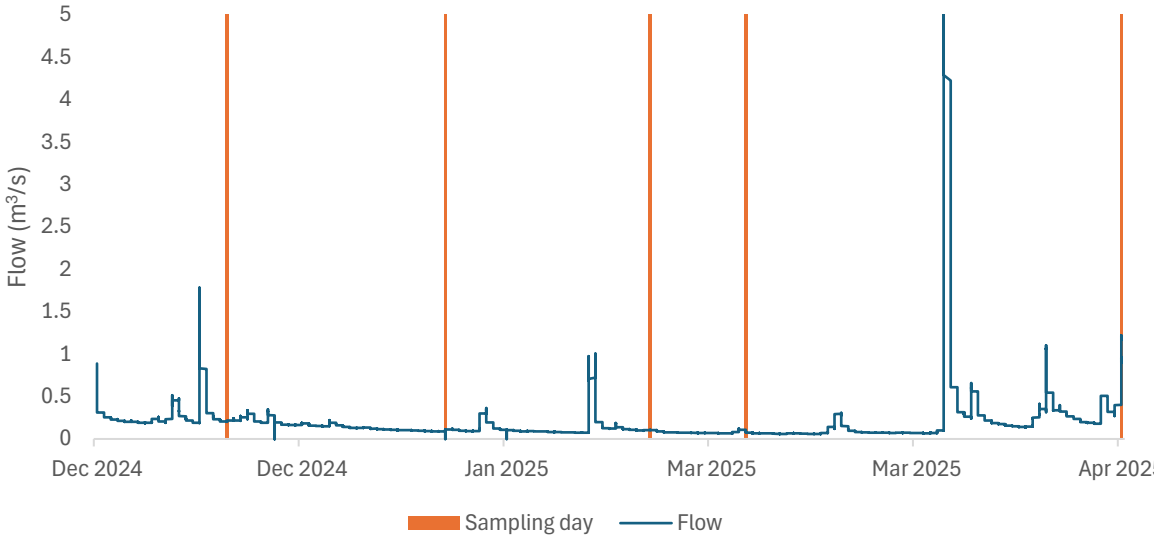


Figure 9-5: Flow at the Mangawheau weir in the December 2024 to April 2025 monitoring period.

9.3.2 Water quality – continuous monitoring

Condition 5(iv) requires that water temperature is continuously monitored at Site A (control) and Site B between December and May (inclusive) at 5-yearly intervals. Condition 5(iv) requires continuous measurement of dissolved oxygen, pH, temperature and conductivity over a 14-day period between 1 February and 15 April at 5-yearly intervals. Data logs at 10-minute intervals and is manually uploaded once monthly.

The most recent continuous monitoring was completed in 2021-2022. The next monitoring is required in 2026-2027.

9.3.3 Macroinvertebrate and habitat monitoring

Macroinvertebrate samples were collected once in winter (Jun-Jul) and in summer (Jan-Feb) each monitoring period. Three replicate samples were collected using kick-net sampling techniques[3]. Visual observations of substrate composition and embeddedness were recorded during each macroinvertebrate sampling event. Embeddedness measurements were based on a 50-100 m reach that includes the sampling site. Substrate composition was based on percentage coverage of different substrate sizes, as shown in Table 9-3.

In the 2024-2025 reporting period, macroinvertebrate and habitat monitoring occurred on 13 July 2024 and 6 February 2025.

Table 9-3: Substrate size classes.

Substratum Type	Size
Clay	<0.004 mm

[3] Stark et al. (2001). Protocols for sampling macroinvertebrates in wadeable streams

Silt	0.004-0.06 mm
Sand	>0.06-2 mm
Gravel	>2-64 mm
Cobble	>64-256 mm
Boulder	>256 mm
Bedrock	-

9.4 Results

9.5 Water quality – discrete monitoring

The results for the monitoring period are presented in Table 9-4. General water quality parameters were very similar in the control site and downstream sites. Temperature: Mean temperature increases from 15.3°C (Site A) to 17.5°C (Site B) and 16.4°C (Site C), reflecting expected warming downstream due to variation in riparian shading. Dissolved Oxygen levels are high across all sites, indicating good aeration and low organic loading. pH is consistent and neutral across sites, showing no acidification or notable deviation from natural background. Turbidity and suspended solids were moderate but variable. Site A and C record higher means compared with Site B.

Nutrient levels were low at all sites. Nitrate was moderate on average at Site A, but much lower downstream, implying nutrient uptake or dilution between sites. Site A's immediate surrounding catchment is pasture, which may be the driver of this difference. Dissolved Reactive Phosphorus is also low on average. Comparing to NPS-FM 2020 nutrient attribute bands for rivers, both nitrogen and phosphorus are firmly within the A band, indicating minimal risk of nuisance algal growth or ecosystem stress.

Periphyton was generally below the recommended maximum chlorophyll *a* value (50 mg/m^2) for the protection of benthic biodiversity[4].

Table 9-4: Summary results (mean ± 95% confidence interval) for water quality parameters for the Hays Creek monitoring sites 2024-2025.

Parameter	Unit	Site A	Site B	Site C
Ammoniacal Nitrogen	mg/L	0.009 ± 0.003	0.006 ± 0.002	N/A
Chlorophyll A	mg/L	0 ± 0	0.5 ± 1	1 ± 2.6
DO	mg/L	9.4 ± 0.4	8.9 ± 0.7	9.1 ± 0.8
DRP	mg/L	0.008 ± 0.004	0.005 ± 0.003	N/A
Nitrate	mg/L	0.534 ± 0.274	0.103 ± 0.112	N/A
Suspended Solids	mg/L	11.7 ± 14.5	4 ± 4.2	N/A
Temperature	°C	15.3 ± 2	17.5 ± 1.5	16.4 ± 3.4
Turbidity	NTU	10.4 ± 8.6	6.2 ± 9.2	10.7 ± 8.2
pH	pH unit	7.1 ± 0.3	7.1 ± 0.3	7.2 ± 0.3

[4] https://environment.govt.nz/assets/Publications/Files/nz-periphyton-guide-jun00.pdf

9.6 Macroinvertebrate and habitat monitoring

The results for the monitoring period are presented in Table 9-5. MCI scores progressively decreased downstream, with Site A, scoring as “excellent”, Site B as “good” and Site C as “good-fair” across the monitoring period (Stark & Maxted, 2007). QMCI follows a similar pattern of “excellent”, “good” and “fair” for Sites A, B and C respectively.

EPT taxa had the highest counts at Sites A and B, with lower richness at Site C. Taxa richness is also highest at Site A, reducing downstream at Sites B and C. Macroinvertebrate assemblages remain healthy and show minimal evidence of stress or pollution, though summer variability at Site C suggests local habitat effects.

Table 9-5: Summary results (mean ± 95% confidence interval) of macroinvertebrate community metrics for the Hays Creef monitoring sites 2024-2025.

Season	Metric	Site A	Site B	Site C
Winter	EPT taxa	12.7 ± 8.7	9.7 ± 2.9	7.3 ± 8
Summer	EPT taxa	10.7 ± 7.6	11.3 ± 7.6	4 ± 2.5
Winter	Individuals	496 ± 316.9	443 ± 483.2	128 ± 143.7
Summer	Individuals	270.3 ± 395.1	496.3 ± 446.7	210.7 ± 161.3
Winter	MCI	127.7 ± 5.2	111.7 ± 9.4	110 ± 18.8
Summer	MCI	126.7 ± 10	107.7 ± 20.8	82.3 ± 22.3
Winter	QMCI	6.7 ± 1.4	6 ± 0	5 ± 0
Summer	QMCI	6.7 ± 1.4	4 ± 0	4 ± 0
Winter	Taxa richness	18 ± 11.4	15 ± 4.3	13.7 ± 7.6
Summer	Taxa richness	14 ± 9	16 ± 7.5	11.3 ± 3.8

9.7 Trend analysis

A summary of the historical results collected by the lab between December 2020 and April 2025 are presented in Table 9-6 and Table 9-7.

Chlorophyll a is decreasing at all sites (A–C), significantly, indicating long-term reduction in periphyton biomass and improved ecological balance, comparatively, there are no significant increasing or decreasing trends for any nutrient parameters.

Turbidity is increasing at Sites B and C, while stable at A. pH has a slight decreasing trend at Sites A and C, but stable at B → could reflect regional rainfall or catchment acid-base shifts rather than dam effects. The results remain within a neutral range. Other parameters (DO, nutrients, temperature, suspended solids) show no significant trends.

Overall, nutrient and oxygen conditions are stable, supporting long-term ecological resilience. The periphyton decline is a positive outcome, however turbidity increases downstream warrant ongoing observation to confirm whether they relate to external sediment inputs rather than dam operations.

For macroinvertebrates, QMCI scores show a significant *increase* at Control (Site A) indicating improving stream health, but no significant trends at B or C. MCI scores are stable at A and no significant trends at Sites B or C. Additionally, EPT Taxa, Taxa Richness, Individuals: No significant trends, but slight increases in total abundance at Site C approach significance ($p = 0.07$).

Overall, macroinvertebrate communities show stable or improving ecological condition overall. Control site improvement (QMCI increase) highlights catchment-wide good management, and downstream sites remain biologically consistent, with no evidence of progressive degradation or enrichment.

Table 9-6: Summary results (mean ± 95% confidence interval) and Mann-Kendall trend analysis results of water quality parameters for the Hays Creek monitoring sites 2020-2025.

Monitoring site	Metric	Unit	Mean ± 95% CI	Tau	p-value	Trend
Site A	Ammoniacal Nitrogen	mg/L	0.008 ± 0.001	0.23	0.15	No significant trend
Site B	Ammoniacal Nitrogen	mg/L	0.007 ± 0.002	0.24	0.17	No significant trend
Site A	Chlorophyll A	mg/L	0.2 ± 0.2	-0.46	0	Decreasing
Site B	Chlorophyll A	mg/L	3.1 ± 1.9	-0.46	0	Decreasing
Site C	Chlorophyll A	mg/L	3.7 ± 3.5	-0.43	0	Decreasing
Site A	DO	mg/L	9.5 ± 0.2	-0.24	0.12	No significant trend
Site B	DO	mg/L	9.2 ± 0.4	0.04	0.79	No significant trend
Site C	DO	mg/L	9.6 ± 0.5	-0.07	0.67	No significant trend
Site A	DRP	mg/L	0.008 ± 0.001	-0.03	0.89	No significant trend
Site B	DRP	mg/L	0.006 ± 0.001	0.04	0.82	No significant trend
Site A	Nitrate	mg/L	0.529 ± 0.057	0.01	0.98	No significant trend
Site B	Nitrate	mg/L	0.209 ± 0.055	0.04	0.83	No significant trend
Site A	pH	pH unit	7.3 ± 0.1	-0.34	0.01	Decreasing
Site B	pH	pH unit	7.2 ± 0.1	-0.24	0.1	No significant trend
Site C	pH	pH unit	7.3 ± 0.1	-0.3	0.03	Decreasing
Site A	Suspended Solids	mg/L	9.4 ± 4.6	0.06	0.71	No significant trend
Site B	Suspended Solids	mg/L	5.2 ± 3.3	0.2	0.19	No significant trend
Site A	Temperature	°C	15.2 ± 0.8	-0.02	0.92	No significant trend
Site B	Temperature	°C	17.1 ± 0.9	-0.04	0.81	No significant trend
Site C	Temperature	°C	16.0 ± 1.0	-0.04	0.79	No significant trend
Site A	Turbidity	NTU	8.6 ± 3.1	0.16	0.3	No significant trend
Site B	Turbidity	NTU	4.1 ± 1.9	0.38	0.01	Increasing
Site C	Turbidity	NTU	7.3 ± 2.9	0.52	0	Increasing

Table 9-7: Summary results (mean ± 95% confidence interval) and Mann-Kendall trend analysis results of macroinvertebrate community metrics for the Hays Creek monitoring sites 2020-2025.

Monitoring site	Metric	Mean ± 95% CI	Tau	p-value	Trend
Site A	EPT taxa	9.7 (± 1.2)	-0.0038	1	No significant trend
Site B	EPT taxa	9.1 (± 1.0)	-0.0734	0.6493	No significant trend
Site C	EPT taxa	5.4 (± 1.5)	-0.0225	0.9006	No significant trend

Monitoring site	Metric	Mean ± 95% CI	Tau	p-value	Trend
Site A	Individuals	204.1 (±62.5)	0.0507	0.7471	No significant trend
Site B	Individuals	296.0 (±71.9)	0.1957	0.1886	No significant trend
Site C	Individuals	97.1 (±27.2)	0.265	0.074	No significant trend
Site A	MCI	124.4 (± 3.0)	0.2256	0.1352	No significant trend
Site B	MCI	114.2 (± 2.6)	-0.2165	0.1548	No significant trend
Site C	MCI	103.3 (± 6.3)	-0.2596	0.082	No significant trend
Site A	QMCI	6.3 (± 0.5)	0.4473	0.0102	Increasing
Site B	QMCI	5.3 (± 0.4)	-0.2447	0.169	No significant trend
Site C	QMCI	4.6 (± 0.4)	-0.3199	0.079	No significant trend
Site A	Taxa richness	14.8 (± 1.8)	-0.1683	0.2719	No significant trend
Site B	Taxa richness	14.1 (± 1.4)	-0.095	0.5469	No significant trend
Site C	Taxa richness	10.1 (± 1.9)	0	1	No significant trend

10 CONCLUSION

This report presents the required data for the period of 1 July 2024 to 30 June 2025 for the Hays Creek Dam and raw water pipeline. All consent conditions were fully compliant throughout the monitoring period.

There were no equipment failures or maintenance activities undertaken in the reporting period that resulted in a discharge that had an observed adverse environmental effect.

The environmental stream monitoring indicates some variability in water quality and macroinvertebrate communities, although this attributed to localised differences in the structure of substrate and cover rather than flow or water quality related changes.

Appendix A. Daily Water Abstraction Volumes

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
1/07/2024	5064	1/01/2025	6111
2/07/2024	5035	2/01/2025	6052
3/07/2024	6133	3/01/2025	5908
4/07/2024	7994	4/01/2025	5996
5/07/2024	7926	5/01/2025	6090
6/07/2024	8018	6/01/2025	6075
7/07/2024	7988	7/01/2025	5372
8/07/2024	8490	8/01/2025	5131
9/07/2024	9770	9/01/2025	5164
10/07/2024	9809	10/01/2025	5088
11/07/2024	9141	11/01/2025	5000
12/07/2024	9906	12/01/2025	5008
13/07/2024	9972	13/01/2025	5114
14/07/2024	9759	14/01/2025	4895
15/07/2024	9749	15/01/2025	5122
16/07/2024	9936	16/01/2025	5208
17/07/2024	9852	17/01/2025	5051
18/07/2024	9787	18/01/2025	5039
19/07/2024	9420	19/01/2025	5037
20/07/2024	7041	20/01/2025	5153
21/07/2024	9885	21/01/2025	5016
22/07/2024	9821	22/01/2025	5150
23/07/2024	9876	23/01/2025	5181
24/07/2024	9991	24/01/2025	5071
25/07/2024	9930	25/01/2025	5045
26/07/2024	9990	26/01/2025	4830
27/07/2024	10032	27/01/2025	5015
28/07/2024	9788	28/01/2025	5031
29/07/2024	9836	29/01/2025	5053
30/07/2024	9993	30/01/2025	4848
31/07/2024	9356	31/01/2025	5094
1/08/2024	9889	1/02/2025	4367
2/08/2024	9817	2/02/2025	5021
3/08/2024	10089	3/02/2025	3393
4/08/2024	9841	4/02/2025	3278

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
5/08/2024	9870	5/02/2025	5162
6/08/2024	9976	6/02/2025	5132
7/08/2024	9884	7/02/2025	5049
8/08/2024	9903	8/02/2025	5196
9/08/2024	9885	9/02/2025	5111
10/08/2024	10006	10/02/2025	4745
11/08/2024	9838	11/02/2025	3287
12/08/2024	9850	12/02/2025	4996
13/08/2024	9916	13/02/2025	5145
14/08/2024	9627	14/02/2025	5074
15/08/2024	9727	15/02/2025	4860
16/08/2024	9914	16/02/2025	5064
17/08/2024	10048	17/02/2025	4951
18/08/2024	9900	18/02/2025	4953
19/08/2024	9851	19/02/2025	4817
20/08/2024	9856	20/02/2025	4975
21/08/2024	9860	21/02/2025	4874
22/08/2024	9795	22/02/2025	5025
23/08/2024	9704	23/02/2025	4893
24/08/2024	9968	24/02/2025	4945
25/08/2024	9970	25/02/2025	4762
26/08/2024	7402	26/02/2025	5163
27/08/2024	5025	27/02/2025	5149
28/08/2024	6777	28/02/2025	5141
29/08/2024	10018	1/03/2025	5161
30/08/2024	9713	2/03/2025	5152
31/08/2024	9971	3/03/2025	5095
1/09/2024	6993	4/03/2025	4956
2/09/2024	9865	5/03/2025	4959
3/09/2024	8862	6/03/2025	6354
4/09/2024	9827	7/03/2025	6239
5/09/2024	9630	8/03/2025	5654
6/09/2024	9909	9/03/2025	5936
7/09/2024	10096	10/03/2025	5906
8/09/2024	9678	11/03/2025	5881

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
9/09/2024	9940	12/03/2025	5782
10/09/2024	10198	13/03/2025	5421
11/09/2024	9996	14/03/2025	5923
12/09/2024	10016	15/03/2025	5904
13/09/2024	9930	16/03/2025	5898
14/09/2024	10031	17/03/2025	5287
15/09/2024	9760	18/03/2025	4900
16/09/2024	9825	19/03/2025	4921
17/09/2024	9895	20/03/2025	4913
18/09/2024	7614	21/03/2025	4979
19/09/2024	9222	22/03/2025	5171
20/09/2024	8676	23/03/2025	5082
21/09/2024	9842	24/03/2025	5048
22/09/2024	9783	25/03/2025	4923
23/09/2024	9957	26/03/2025	4885
24/09/2024	9908	27/03/2025	4809
25/09/2024	9671	28/03/2025	5002
26/09/2024	9895	29/03/2025	4953
27/09/2024	10012	30/03/2025	4997
28/09/2024	9882	31/03/2025	4949
29/09/2024	9791	1/04/2025	4935
30/09/2024	9774	2/04/2025	4940
1/10/2024	9686	3/04/2025	4893
2/10/2024	9942	4/04/2025	4931
3/10/2024	9903	5/04/2025	4907
4/10/2024	9987	6/04/2025	4966
5/10/2024	9925	7/04/2025	4973
6/10/2024	9985	8/04/2025	4906
7/10/2024	9910	9/04/2025	4924
8/10/2024	9935	10/04/2025	4933
9/10/2024	9876	11/04/2025	4944
10/10/2024	9351	12/04/2025	4949
11/10/2024	10021	13/04/2025	4910
12/10/2024	9893	14/04/2025	4997
13/10/2024	9790	15/04/2025	4956

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
14/10/2024	9851	16/04/2025	4979
15/10/2024	9912	17/04/2025	5247
16/10/2024	9672	18/04/2025	5490
17/10/2024	9272	19/04/2025	5651
18/10/2024	9913	20/04/2025	6182
19/10/2024	9795	21/04/2025	6895
20/10/2024	9774	22/04/2025	6759
21/10/2024	9828	23/04/2025	6474
22/10/2024	9849	24/04/2025	6152
23/10/2024	9799	25/04/2025	5971
24/10/2024	9611	26/04/2025	5925
25/10/2024	9309	27/04/2025	5897
26/10/2024	9879	28/04/2025	5908
27/10/2024	9793	29/04/2025	5895
28/10/2024	9797	30/04/2025	5864
29/10/2024	9918	1/05/2025	5853
30/10/2024	9788	2/05/2025	5839
31/10/2024	8146	3/05/2025	5781
1/11/2024	9719	4/05/2025	5980
2/11/2024	9760	5/05/2025	5875
3/11/2024	9774	6/05/2025	7696
4/11/2024	9797	7/05/2025	9717
5/11/2024	9932	8/05/2025	9697
6/11/2024	9795	9/05/2025	9709
7/11/2024	7400	10/05/2025	9762
8/11/2024	10010	11/05/2025	9783
9/11/2024	9826	12/05/2025	9714
10/11/2024	9747	13/05/2025	9770
11/11/2024	9950	14/05/2025	9733
12/11/2024	8360	15/05/2025	9544
13/11/2024	8427	16/05/2025	9730
14/11/2024	7400	17/05/2025	9806
15/11/2024	5902	18/05/2025	9849
16/11/2024	7486	19/05/2025	9383
17/11/2024	7975	20/05/2025	9673

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
18/11/2024	6649	21/05/2025	9699
19/11/2024	9025	22/05/2025	9578
20/11/2024	9963	23/05/2025	9763
21/11/2024	9586	24/05/2025	9721
22/11/2024	9732	25/05/2025	9752
23/11/2024	9956	26/05/2025	9581
24/11/2024	10023	27/05/2025	5093
25/11/2024	9823	28/05/2025	5964
26/11/2024	8753	29/05/2025	6011
27/11/2024	7781	30/05/2025	6058
28/11/2024	7963	31/05/2025	6077
29/11/2024	7968	1/06/2025	6020
30/11/2024	7994	2/06/2025	6885
1/12/2024	8044	3/06/2025	7965
2/12/2024	7987	4/06/2025	7866
3/12/2024	7918	5/06/2025	7895
4/12/2024	8094	6/06/2025	7952
5/12/2024	8041	7/06/2025	7559
6/12/2024	8068	8/06/2025	7886
7/12/2024	7951	9/06/2025	7916
8/12/2024	8067	10/06/2025	8697
9/12/2024	8741	11/06/2025	9807
10/12/2024	9822	12/06/2025	9743
11/12/2024	9934	13/06/2025	9021
12/12/2024	9561	14/06/2025	9060
13/12/2024	9860	15/06/2025	7945
14/12/2024	9777	16/06/2025	8238
15/12/2024	9941	17/06/2025	9839
16/12/2024	9830	18/06/2025	9800
17/12/2024	8130	19/06/2025	8168
18/12/2024	7592	20/06/2025	7889
19/12/2024	8204	21/06/2025	7910
20/12/2024	6880	22/06/2025	7950
21/12/2024	5960	23/06/2025	7935
22/12/2024	6018	24/06/2025	9177

Date	Abstraction (m^3/day)	Date (continued)	Abstraction (m^3/day)
23/12/2024	6065	25/06/2025	9746
24/12/2024	6011	26/06/2025	9471
25/12/2024	5997	27/06/2025	9843
26/12/2024	6099	28/06/2025	9860
27/12/2024	6010	29/06/2025	9883
28/12/2024	5969	30/06/2025	9848
29/12/2024	6106		
30/12/2024	5875		
31/12/2024	6003		

Appendix B. Daily average reservoir level

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
1/07/2024	16.018	1/01/2025	15.159
2/07/2024	16.077	2/01/2025	15.134
3/07/2024	16.133	3/01/2025	15.109
4/07/2024	16.160	4/01/2025	15.105
5/07/2024	16.166	5/01/2025	15.095
6/07/2024	16.169	6/01/2025	15.071
7/07/2024	16.169	7/01/2025	15.044
8/07/2024	16.167	8/01/2025	15.022
9/07/2024	16.152	9/01/2025	15.002
10/07/2024	16.130	10/01/2025	14.979
11/07/2024	16.108	11/01/2025	14.954
12/07/2024	16.088	12/01/2025	14.927
13/07/2024	16.058	13/01/2025	14.900
14/07/2024	16.032	14/01/2025	14.874
15/07/2024	16.014	15/01/2025	14.849
16/07/2024	16.018	16/01/2025	14.819
17/07/2024	16.006	17/01/2025	14.790
18/07/2024	15.994	18/01/2025	14.763
19/07/2024	15.979	19/01/2025	14.735
20/07/2024	16.043	20/01/2025	14.708
21/07/2024	16.111	21/01/2025	14.679
22/07/2024	16.146	22/01/2025	14.660
23/07/2024	16.159	23/01/2025	14.633
24/07/2024	16.162	24/01/2025	14.606
25/07/2024	16.156	25/01/2025	14.578
26/07/2024	16.145	26/01/2025	14.585
27/07/2024	16.129	27/01/2025	14.588
28/07/2024	16.112	28/01/2025	14.561
29/07/2024	16.098	29/01/2025	14.536
30/07/2024	16.188	30/01/2025	14.509
31/07/2024	16.352	31/01/2025	14.483
1/08/2024	16.380	1/02/2025	14.461
2/08/2024	16.366	2/02/2025	14.429
3/08/2024	16.358	3/02/2025	14.404
4/08/2024	16.354	4/02/2025	14.394

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
5/08/2024	16.351	5/02/2025	14.367
6/08/2024	16.343	6/02/2025	14.336
7/08/2024	16.332	7/02/2025	14.301
8/08/2024	16.309	8/02/2025	14.270
9/08/2024	16.299	9/02/2025	14.239
10/08/2024	16.282	10/02/2025	14.208
11/08/2024	16.261	11/02/2025	14.198
12/08/2024	16.244	12/02/2025	14.226
13/08/2024	16.231	13/02/2025	14.203
14/08/2024	16.210	14/02/2025	14.171
15/08/2024	16.182	15/02/2025	14.143
16/08/2024	16.159	16/02/2025	14.120
17/08/2024	16.170	17/02/2025	14.094
18/08/2024	16.379	18/02/2025	14.071
19/08/2024	16.389	19/02/2025	14.045
20/08/2024	16.378	20/02/2025	14.025
21/08/2024	16.367	21/02/2025	13.997
22/08/2024	16.361	22/02/2025	13.969
23/08/2024	16.356	23/02/2025	13.935
24/08/2024	16.355	24/02/2025	13.905
25/08/2024	16.350	25/02/2025	13.876
26/08/2024	16.342	26/02/2025	13.846
27/08/2024	16.364	27/02/2025	13.811
28/08/2024	16.368	28/02/2025	13.779
29/08/2024	16.356	1/03/2025	13.745
30/08/2024	16.356	2/03/2025	13.713
31/08/2024	16.362	3/03/2025	13.676
1/09/2024	16.427	4/03/2025	13.646
2/09/2024	16.374	5/03/2025	13.626
3/09/2024	16.367	6/03/2025	13.586
4/09/2024	16.364	7/03/2025	13.540
5/09/2024	16.356	8/03/2025	13.498
6/09/2024	16.351	9/03/2025	13.459
7/09/2024	16.346	10/03/2025	13.414
8/09/2024	16.345	11/03/2025	13.371

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
9/09/2024	16.336	12/03/2025	13.333
10/09/2024	16.315	13/03/2025	13.294
11/09/2024	16.298	14/03/2025	13.254
12/09/2024	16.277	15/03/2025	13.211
13/09/2024	16.255	16/03/2025	13.165
14/09/2024	16.241	17/03/2025	13.127
15/09/2024	16.328	18/03/2025	13.110
16/09/2024	16.347	19/03/2025	13.103
17/09/2024	16.361	20/03/2025	13.107
18/09/2024	16.360	21/03/2025	13.081
19/09/2024	16.353	22/03/2025	13.046
20/09/2024	16.463	23/03/2025	13.012
21/09/2024	16.396	24/03/2025	12.979
22/09/2024	16.373	25/03/2025	12.945
23/09/2024	16.366	26/03/2025	12.911
24/09/2024	16.361	27/03/2025	12.877
25/09/2024	16.357	28/03/2025	12.845
26/09/2024	16.351	29/03/2025	12.807
27/09/2024	16.347	30/03/2025	12.773
28/09/2024	16.338	31/03/2025	12.737
29/09/2024	16.319	1/04/2025	12.702
30/09/2024	16.303	2/04/2025	12.665
1/10/2024	16.286	3/04/2025	12.641
2/10/2024	16.276	4/04/2025	12.853
3/10/2024	16.441	5/04/2025	13.359
4/10/2024	16.377	6/04/2025	13.402
5/10/2024	16.366	7/04/2025	13.403
6/10/2024	16.371	8/04/2025	13.401
7/10/2024	16.406	9/04/2025	13.396
8/10/2024	16.376	10/04/2025	13.377
9/10/2024	16.372	11/04/2025	13.355
10/10/2024	16.368	12/04/2025	13.334
11/10/2024	16.363	13/04/2025	13.306
12/10/2024	16.359	14/04/2025	13.283
13/10/2024	16.358	15/04/2025	13.257

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
14/10/2024	16.362	16/04/2025	13.232
15/10/2024	16.357	17/04/2025	13.213
16/10/2024	16.348	18/04/2025	13.221
17/10/2024	16.337	19/04/2025	13.298
18/10/2024	16.317	20/04/2025	13.345
19/10/2024	16.299	21/04/2025	13.358
20/10/2024	16.280	22/04/2025	13.353
21/10/2024	16.259	23/04/2025	13.336
22/10/2024	16.237	24/04/2025	13.308
23/10/2024	16.218	25/04/2025	13.283
24/10/2024	16.189	26/04/2025	13.257
25/10/2024	16.169	27/04/2025	13.250
26/10/2024	16.152	28/04/2025	13.277
27/10/2024	16.177	29/04/2025	13.273
28/10/2024	16.166	30/04/2025	13.327
29/10/2024	16.144	1/05/2025	13.597
30/10/2024	16.123	2/05/2025	13.852
31/10/2024	16.103	3/05/2025	14.005
1/11/2024	16.079	4/05/2025	14.050
2/11/2024	16.048	5/05/2025	14.069
3/11/2024	16.043	6/05/2025	14.074
4/11/2024	16.017	7/05/2025	14.048
5/11/2024	15.985	8/05/2025	14.018
6/11/2024	15.953	9/05/2025	14.050
7/11/2024	15.927	10/05/2025	14.327
8/11/2024	15.901	11/05/2025	14.369
9/11/2024	15.866	12/05/2025	14.367
10/11/2024	15.838	13/05/2025	14.352
11/11/2024	15.813	14/05/2025	14.330
12/11/2024	15.783	15/05/2025	14.298
13/11/2024	15.756	16/05/2025	14.264
14/11/2024	15.734	17/05/2025	14.229
15/11/2024	15.825	18/05/2025	14.189
16/11/2024	16.070	19/05/2025	14.161
17/11/2024	16.096	20/05/2025	14.126

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
18/11/2024	16.098	21/05/2025	14.084
19/11/2024	16.089	22/05/2025	14.040
20/11/2024	16.061	23/05/2025	13.996
21/11/2024	16.041	24/05/2025	13.951
22/11/2024	16.018	25/05/2025	13.903
23/11/2024	15.986	26/05/2025	13.879
24/11/2024	15.953	27/05/2025	14.465
25/11/2024	15.918	28/05/2025	14.742
26/11/2024	15.887	29/05/2025	14.959
27/11/2024	15.864	30/05/2025	15.229
28/11/2024	15.842	31/05/2025	15.354
29/11/2024	15.813	1/06/2025	15.406
30/11/2024	15.801	2/06/2025	15.432
1/12/2024	15.808	3/06/2025	15.444
2/12/2024	15.792	4/06/2025	15.501
3/12/2024	15.768	5/06/2025	16.309
4/12/2024	15.740	6/06/2025	16.396
5/12/2024	15.712	7/06/2025	16.394
6/12/2024	15.678	8/06/2025	16.378
7/12/2024	15.648	9/06/2025	16.400
8/12/2024	15.617	10/06/2025	16.396
9/12/2024	15.590	11/06/2025	16.448
10/12/2024	15.560	12/06/2025	16.386
11/12/2024	15.521	13/06/2025	16.383
12/12/2024	15.518	14/06/2025	16.392
13/12/2024	15.501	15/06/2025	16.381
14/12/2024	15.466	16/06/2025	16.374
15/12/2024	15.421	17/06/2025	16.367
16/12/2024	15.419	18/06/2025	16.363
17/12/2024	15.448	19/06/2025	16.361
18/12/2024	15.424	20/06/2025	16.388
19/12/2024	15.395	21/06/2025	16.373
20/12/2024	15.366	22/06/2025	16.367
21/12/2024	15.356	23/06/2025	16.364
22/12/2024	15.344	24/06/2025	16.360

Date	Reservoir level (m)	Date (continued)	Reservoir level (m)
23/12/2024	15.336	25/06/2025	16.353
24/12/2024	15.315	26/06/2025	16.345
25/12/2024	15.294	27/06/2025	16.458
26/12/2024	15.290	28/06/2025	16.416
27/12/2024	15.284	29/06/2025	16.397
28/12/2024	15.259	30/06/2025	16.380
29/12/2024	15.234		
30/12/2024	15.212		
31/12/2024	15.184		

Appendix C. Compensation and spillway flows

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
1/07/2024	12.5	0	12.5
2/07/2024	12.3	0	12.3
3/07/2024	18.7	0	18.7
4/07/2024	12.9	0	12.9
5/07/2024	11.1	0	11.1
6/07/2024	11.0	0	11.0
7/07/2024	12.5	0	12.5
8/07/2024	11.3	0	11.3
9/07/2024	11.3	0	11.3
10/07/2024	13.0	0	13.0
11/07/2024	12.7	0	12.7
12/07/2024	12.6	0	12.6
13/07/2024	11.1	0	11.1
14/07/2024	12.3	0	12.3
15/07/2024	13.2	0	13.2
16/07/2024	11.6	0	11.6
17/07/2024	12.6	0	12.6
18/07/2024	11.2	0	11.2
19/07/2024	11.9	0	11.9
20/07/2024	12.8	0	12.8
21/07/2024	12.7	0	12.7
22/07/2024	12.9	0	12.9
23/07/2024	11.0	0	11.0
24/07/2024	12.6	0	12.6
25/07/2024	11.2	0	11.2
26/07/2024	10.9	0	10.9
27/07/2024	11.0	0	11.0
28/07/2024	12.6	0	12.6
29/07/2024	12.4	0	12.4
30/07/2024	12.9	0	12.9
31/07/2024	13.3	40	53.3
1/08/2024	11.1	219	230.1
2/08/2024	13.3	91	104.3
3/08/2024	13.5	39	52.5

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
4/08/2024	11.2	19	30.2
5/08/2024	10.9	7	17.9
6/08/2024	12.8	0	12.8
7/08/2024	12.9	0	12.9
8/08/2024	12.4	0	12.4
9/08/2024	12.5	0	12.5
10/08/2024	12.7	0	12.7
11/08/2024	11.4	0	11.4
12/08/2024	12.1	0	12.1
13/08/2024	13.2	0	13.2
14/08/2024	13.2	0	13.2
15/08/2024	13.2	0	13.2
16/08/2024	12.3	0	12.3
17/08/2024	13.1	0	13.1
18/08/2024	13.1	360	373.1
19/08/2024	13.4	315	328.4
20/08/2024	11.4	197	208.4
21/08/2024	12.5	99	111.5
22/08/2024	12.8	57	69.8
23/08/2024	13.0	25	38.0
24/08/2024	11.3	23	34.3
25/08/2024	13.4	6	19.4
26/08/2024	12.3	0	12.3
27/08/2024	11.0	106	117.0
28/08/2024	13.4	106	119.4
29/08/2024	11.0	29	40.0
30/08/2024	13.1	26	39.1
31/08/2024	11.2	80	91.2
1/09/2024	13.3	1063	1,076.3
2/09/2024	13.0	162	175.0
3/09/2024	12.6	102	114.6
4/09/2024	12.5	75	87.5
5/09/2024	12.7	29	41.7
6/09/2024	12.8	7	19.8

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
7/09/2024	12.2	0	12.2
8/09/2024	12.8	0	12.8
9/09/2024	13.4	0	13.4
10/09/2024	12.2	0	12.2
11/09/2024	13.2	0	13.2
12/09/2024	11.0	0	11.0
13/09/2024	13.2	0	13.2
14/09/2024	11.1	0	11.1
15/09/2024	11.5	0	11.5
16/09/2024	12.5	4	16.5
17/09/2024	12.8	59	71.8
18/09/2024	12.7	53	65.7
19/09/2024	13.3	14	27.3
20/09/2024	12.8	1905	1,917.8
21/09/2024	12.0	422	434.0
22/09/2024	11.1	156	167.1
23/09/2024	11.1	94	105.1
24/09/2024	10.9	56	66.9
25/09/2024	12.8	30	42.8
26/09/2024	12.2	7	19.2
27/09/2024	11.2	0	11.2
28/09/2024	11.4	0	11.4
29/09/2024	13.2	0	13.2
30/09/2024	12.7	0	12.7
1/10/2024	12.7	0	12.7
2/10/2024	13.2	3	16.2
3/10/2024	12.9	1264	1,276.9
4/10/2024	11.1	190	201.1
5/10/2024	12.8	95	107.8
6/10/2024	12.8	145	157.8
7/10/2024	13.0	550	563.0
8/10/2024	13.0	185	198.0
9/10/2024	13.4	142	155.4
10/10/2024	11.3	108	119.3

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
11/10/2024	12.7	72	84.7
12/10/2024	13.0	44	57.0
13/10/2024	11.1	38	49.1
14/10/2024	11.1	60	71.1
15/10/2024	11.1	34	45.1
16/10/2024	13.4	3	16.4
17/10/2024	13.0	0	13.0
18/10/2024	12.5	0	12.5
19/10/2024	13.1	0	13.1
20/10/2024	13.1	0	13.1
21/10/2024	13.3	0	13.3
22/10/2024	14.1	0	14.1
23/10/2024	11.3	0	11.3
24/10/2024	12.6	0	12.6
25/10/2024	13.2	0	13.2
26/10/2024	12.9	0	12.9
27/10/2024	11.2	0	11.2
28/10/2024	12.9	0	12.9
29/10/2024	12.7	0	12.7
30/10/2024	12.5	0	12.5
31/10/2024	13.0	0	13.0
1/11/2024	13.5	0	13.5
2/11/2024	13.1	0	13.1
3/11/2024	12.8	0	12.8
4/11/2024	12.8	0	12.8
5/11/2024	11.2	0	11.2
6/11/2024	13.3	0	13.3
7/11/2024	13.0	0	13.0
8/11/2024	12.8	0	12.8
9/11/2024	11.2	0	11.2
10/11/2024	13.5	0	13.5
11/11/2024	11.9	0	11.9
12/11/2024	13.1	0	13.1
13/11/2024	12.4	0	12.4

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
14/11/2024	13.3	0	13.3
15/11/2024	12.8	0	12.8
16/11/2024	12.2	0	12.2
17/11/2024	13.1	0	13.1
18/11/2024	13.2	0	13.2
19/11/2024	13.0	0	13.0
20/11/2024	12.9	0	12.9
21/11/2024	13.0	0	13.0
22/11/2024	12.8	0	12.8
23/11/2024	12.8	0	12.8
24/11/2024	12.5	0	12.5
25/11/2024	12.9	0	12.9
26/11/2024	13.1	0	13.1
27/11/2024	12.2	0	12.2
28/11/2024	11.9	0	11.9
29/11/2024	13.1	0	13.1
30/11/2024	13.4	0	13.4
1/12/2024	12.8	0	12.8
2/12/2024	12.6	0	12.6
3/12/2024	13.0	0	13.0
4/12/2024	13.0	0	13.0
5/12/2024	11.2	0	11.2
6/12/2024	12.0	0	12.0
7/12/2024	12.9	0	12.9
8/12/2024	13.0	0	13.0
9/12/2024	12.7	0	12.7
10/12/2024	12.9	0	12.9
11/12/2024	12.0	0	12.0
12/12/2024	12.9	0	12.9
13/12/2024	11.0	0	11.0
14/12/2024	13.2	0	13.2
15/12/2024	12.1	0	12.1
16/12/2024	12.7	0	12.7
17/12/2024	12.6	0	12.6

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
18/12/2024	10.9	0	10.9
19/12/2024	12.7	0	12.7
20/12/2024	12.7	0	12.7
21/12/2024	12.4	0	12.4
22/12/2024	12.8	0	12.8
23/12/2024	12.3	0	12.3
24/12/2024	13.0	0	13.0
25/12/2024	12.6	0	12.6
26/12/2024	11.0	0	11.0
27/12/2024	13.0	0	13.0
28/12/2024	11.0	0	11.0
29/12/2024	12.8	0	12.8
30/12/2024	12.9	0	12.9
31/12/2024	12.7	0	12.7
1/01/2025	12.7	0	12.7
2/01/2025	11.2	0	11.2
3/01/2025	13.2	0	13.2
4/01/2025	12.9	0	12.9
5/01/2025	12.9	0	12.9
6/01/2025	12.7	0	12.7
7/01/2025	11.1	0	11.1
8/01/2025	12.3	0	12.3
9/01/2025	13.1	0	13.1
10/01/2025	11.0	0	11.0
11/01/2025	12.3	0	12.3
12/01/2025	11.2	0	11.2
13/01/2025	12.6	0	12.6
14/01/2025	12.5	0	12.5
15/01/2025	11.9	0	11.9
16/01/2025	18.2	0	18.2
17/01/2025	17.4	0	17.4
18/01/2025	13.1	0	13.1
19/01/2025	11.6	0	11.6
20/01/2025	11.4	0	11.4

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
21/01/2025	11.1	0	11.1
22/01/2025	12.9	0	12.9
23/01/2025	12.1	0	12.1
24/01/2025	12.9	0	12.9
25/01/2025	12.5	0	12.5
26/01/2025	12.5	0	12.5
27/01/2025	11.1	0	11.1
28/01/2025	12.5	0	12.5
29/01/2025	11.4	0	11.4
30/01/2025	12.5	0	12.5
31/01/2025	12.8	0	12.8
1/02/2025	11.1	0	11.1
2/02/2025	13.0	0	13.0
3/02/2025	12.6	0	12.6
4/02/2025	11.0	0	11.0
5/02/2025	10.9	0	10.9
6/02/2025	11.1	0	11.1
7/02/2025	11.2	0	11.2
8/02/2025	12.7	0	12.7
9/02/2025	12.5	0	12.5
10/02/2025	12.9	0	12.9
11/02/2025	12.6	0	12.6
12/02/2025	11.1	0	11.1
13/02/2025	12.5	0	12.5
14/02/2025	11.7	0	11.7
15/02/2025	12.2	0	12.2
16/02/2025	17.4	0	17.4
17/02/2025	12.3	0	12.3
18/02/2025	7.9	0	7.9
19/02/2025	7.7	0	7.7
20/02/2025	10.4	0	10.4
21/02/2025	5.7	0	5.7
22/02/2025	5.7	0	5.7
23/02/2025	6.0	0	6.0

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
24/02/2025	7.3	0	7.3
25/02/2025	5.8	0	5.8
26/02/2025	5.9	0	5.9
27/02/2025	6.0	0	6.0
28/02/2025	5.8	0	5.8
1/03/2025	5.7	0	5.7
2/03/2025	7.9	0	7.9
3/03/2025	6.0	0	6.0
4/03/2025	5.9	0	5.9
5/03/2025	5.8	0	5.8
6/03/2025	7.1	0	7.1
7/03/2025	5.6	0	5.6
8/03/2025	5.7	0	5.7
9/03/2025	6.0	0	6.0
10/03/2025	5.6	0	5.6
11/03/2025	5.8	0	5.8
12/03/2025	7.8	0	7.8
13/03/2025	6.1	0	6.1
14/03/2025	5.6	0	5.6
15/03/2025	5.8	0	5.8
16/03/2025	6.2	0	6.2
17/03/2025	6.3	0	6.3
18/03/2025	6.0	0	6.0
19/03/2025	7.5	0	7.5
20/03/2025	5.7	0	5.7
21/03/2025	6.0	0	6.0
22/03/2025	5.6	0	5.6
23/03/2025	5.7	0	5.7
24/03/2025	7.8	0	7.8
25/03/2025	5.7	0	5.7
26/03/2025	5.8	0	5.8
27/03/2025	5.8	0	5.8
28/03/2025	5.6	0	5.6
29/03/2025	7.6	0	7.6

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
30/03/2025	5.7	0	5.7
31/03/2025	5.7	0	5.7
1/04/2025	5.8	0	5.8
2/04/2025	5.7	0	5.7
3/04/2025	5.8	0	5.8
4/04/2025	7.7	0	7.7
5/04/2025	7.1	0	7.1
6/04/2025	5.6	0	5.6
7/04/2025	7.3	0	7.3
8/04/2025	5.7	0	5.7
9/04/2025	7.0	0	7.0
10/04/2025	6.0	0	6.0
11/04/2025	6.1	0	6.1
12/04/2025	5.8	0	5.8
13/04/2025	5.8	0	5.8
14/04/2025	5.8	0	5.8
15/04/2025	11.5	0	11.5
16/04/2025	7.2	0	7.2
17/04/2025	5.9	0	5.9
18/04/2025	6.0	0	6.0
19/04/2025	7.7	0	7.7
20/04/2025	6.0	0	6.0
21/04/2025	5.8	0	5.8
22/04/2025	5.8	0	5.8
23/04/2025	5.8	0	5.8
24/04/2025	6.8	0	6.8
25/04/2025	7.3	0	7.3
26/04/2025	5.6	0	5.6
27/04/2025	7.0	0	7.0
28/04/2025	7.1	0	7.1
29/04/2025	5.6	0	5.6
30/04/2025	5.8	0	5.8
1/05/2025	5.8	0	5.8
2/05/2025	5.6	0	5.6

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
3/05/2025	7.2	0	7.2
4/05/2025	7.2	0	7.2
5/05/2025	7.8	0	7.8
6/05/2025	7.4	0	7.4
7/05/2025	5.8	0	5.8
8/05/2025	5.7	0	5.7
9/05/2025	16.3	0	16.3
10/05/2025	15.6	0	15.6
11/05/2025	10.9	0	10.9
12/05/2025	12.0	0	12.0
13/05/2025	12.2	0	12.2
14/05/2025	11.0	0	11.0
15/05/2025	12.7	0	12.7
16/05/2025	12.0	0	12.0
17/05/2025	11.2	0	11.2
18/05/2025	11.1	0	11.1
19/05/2025	12.3	0	12.3
20/05/2025	9.8	0	9.8
21/05/2025	8.1	0	8.1
22/05/2025	7.3	0	7.3
23/05/2025	5.7	0	5.7
24/05/2025	5.8	0	5.8
25/05/2025	5.5	0	5.5
26/05/2025	5.5	0	5.5
27/05/2025	15.2	0	15.2
28/05/2025	15.0	0	15.0
29/05/2025	12.3	0	12.3
30/05/2025	12.2	0	12.2
31/05/2025	12.3	0	12.3
1/06/2025	12.3	0	12.3
2/06/2025	12.5	0	12.5
3/06/2025	12.1	0	12.1
4/06/2025	12.2	0	12.2
5/06/2025	12.4	98	110.4

Date	Compensation Flow (l/s)	Spillway Flow (l/s)	Combined Compensation and Spillway Flows (l/s)
6/06/2025	12.3	405	417.3
7/06/2025	12.8	377	389.8
8/06/2025	12.3	201	213.3
9/06/2025	12.5	465	477.5
10/06/2025	12.3	546	558.3
11/06/2025	12.3	1539	1,551.3
12/06/2025	12.3	289	301.3
13/06/2025	12.6	256	268.6
14/06/2025	12.5	357	369.5
15/06/2025	12.4	235	247.4
16/06/2025	12.6	160	172.6
17/06/2025	12.6	99	111.6
18/06/2025	12.0	69	81.0
19/06/2025	12.3	59	71.3
20/06/2025	12.3	308	320.3
21/06/2025	12.3	156	168.3
22/06/2025	12.3	100	112.3
23/06/2025	12.7	75	87.7
24/06/2025	12.3	49	61.3
25/06/2025	12.1	13	25.1
26/06/2025	12.7	0	12.7
27/06/2025	12.1	2111	2,123.1
28/06/2025	12.1	696	708.1
29/06/2025	12.1	429	441.1
30/06/2025	12.1	220	232.1

Appendix D. Native fisheries MPI report

Auckland Water Supply Dams
2024-2025 Native Fisheries Annual Report

Final - August 2025

Watercare

QUALITY INFORMATION

Document	Annual Report
Date	8 August 2025
Name and position of originator	Emma Baker, Environmental Scientist
Report directory	\\water.internal\ORG\Ops\Water Supply\Headworks\SDGEN\00 - Site General\Compliance\Trap and Haul\Ministry of Fisheries Reports

REVISION HISTORY

Rev	Revision Date	Name	Position	Signature
1	24/07/2025	Michiel Jonker	Environmental Care Manager	
2	05/08/2025	AJ Grobler	Operations Controller	
3	08/08/2025	Brendon Dockary	Operations Controller	

APPROVED

Date	Name	Position	Signature
08/08/2025	Michiel Jonker	Environmental Care Manager	

TABLE OF CONTENTS

LIST OF TABLES

1 INTRODUCTION

Watercare Services Limited (Watercare) currently undertakes a Native Fisheries Management Programme utilising 'trap and haul' methods at eight of the water supply dams. Ministry of Primary Industries approval has been granted for this work under Special Permit 737 (expires on 1 October 2025; Appendix A) and Fish Transfer Authorisation NFT325. The permit covers the upstream and downstream trap and haul activities for dams in the Auckland and Waikato regions:

- Hunua Ranges:
  - Hays Creek Dam
  - Cosseys Dam
  - Wairoa Dam
  - Upper Mangatawhiri Dam
  - Mangatangi Weir
- Waitākere Ranges:
  - Lower Nihotupu Dam
  - Lower Huia Dam
  - Waitākere Dam

New permits will be applied for to continue trap and haul from the 2025-2026 season onwards.

This report provides details of the programme for the period 1 July 2024 to 30 June 2025, in fulfilment of conditions 27, 28 and 29 of Special Permit 737.

2 UPSTREAM TRANSFER

Trapping for elver and other freshwater fish was conducted at the following sites for the purpose of upstream transfer:

- Lower Nihotupu Dam
- Waitākere Dam
- Hays Creek Dam
- Cosseys Dam
- Mangatangi weir

Trapping (upstream transfer) at Lower Huia Dam has proven unsuccessful in the past and is no longer undertaken.

2.1 Collection methods

During the 2024-2025 trap and haul season, two traps were deployed in the Waitākere Ranges and three in the Hunua Ranges. The design and methodology of each trap followed those outlined in Watercare's Native Fisheries Program – Operations Manual for Undertaking Trap and Haul.

During rainfall events, traps were taken out of service as part of standard operations. Additionally, over the Christmas holiday period, the Hunua dams' traps were not in service due to low staff availability.

2.2 Fish species, elvers and approximate total weight

The estimated weight of each catch is based on the number of individuals caught, the expected weight for each species (1 g per elver and 0.5 g per juvenile galaxiid) and the measured size of the individuals. The data provided in Table 2-1 to Table 2-5 fulfil conditions 28a, 28b and 28f.

All elvers and galaxiids were released directly into the respective dams upstream of the trapping sites or above the Mangatangi weir.

Table 2-1: Approximate total weight of each species collected at Lower Nihotupu Dam during the 2024-2025 upstream trap and haul season.

Date	Elver (g)	Galaxiids (g)
20/10/2024	5	100.0
24/10/2024	-	10.0
30/10/2024	6	3.5
3/11/2024	40	1.0
7/11/2024	38	-
13/11/2024	12	-
18/11/2024	14	9.0
25/11/2024	80	30.0
28/11/2024	50	2.0
3/12/2024	200	-
6/12/2024	250	6.0
9/12/2024	300	2.5
10/12/2024	50	0.5

Date	Elver (g)	Galaxiids (g)
15/12/2024	40	1.5
22/12/2024	100	-
22/12/2024	50	-
2/01/2025	480	-
5/01/2025	107	3.0
9/01/2025	100	-
14/01/2025	60	-
16/01/2025	100	0.5
23/01/2025	120	2.0
28/01/2025	230	-
3/02/2025	200	16.0
6/02/2025	85	-
11/02/2025	48	-
17/02/2025	30	-
7/03/2025	28	-
10/04/2025	14	-
Total	**2,837**	**178.0**

Table 2-2: Approximate total weight of each species collected at Waitākere Dam during the 2024-2025 upstream trap and haul season.

Date	Elver (g)	Galaxiids (g)
10/11/2024	5	-
18/11/2024	7	-
2/12/2024	23	1.0
11/12/2024	22	2.0
19/12/2024	12	1.0
27/12/2024	3	1.5
29/12/2024	3	1.0
29/12/2024	35	-
3/01/2025	170	-
6/01/2025	12	-
7/01/2025	100	-
9/01/2025	50	-
13/01/2025	110	-
14/01/2025	5	7.5
16/01/2025	200	-
20/01/2025	24	-
21/01/2025	104	-

Date	Elver (g)	Galaxiids (g)
2/02/2025	35	-
7/02/2025	300	-
10/02/2025	140	-
17/02/2025	350	-
27/02/2025	200	-
4/03/2025	64	-
10/03/2025	184	-
12/03/2025	11	-
18/03/2025	64	-
26/03/2025	38	-
30/03/2025	44	-
16/04/2025	15	-
Total	**2,330**	**14.0**

Table 2-3: Approximate total weight of each species collected at Hays Creek Dam during the 2024-2025 upstream trap and haul season.

Date	Elver (g)	Galaxiids (g)
21/10/2024	-	1.0
28/10/2024	-	1.5
31/10/2024	-	0.5
1/11/2024	-	1.0
2/11/2024	-	2.0
4/11/2024	-	1.0
4/11/2024	-	0.5
5/11/2024	-	2
22/12/2024	52	-
27/12/2024	49	-
30/12/2024	69	-
31/12/2024	16	-
7/01/2025	17	-
13/01/2025	15	-
13/01/2025	200	0.5
15/01/2025	14	-
6/02/2025	84	-
19/02/2025	46	-
20/02/2025	25	-
24/02/2025	12	-
3/03/2025	3	-

Date	Elver (g)	Galaxiids (g)
4/03/2025	6	-
9/03/2025	6	-
Total	**614**	**10.0**

Table 2-4: Approximate total weight of each species collected at Cosseys Dam during the 2024-2025 upstream trap and haul season.

Date	Elver (g)	Galaxiids (g)
29/10/2024	3	-
7/11/2024	2	-
14/11/2024	2	-
2/12/2024	16	-
3/12/2024	5	-
3/12/2024	16	-
16/12/2024	12	-
26/12/2024	10	-
29/12/2024	26	-
31/12/2024	18	-
5/01/2025	16	-
7/01/2025	12	-
14/01/2025	12	-
27/01/2025	66	-
4/02/2025	24	-
12/02/2025	5	-
18/02/2025	11	-
19/02/2025	11	-
21/02/2025	15	-
10/03/2025	34	-
14/03/2025	3	-
18/03/2025	4	-
Total	**323**	**0.0**

Table 2-5: Approximate total weight of each species collected at Mangatangi weir during the 2024-2025 upstream trap and haul season.

Date	Elver (g)	Galaxiids (g)
8/10/2024	1	-
30/10/2024	1	-
13/11/2024	1	-
17/11/2024	2	-
20/11/2024	4	-

Date	Elver (g)	Galaxiids (g)
25/11/2024	4	-
26/11/2024	4	-
29/11/2024	6	-
1/12/2024	50	-
9/12/2024	1	-
11/12/2024	23	0.5
13/12/2024	24	-
16/12/2024	19	-
23/12/2024	3	-
24/12/2024	4	-
30/12/2024	11	1.0
31/12/2024	13	-
2/01/2025	7	-
3/01/2025	11	-
5/01/2025	13	0.5
8/01/2025	14	-
10/01/2025	5	-
20/01/2025	55	5.5
27/01/2025	78	1.5
28/01/2025	13	-
29/01/2025	35	-
30/01/2025	3	-
3/02/2025	15	0.5
7/02/2025	24	-
16/02/2025	4	-
21/02/2025	7	0.5
28/02/2025	3	-
10/03/2025	1	-
Total	**459**	**10**

2.3 Juvenile eel length

Condition 28c requires the weight of juvenile eels (i.e., greater than 20 g in weight) collected for transfer to be measured. The length was measured instead of weight, consistent with previous years' practices. The data is provided in Table 2-6.

Table 2-6: Length of juvenile eels reported during the 2024-2025 upstream trap and haul season

Location	Date	Length of juvenile eel (mm)
Waitākere	23/10/2024	250

2.4 Bycatch species and weight

The most caught bycatch species were the Kōura (*Paranephrops planifrons*) and bullies (*Gobiomorphus spp*). All bycatch species were caught in the permanent fish trap structures located at the base of the dams. On average, the bullies are estimated to weigh 2.5 g, and smelt (*Retropinna retropinna*) approximately 0.5 g, though no smelt were caught during this trap and haul season. When the bully species could not be identified, they were assumed to be common bullies. The results of the bycatch are presented in Table 2-7.

Table 2-7: Approximate total weight of bycatch reported during the 2024-2025 upstream trap and haul season.

Location	Date	Species (number if weight unknown)	Weight (g)
Lower Nihotupu	20/10/2024	Common bully	2.5
	24/10/2024	Common bully	2.5
	3/11/2024	Common bully	65.0
	7/11/2024	Common bully	17.5
	13/11/2024	Common bully	12.5
	25/11/2024	Common bully	27.5
	3/12/2024	Common bully	7.5
	3/12/2024	Common bully	15
	9/12/2024	Common bully	7.5
	10/12/2024	Common bully	17.5
	15/12/2024	Common bully	2.5
	22/12/2024	Common bully	2.5
	22/12/2024	Common bully	12.5
	14/01/2025	Common bully	2.5
	16/01/2025	Common bully	2.5
	7/03/2025	Common bully	2.5
	10/04/2025	Common bully	25.0
Waitākere	18/11/2024	Common bully	2.5
	29/12/2024	Common bully	10.0
	3/01/2025	Common bully	5.0
	10/02/2025	Common bully	7.5
Hays Creek	1/12/2024	Common bully	2.5
	7/01/2025	Common bully	2.5
Mangatangi	8/10/2025	Common bully	15.0
		Kōura (1)	n/a
	11/10/2025	Common bully	5.0
	14/10/2025	Common bully	2.5
	18/10/2024	Common bully	2.5
	22/10/2024	Kōura (1)	n/a

Location	Date	Species (number if weight unknown)	Weight (g)
	22/10/2024	Common bully	2.5
	22/10/2024	Redfin bully (1)	2.5
	24/10/2024	Kōura (1)	n/a
	29/10/2024	Kōura (1)	n/a
	29/10/2024	Common bully	7.5
	1/11/2024	Redfin bully	2.5
	4/11/2024	Common bully	2.5
	6/11/2024	Common bully	2.5
	8/11/2024	Common bully	5.0
	11/11/2024	Common bully	15.0
	13/11/2024	Common bully	15.0
	18/11/2024	Common bully	7.5
	20/11/2024	Common bully	7.5
	21/11/2024	Kōura (1)	n/a
	25/11/2024	Common bully	7.5
	26/11/2024	Kōura (1)	n/a
	26/11/2024	Common bully	17.5
	1/12/2024	Kōura (10)	n/a
	1/12/2024	Common bully	30.0
	1/12/2024	Common bully	22.5
	6/12/2024	Kōura (1)	n/a
	9/12/2024	Common bully	37.5
	11/12/2024	Common bully	42.5
	13/12/2024	Kōura (2)	n/a
	13/12/2024	Common bully	32.5
	16/12/2024	Common bully	40.0
	18/12/2024	Common bully	15.0
	23/12/2024	Common bully	12.5
	24/12/2024	Kōura (1)	n/a
	24/12/2024	Common bully	105.0
	27/12/2024	Common bully	117.5
	30/12/2024	Common bully	170.0
	31/12/2024	Common bully	27.5
	3/01/2025	Common bully	45.0
	6/01/2025	Common bully	75.0
	8/01/2025	Common bully	32.5
	10/01/2025	Common bully	12.5
	21/01/2025	Common bully	27.5

Location	Date	Species (number if weight unknown)	Weight (g)
	27/01/2025	Kōura (1)	n/a
	27/01/2025	Common bully	45.0
	29/01/2025	Common bully	37.5
	3/02/2025	Common bully	12.5
	7/02/2025	Common bully	120.0
	10/02/2025	Common bully	25.0
	16/02/2025	Common bully	42.5
	18/02/2025	Common bully	25.0
	21/02/2025	Common bully	175.0
	24/02/2025	Common bully	20.0
	28/02/2025	Kōura (1)	n/a
	28/02/2025	Common bully	10.0
	3/03/2025	Common bully	12.5
	6/03/2025	Kōura (1)	n/a
	10/03/2025	Kōura (1)	n/a
	10/03/2025	Common bully	7.5
	21/03/2025	Kōura (2)	n/a
	24/03/2025	Common bully	15.0
	24/03/2025	Kōura (2)	n/a
	26/03/2025	Kōura (4)	n/a
	31/03/2025	Kōura (3)	n/a
Total			**1,767.5**

2.5 Fish deaths

Fish deaths were observed on a number of occasions during the upstream trapping season, detailed in Table 2-8. When the bully species could not be identified, they were assumed to be common bullies. Fish deaths primarily occurred inside the permanent fish trap structures, however, deceased juvenile brown trout (*Salmo trutta*) were located on the netted ramp leading to the tank at the Mangatangi weir, and some elvers were found in the trap's outlet structure at Waitākere Dam.

Table 2-8: Fish deaths during the 2024-2025 upstream trap and haul.

Location	Date	Species	Number
Lower Nihotupu	30/10/2024	Galaxiid	5
	3/11/2024	Common bully	5
Waitākere	7/01/2025	Elver	1
	7/02/2025	Elver	2
	10/03/2025	Elver	12
	16/04/2025	Elver	4
Hays Creek	29/10/2024	Galaxiids	3
	31/10/2024	Galaxiids	1

Location	Date	Species	Number
	2/11/2024	Galaxiids	1
Cosseys	30/12/2024	Elver	1
Mangatangi	20/11/2024	Brown trout	1
	21/11/2024	Brown trout	6
	25/11/2024	Brown trout	1
	26/11/2024	Brown trout	10
	29/11/2024	Brown trout	9
	2/12/2024	Brown trout	4
	2/12/2024	Elver	3

3 DOWNSTREAM TRANSFER

3.1 Collection methods

Net setting for eels was conducted at the following eight sites for the purpose of downstream transfer:

- Lower Nihotupu Dam
- Lower Huia Dam
- Waitākere Dam
- Hays Creek Dam
- Cosseys Dam
- Wairoa Dam
- Upper Mangatāwhiri Dam
- Mangatangi Dam

Fyke nets are used as the downstream eel trapping method. They are long cylindrical netting bags with netting cones, designed for easy entry but a difficult exit. Two fyke nets were deployed near the dam face in all permitted water supply dams overnight, collected on the dates listed in Table 3-1 during the eel migration season. Migrating eels exhibit distinctive morphological features and can therefore be identified from non-migrating eels during the trapping process.

3.2 Migrating eel

Condition 28h requires reporting on several aspects of the downstream eel transfer process, including the total weight, approximate number, and species of adult migrating eels collected for transfer. It also requires the date of collection, comments on the prevailing flow conditions (e.g., normal, flood), the site of release, and the percentage of eels caught that were successfully transferred and released.

Table 3-1 provides most of the data required by this condition. There were 19 migrating eels caught in the 2024-2025 trap and haul season, this is an increase compared to the 11 eels caught in 2023-2024. Any migrant eels caught were transferred downstream on the day of capture and the remainder of the catch was released back into dams. Flow conditions were normal on the days trapping occurred.

Table 3-1: Total weight per day, eel species and approximate numbers caught for transfer, and the number and percentage of adult migrating eels transferred.

Location	Date	Total	Species		Weight (g)		Length (mm)		Migrators	
		Eels	Longfin	Shortfin	Average	Largest	Average	Largest	Count	(%)
Lower Nihotupu	4/03/2025	3	0	3	340	510	550	600	0	0
	25/03/2025	6	3	3	400	600	550	750	2	33.3
	15/04/2025	0	0	0	0	0	0	0	0	0
	6/05/2025	4	1	3	1162.5	2,900	712.5	950	2	50
	27/05/2025	3	2	1	4066.7	7,700	1000	1,400	2	66.7
Lower Huia	2/04/2025	0	0	0	0	0	0	0	0	0
	23/04/2025	0	0	0	0	0	0	0	0	0
	13/05/2025	0	0	0	0	0	0	0	0	0

Location	Date	Total Eels	Species		Weight (g)		Length (mm)		Migrators	
			Longfin	Shortfin	Average	Largest	Average	Largest	Count	(%)
	22/05/2025	0	0	0	0	0	0	0	0	0
	27/06/2025	0	0	0	0	0	0	0	0	0
Waitākere	20/03/2025	1	0	1	750	750	700	700	0	0
	5/06/2025	0	0	0	0	0	0	0	0	0
Hays Creek	19/03/2025	0	0	0	0	0	0	0	0	0
	24/04/2025	7	4	3	1000	2,900	671.4	1,100	1	14.3
	28/05/2025	4	4	0	1,780	3,555	1,000	1,500	0	0
	30/05/2025	4	4	0	3,650	6,850	912.5	1,300	1	25
Cosseys	12/03/2025	2	2	0	2,025	3,000	750	900	0	-
	14/03/2025	5	5	0	3,253	9,000	780	950	1	20
	15/04/2025	0	0	0	0	0	0	0	0	-
	18/04/2025	1	1	0	1,634	1,634	800	800	0	-
	20/05/2025	1	1	0	400	400	400	400	0	-
	21/05/2025	2	2	0	1142.5	1,600	825	900	0	-
	26/06/2025	3	3	0	569.7	956	500	800	0	-
Wairoa	5/03/2025	1	1	0	5,900	5,900	1,270	1,270	1	100
	7/03/2025	1	1	0	1,525	1,525	570	570	1	100
	9/04/2025	4	4	0	4,050.5	6,702	1,026.25	1,205	0	-
	11/04/2025	0	0	0	0	0	0	0	0	-
	14/05/2025	1	1	0	3,000	3,000	950	950	0	-
	16/05/2025	1	1	0	3,674	3,674	1,200	1,200	1	100
Mangatāwhiri	7/05/2025	3	3	0	2,803	5,675	916.7	1,200	1	33.3
	9/05/2025	6	6	0	617	985	520	600	0	-
	11/06/2025	0	0	0	0	0	0	0	0	-
	13/06/2025	0	0	0	0	0	0	0	0	-
Mangatangi	26/03/2025	1	1	0	1,950	1,950	960	960	0	-
	27/03/2025	0	0	0	0	0	0	0	0	-
	2/05/2025	7	7	0	1,205	2,390	714.3	900	6	85.7

3.3 Bycatch species and weight

Perch (*Perca fluviatilis*), rudd (*Scardinius erythrophthalamus*) and carp (*Cyprinus rubrofuscus*) were caught in the dams as part of the downstream transfer and weighed onsite.

Table 3-2: Approximate total weight of the bycatch reported during the 2024-2025 downstream trap and haul season.

Location	Date	Species	Weight (g)
Lower Nihotupu	25/03/2025	Perch	50
		Rudd	100
Hays Creek	30/05/2025	Carp	150
Cosseys	26/06/2025	Perch	300

Location	Date	Species	Weight (g)
Upper Mangatāwhiri	2/04/2025	Common bully	34

3.4 Fish deaths

Fish deaths occurred on two occasions as part of the downstream transfer operations. One deceased rudd was found at Cosseys Dam on 21 May 2025, and two carp were found on 30 May 2025 at Hays Creek Dam.

4 SUMMARY

Upstream transfer of migrating species occurred at five Watercare dams for the 2024-2025 season: Lower Nihotupu Dam, Waitākere Dam, Hays Creek Dam, Cosseys Dam and at the Mangatangi weir. All transferred both galaxiids and elvers, with Lower Nihotupu having the greatest catch rates, consistent with previous years. Notably, a significant number of bullies were also caught at the Mangatangi weir.

The downstream transfer of migrating species was undertaken at eight Watercare dams for the season: Lower Nihotupu Dam, Lower Huia Dam and Waitākere Dam in the Waitākere Ranges and Hays Creek dam, Cosseys Dam, Wairoa Dam, Upper Mangatawhiri Dam and at the Mangatangi weir in the Hunua Ranges. Eels (migratory and non-migratory) were caught on at least one occasion at most dams, with the exception of Lower Huia Dam. Migrating eels were caught at all five Hunua Ranges dams, and only at Lower Nihotupu Dam in the Waitākere Ranges.

Appendix A. Ministry of Primary Industries Special Permit 737

Fisheries New Zealand
Tini a Tangaroa

SPECIAL PERMIT (737)

The Director-General of the Ministry for Primary Industries (**MPI**) acting through his delegated officer (**Director-General**) and pursuant to section 97(1) of the *Fisheries Act 1996* (**the Act**), hereby issues a special permit to:

Watercare Services Limited
Private Bag 92521
Wellesley Street
Auckland 1141

Client Number: 9720100

and agents, representatives and employees of, as part of their association with Watercare Services Limited (**the permit holder**), subject to the following conditions specified below.

Purpose

1. This special permit is issued for the following purpose specified in section 97(1)(c) of the Act:
    a) to allow persons or agencies to take aquatic life and relocate it to a suitable habitat where this is necessary or required to mitigate adverse effects of habitat modification on the aquatic life.
2. The permit holder is permitted to take, transfer, and release native fish of the following species: shortfin and longfin eels (*Anguilla* spp.), *Galaxias* spp., *Gobiomorphus* spp., and torrentfish (*Cheimarrichthys fosteri*), irrespective of size for the above purpose.

Term of Permit

3. This special permit revokes and replaces special permit 610 and any previous amendments.
4. This special permit is valid from the date of signature until 1 October 2025, unless sooner varied or revoked.

Permitted Activities

5. This special permit allows the taking (as defined in section 2 of the Act) of aquatic life, for the purposes of relocating aquatic life, to mitigate adverse effects of habitat modification, carried out by the permit holder.

6. Fishing under the authority of this special permit for upstream migration may only be taken from the following waterways:
    a) Hūnua area:

i) Cosseys Stream or its tributaries downstream of the Cosseys Dam;

ii) Hays Creek or its tributaries downstream of the Hays Creek Dam;

iii) Mangatangi stream or its tributaries downstream of the Mangatangi Weir.

b) Waitākere area:

i) Huia Stream, downstream of the lower Huia Dam;

ii) Nihotupu Stream, downstream of the lower Nihotupu Dam, near the spillway;

iii) Waitākere River, downstream of the Waitākere Dam.

7. Fishing under the authority of this special permit may be undertaken for downstream migrant eels from the following waterways:

a) Hūnua area:

i) Cosseys Reservoir upstream of the Cosseys Dam;

ii) Hays Creek Reservoir upstream of the Hays Creek Dam;

iii) Wairoa Reservoir upstream of the Wairoa Dam;

iv) Mangatangi Reservoir upstream of the Mangatangi Dam;

v) Mangatawhiri Reservoir upstream of the Upper Mangatawhiri Dam.

b) Waitakere area:

i) Lower Huia Reservoir, upstream of the Huia Dam;

ii) Lower Nihotupu Reservoir, upstream of the Nihotupu Dam;

iii) Waitākere Reservoir, upstream of the Waitakere Dam.

8. New sites or species may only be added under the authority of this special permit through an amendment to the special permit. An application for inclusion of new site or species must be lodged with the Customary Fisheries and Spatial Allocations Manager (see Schedule One for contact details).

9. The permit holder is to obtain written approval from the taiāpure management committee or Tangata Kaitiaki/Tiaki prior to fishing in any taiāpure–local fisheries or mātaitai area. The permit holder should contact the relevant Fisheries Compliance Team Manager (see contact details in Schedule One) for current details of taiāpure-local fisheries or mātaitai reserves in the area where collection is proposed.

10. The permit holder is to consult with Waikato-Tainui before fishing in Waikato Tainui's rohe (illustrated as area A on the Iwi map attached in Schedule Two). The permit holder should avoid fishing in wāhi tapu areas within area A. To determine areas of significance to Iwi, the permit holder is advised to contact local marae in areas where fishing is to take place. Local marae details can be obtained from Waikato Raupatu River Trust [ph. (07) 858 0400].

11. Any transfer of native fish may only be undertaken with an appropriate approval pursuant to section 26ZM(2) of the *Conservation Act 1987*, or any statutory re-enactment or amendment of that provision.

Fishing Conditions

12. No fish, aquatic life, or seaweed may be taken for personal use or collection, to provide for broodstock for commercial production, or for sale, bait or berley, while fishing under the authority of this special permit.

13. For the purpose of fishing pursuant to this special permit, the permit holder is authorised to use:

    a) Fyke nets irrespective of mesh size (escapement tubes blocked if required);

    b) A floating pontoon set trap with wings and holding pen;

    c) Dip nets irrespective of mesh size;

    d) Mesh liners may be used on fyke nets to meet the desired net mesh size;

    e) A fish trap with a ramp, shaded holding tank and using a fish attractant;

    f) Any other catching device as approved by the Customary Fisheries and Spatial Allocations Manager;

    g) Any suitable vessel.

14. Any fishing equipment left unattended must be clearly labelled with the permit holder's name and the words: "Fisheries New Zealand Special Permit No. 737".

15. Explosive or toxic gas, or toxic, poisonous, or narcotic substance must not be used to take native fish under the authority of this special permit unless prior written approval is obtained from the Customary Fisheries and Spatial Allocations Manager, Fisheries New Zealand.

16. Any vessel(s) nominated to fish under the authority of this special permit must not engage in commercial fishing for any species under the authority of a fishing permit, issued under section 91 of the Act, while fishing under the authority of this special permit. Unless written approval is obtained from a Regional Fisheries Compliance Team Manager prior to fishing. For the purposes of interpretation, 'commercial fishing' is defined as the taking of fish, aquatic life, or seaweed within New Zealand fisheries waters for the purpose of sale.

Disposal Conditions

17. Any bycatch species caught while fishing under the authority of this special permit shall be released at the point of capture with the exception of dead, diseased or unwanted aquatic life[1]. The permit holder shall take measures as appropriate to minimise the capture of non-target species (eg, trout). These may include appropriate placement of fishing gear and using grills or coarse mesh.

18. The permit holder must not use any fish or aquatic life taken under this permit for personal use or collection, to stock a fish farm or use as food on a fish farm, for consumption, or for bait.

19. Native fish that cannot be returned alive to the environment (including dead, diseased or contaminated eels), must be humanely killed and disposed of in a biosecure manner, after relevant data has been collected, as per appendices.

[1] Unwanted aquatic life as defined in section 2 of the *Fisheries Act 1996*.

Upstream migrants

20. Fish taken under this special permit may be held in a 'holding pen' at the point of capture for a period of no more than 7 days. Fishing equipment should be inspected more frequently during peak migration or following floods. Releases of fish may not be made beyond any natural barrier (as natural recruitment processes should determine passage beyond these points).

Downstream migrants

21. Eels taken under this special permit as adult downstream migrants may be held at the specific capture sites for a maximum of 72 hours from the time of capture and are to be released as follows:

    a) Eels taken from the lower Nihotupu Reservoir: either below the Nihotupu Dam or in the Huia Stream below the lower Huia Dam;

    b) Eels taken from all other reservoirs: at a point in the river catchment from which they were taken where their subsequent migration is unhindered by any manmade barrier.

22. All non-migrant eels collected shall be released upstream of the collection point.

Biosecurity Conditions

23. In order to eliminate the risk of transferring species declared as noxious or unwanted organisms within the aquatic environment, the permit holder must screen catch for signs of disease or morbidity and any unwanted aquatic life before transportation.

24. During the collection fish, aquatic life, or seaweed the permit holder shall ensure that no aquatic plant, noxious fish, or unwanted organism, including eggs and larvae of noxious fish or unwanted organisms, is introduced into any other waterway, either from the water holding the collected fish, aquatic life, or seaweed, or enmeshed in fishing gear.

25. To prevent the spread of unwanted aquatic plants and animals, all equipment used in the collection and removal of fish, aquatic life or seaweed must be thoroughly checked, cleaned and dried before and after being used for fishing under this special permit:

    a) all equipment used in the transport, holding and release of aquatic life should be treated, as outlined below, before being used again:

        i. all non-fibrous (metal and plastic) smooth surfaced equipment is to be thoroughly cleaned using freshwater (chlorinated town supply water, bore water or collected rain water); and

        ii. any non-fibrous smooth surfaced equipment that can retain water such as under seals and hollows within handles etc. must be dismantled in such a way that all surfaces can be thoroughly cleaned using freshwater (chlorinated town supply water, bore water or collected rain water); and

    b) all other equipment must be:

        i. immersed for a minimum of 30 seconds, in a water bath heated to at least 50° C; or

ii. immersed in water, for a minimum of 5 minutes containing at least 35 g of sodium chloride per litre.

26. The permit holder must notify Biosecurity New Zealand's emergency hotline (0800 809 966) as soon as practicable should it observe unwanted or unusual organisms, including any distressed, diseased, or moribund aquatic life during any of its operations. None of the above organisms or contaminated water, should be released into any waterway and samples should be kept for Biosecurity New Zealand investigation. Samples should be chilled not frozen, or as advised after contacting Biosecurity New Zealand.

Reporting Requirements

27. The permit holder shall supply an annual report of all work undertaken under the authority of this special permit to the Customary Fisheries and Spatial Allocations Manager, Fisheries New Zealand (see contact details in Schedule One). This report shall be supplied no later than the 31st of August of each year. A nil return shall be made if no collection activities are undertaken by the 31st August of each year.

28. The report should contain the following information:

Upstream transfers

a) the species and approximate total weight of each species collected for transfer, and the date of collection;

b) the total weight of elvers (ie, less than 20 g in weight) collected for transfer, and the date of collection;

c) the total weight of juvenile eels (ie, greater than 20 g in weight) collected for transfer, and the date of collection;

d) the species and total weight of each bycatch species caught, and which method or specific trap resulted in their capture;

e) numbers of each species that die before release of the fish can occur;

f) the total weight of each species released at each respective release site, the location of the site, and date of respective releases;

g) the number and type of collection mechanisms employed, and any factors that reduced collection efficiency.

Downstream transfers

h) the total weight, approximate number and species of adult migrating eels collected for transfer, and the date of collection, including comment on the flow conditions that prevailed on that date (eg, normal, flood), the site of release, and the percentage caught that were transferred and released;

i) the species and total weight of each bycatch species caught, and which method or specific trap resulted in their capture;

j) numbers of each species that die before release of the fish can occur;

k) the number and type of collection mechanisms employed, and a brief description of how they work.

29. To obtain useful data for the management of native eel fisheries, the permit holder is also required to:

a) record the number and total weight of shortfin and longfin elvers in a representative sample of the catch (100 elvers) at 15 day intervals, when catch allows. For the purpose of this data collection elvers are those up to 20 g in weight;

b) supply electronic records (in Excel or txt format) on fish caught for entry into the New Zealand Freshwater Fish or eel recruitment database (currently maintained by NIWA) to Fisheries New Zealand with the annual report required by condition 27.

30. For any projects, or part projects that are carried out in Waikato-Tainui's rohe (area A in Schedule Two) a summary report of those projects must be submitted to Waikato Raupatu River Trust annually (see contact details in Schedule One).

31. For the purpose of this permit, the permit holder is not required to meet the requirements of the *Fisheries (Reporting) Regulations 2017* and the *Fisheries (Geospatial Position Reporting) Regulations 2017*.

General Conditions

32. Except as otherwise expressly provided, the provisions of the Act or any regulation, notice, direction, restriction, requirement, or condition under the Act will apply to any fishing, or any person engaged in fishing, under this special permit.

33. The permit holder must ensure that all personnel, read, understand and are fully conversant with the conditions of the special permit before the taking aquatic life commences under this special permit.

34. This special permit must be held at the permit holder's premises. The permit holder of their employees or agents at the location, must have a copy of this special permit in their possession while collecting aquatic life under the authority of this special permit. In all cases, copies of this special permit must be produced for sighting on request by a Fishery Officer.

35. The Director-General (or his delegate) may amend, add or revoke any conditions to this special permit, or revoke this special permit by notice in writing to the permit holder.

36. This special permit does not preclude the permit holder from complying with any other statutory requirement from any other governing agency.

37. No fishing undertaken, or catch taken or otherwise possessed under this special permit shall give rise to any right, privilege, or expectation or preference in regard to the granting of any future permit, license, authorisation, quota, catch history, individual catch entitlement or other right whatsoever under the Act.

38. Failure to comply with the conditions of this special permit can, at the discretion of the delegated officer, result in the revocation of the permit. Every person commits an offence who contravenes any term or condition placed on this special permit and is liable to a fine not exceeding $100 000.

DATED at Nelson on the 9th of June 2020.

David Scranney
Manager Customary Fisheries and Spatial Allocations
Acting pursuant to a delegation issued under Section 41 of the State Sector Act 1988.

SCHEDULE ONE:
Contact Details

Fisheries New Zealand Manager Customary Fisheries and Spatial Allocations can be contacted by the following:

Nelson	David Scranney Tel (03) 548 1069 Email: David.Scranney@mpi.govt.nz cc. Christine.Bowden@mpi.govt.nz

Fisheries Compliance Regional Manager can be contacted by the following:

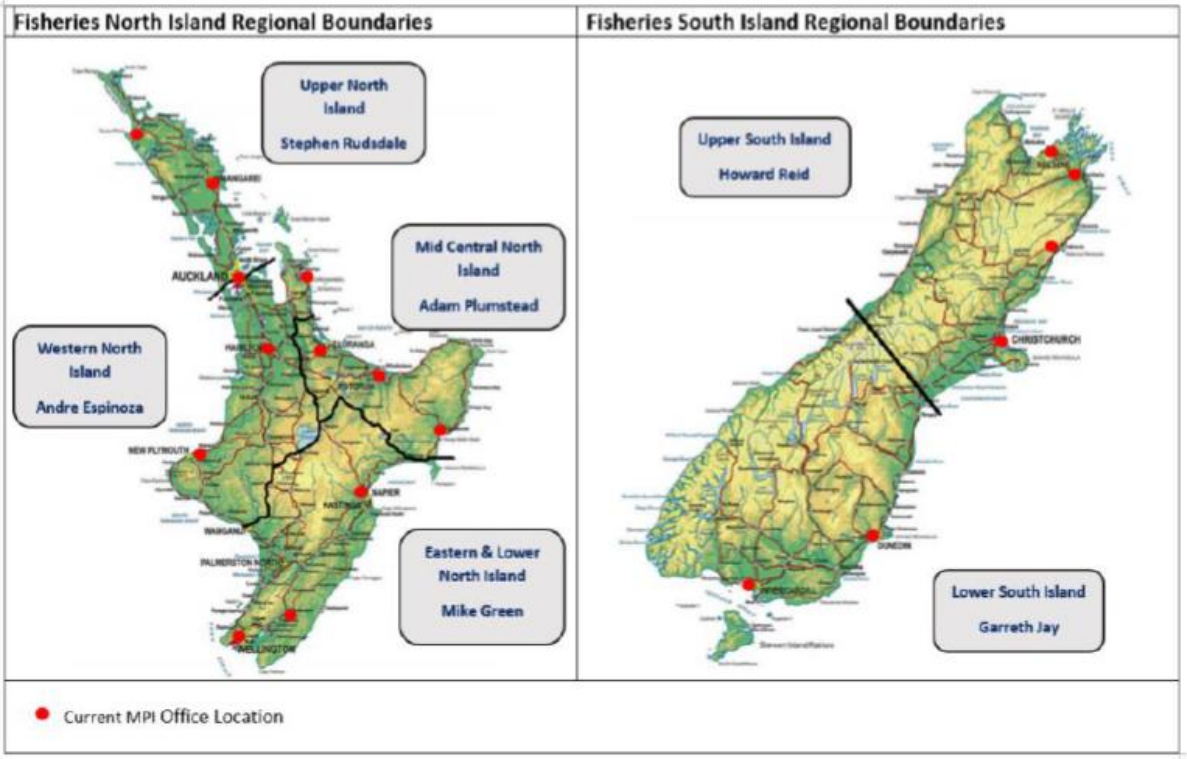
Upper North Island	Stephen Rudsdale Tel (09) 470 0580 Email Stephen.Rudsdale@mpi.govt.nz cc. Charlene.Sutton@mpi.govt.nz
Western North Island	Andre Espinoza Tel (09) 820 7742 Email: Andre.Espinoza@mpi.govt.nz cc. Louise.Kay@mpi.govt.nz

Waikato-Tainui River Iwi can be contacted on the following:

Hamilton	Taroi Rawiri Waikato-Tainui Environmental Manager Waikato Raupatu River Trust Private Bag 3344 Hamilton Tel: (07) 858 0400 Email: taroi.rawiri@tainui.co.nz

NIWA agent for otolith submissions can be contacted by the following:

Christchurch	Dr Shannan Crow NIWA 10 Kyle Street Riccarton Tel: 027 291 9119 Email: shannan.crow@niwa.co.nz


Fisheries North Island Regional Boundaries
Upper North Island
Stephen Rudsdale
Mid Central North Island
Adam Plumstead
Western North Island
Andre Espinoza
Eastern & Lower North Island
Mike Green
AUCKLAND
Fisheries South Island Regional Boundaries
Upper South Island
Howard Reid
Lower South Island
Garreth Jay
CHRISTCHURCH
Current MPI Office Location

Page 9 of 10

SCHEDULE TWO
Map of Waikato co-governance areas; Waikato-Tainui's rohe is area A