Mangakura Dams and Ohirangi (Sandhills) Stream

2024-2025 Annual Report

Final - November 2025

Watercare

QUALITY INFORMATION

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REVISION HISTORY

Rev	Revision Date	Name	Position	Signature
1	3/12/2025	Michiel Jonker	Environmental Care Manager	
2	3/12/2025	AJ Grobler	Operations Controller	
3	29/10/2025	James Talbot	Headworks Manager	

APPROVED

Date	Name	Position	Signature
3/12/2025	Michiel Jonker	Environmental Care Manager	

CONSENT CHANGE AND MONITORING HISTORY

Change type	Description	Effective date	Reference / condition	Reporting / monitoring implications
Annual report due date	Watercare requested all dam annual reports to be extended from 30 September to 31 October	19/05/2025	7	All reports to be submitted by 31 October of each year.

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1 INTRODUCTION

1.1 Background

This annual report is written to satisfy the reporting requirements of the following consents, for the reporting period 1 July 2024 to 30 June 2025:

Mangakura:

- 25161, 25168, 25169 (Take)
- 25170, 25171, 25172, 25173, 25174 (Dam)
- 25189 (Stream Work)
- 25188 (Discharge)

Ohirangi

- 20785 (Take)
- 25185 (Dam)
- 25186 (Discharge)

Table 1-1 details the information required to be reported on and the conditions that this information relates to.

Table 1-1: Annual report information required by resource consent conditions.

Reporting information	Consent condition
Environmental monitoring • water quality • macroinvertebrates	Condition 10 Condition 11 Condition 13a
Drought Management Plan	Condition 13b
Discharge valve monitoring	Condition 20 Condition 21
Dam Safety	Condition 24 Condition 25

2 ENVIRONMENTAL MONITORING – MANGAKURA STREAM

2.1 Overview

Environmental monitoring is required at four sites across the Mangakura and Ohirangi Streams in accordance with condition 10 and 11 to assess the effects of the stream abstractions. Monitoring is undertaken by Watercare Laboratory Services.

2.2 Monitoring sites

The location of the monitoring sites is shown in Figure 2-3. The characteristics and values of the Mangakura Stream ecosystem vary considerably above and below Dam 1, primarily due to differences in the surrounding landcover.

2.3 Mangakura upstream (control)

36°42'04.3"S 174°27'41.8"E

The upstream (control) site shown in Figure 2-1 is located on the Mangakura Stream, upstream of Dams 1 and 2, and approximately 100 m downstream of Dam 3. This section of stream is well-defined and a moderately steeply graded channel, with bed substrates comprising a mix of bedrock, large boulders and cobbles which support a diverse hydrologic environment of intermixed pools, riffles, runs and chutes. The surrounding mature broadleaved forest, combined with the steep topography, provides a high level of shading to the stream channel.

2.4 Mangakura downstream

36°41'52.8"S 174°26'58.3"E

The Mangakura Stream spills from Dam 1 into a short, highly modified stream section (~600 m) passing through an agricultural land-use area before entering the Kaipara River. Mangakura downstream site, shown in Figure 2-2, is located approximately 80 m downstream of the spillway, near the bridge. This reach is relatively shallow with a low level of flow and a sand/silt substrate. There is high instream macrophyte cover and moderate shading from high banks and a narrow band of riparian vegetation. The dense macrophyte cover limits the biogeochemical function of the reach, though this is somewhat mitigated by the relatively high level of shading.

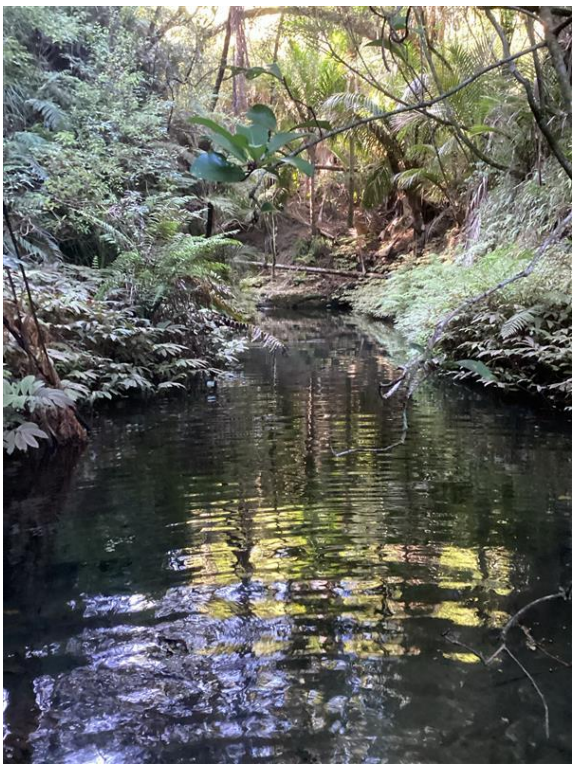

Figure 2-1: Mangakura upstream (control) monitoring site, looking upstream (February 2025).

Figure 2-2: Mangakura downstream monitoring site (February 2025).

2.5 Methods

2.5.1 Water quality – continuous monitoring

Summer continuous water quality monitoring for dissolved oxygen and pH is required for at least 15 days between January and February annually. Water temperature monitoring is required continuously for a 5-month period from December to April (inclusive).

Sensors monitoring dissolved oxygen and pH were deployed between 28 January and 18 February at both sites. Temperature monitoring occurred throughout the required period, from 1 December 2024 to 30 April 2025. Data logs at 10-minute intervals.

2.5.2 Macroinvertebrate monitoring

Analysis of macroinvertebrate community structure is required at each site on one occasion each in January/February and June/July every year. The collection of five replicate samples was undertaken using kick net sampling techniques in accordance with Protocols for sampling macroinvertebrates in wadeable streams (Stark *et al.*, 2001). This report presents results from last year's winter (June/July 2024) and this year's summer (January/February 2025), irrespective of the financial year in which each winter sample was collected. All future annual reports follow this format, transitioning from reporting on this year's summer and winter results as in previous reports.

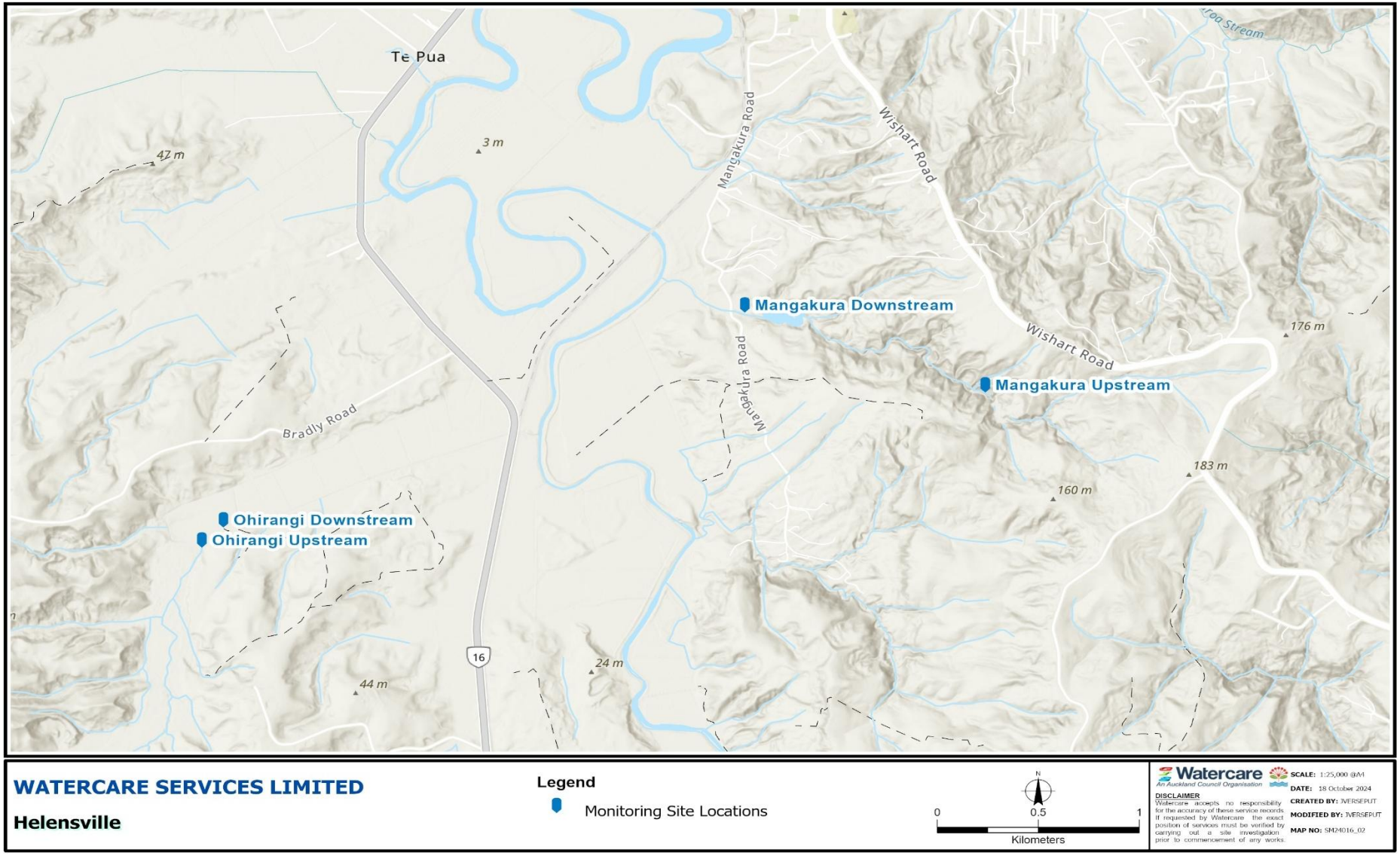

Figure 2-3: Helensville environmental monitoring locations.

2.6 Results

2.6.1 Macroinvertebrate monitoring

Table 2-1: Summary results (mean ± 95% confidence interval) of macroinvertebrate community metrics for the Mangakura monitoring sites 2024-2025.

Season	Metric	Upstream	Downstream
Winter	EPT taxa	0.2 ± 0.6	0 ± 0
Summer	EPT taxa	0 ± 0	0 ± 0
Winter	Individuals	32 ± 12.6	19.6 ± 8.6
Summer	Individuals	45.8 ± 35.3	48.2 ± 20.7
Winter	MCI	56.2 ± 8.2	63.8 ± 18.2
Summer	MCI	59.8 ± 15.3	68.8 ± 10.6
Winter	QMCI	2.8 ± 0.6	2.8 ± 1
Summer	QMCI	3.8 ± 0.6	4 ± 0
Winter	Taxa richness	5.4 ± 3	3.2 ± 2.4
Summer	Taxa richness	3.8 ± 1	5.2 ± 1

2.6.2 Historical trend analysis (2016 – 2025)

The summary data presented in Table 2-2 shows that the summer water temperature ranges at both sites generally vary by ≥ 10 C°, with lows of roughly 12 – 15 C° and highs of 24 – 30 C°. Mean temperatures are relatively similar between the two sites and are consistent over time.

Dissolved oxygen concentrations show a high level of variation within and between periods, particularly at the Downstream site. Variability at the downstream site may be attributed to macrophyte respiration causing diurnal fluctuation, with more extreme lows attributed to stagnated water and/or very low water levels during some monitoring periods. During the 2024-2025 monitoring, dissolved oxygen at Downstream was more similar to periods 2021-2022 and earlier, with a slight decrease in mean results and overall range compared to 2022-2023 and 2023-2024. Comparatively, dissolved oxygen at Upstream was on average, consistent with previous monitoring periods.

The pH levels at Downstream and Upstream sites have shown moderate variability within and between earlier survey periods, and improved consistency since the 2019-202 period. Recent pH levels have remained relatively neutral, generally ranging between 6.5 and 7.5. For 2024-2025, pH has remained neutral throughout the monitoring period, consistent with previous years.

Overall, temperature and pH are typically relatively similar between Upstream and Downstream sites within a given year during previous and current monitoring years, whilst dissolved oxygen is generally lower and more variable, suggesting possible impacts from reduced flows and greater macrophyte coverage below the reservoir in addition to the influence of surrounding land use. There are no notable changes in 2024-2025 compared to previous monitoring periods.

Table 2-2: Mean (min - max) water quality data for annual water quality monitoring at the Mangakura monitoring sites.

Monitoring Period	Mangakura Upstream			Mangakura Downstream		
	Temperature (C°)	Dissolved Oxygen (mg/L)	pH	Temperature (C°)	Dissolved Oxygen (mg/L)	pH
2016-2017	17.6 (14.2 - 21.5)	5.6 (0.3 - 8.4)	7.1 (6.9 - 7.5)	18.9 (13.9 - 25.5)	4.0 (1.5 - 6.8)	8.1 (7.7 - 8.4)
2017-2018	19.2 (14.5 - 24.2)	8.6 (7.9 - 9)	7.6 (6.5 - 9.6)	18.5 (12.4 - 25.6)	6.2 (5.5 - 7.1)	10.4 (9.0 - 12.5)
2018- 2019	18.3 (12.9 - 23.8)	6.8 (5.7 - 7.7)	9.0 (8.3 - 9.7)	17.1 (11.5 - 23.8)	7.2 (6.6 - 7.6)	9.3 (8.4 - 9.8)
2019-2020	18.1 (13.2 - 23.4)	6.0 (5.2 - 7.9)	7.3 (7.1 - 7.5)	18.5 (13.4 - 26.4)	0.5 (0.1 - 3.3)	6.8 (6.6 - 6.9)
2020-2021	18.2 (13.3 - 22.8)	7.1 (3.3 - 8.8)	7.3 (7 - 7.6)	18.0 (12.7 - 28.6)	3.2 (0.1 - 9.9)	7.1 (6.8 - 7.8)
2021-2022	19.9 (13.4 - 29.2)	8.1 (6.7 - 9.2)	7.1 (6.6 - 7.4)	18.0 (13.4 - 24.1)	4.8 (0.2 - 9.6)	7.1 (6.9 - 7.5)
2022-2023	17.9 (14.6 - 23.2)	10.8 (8.3 - 11.6)	6.6 (5.8 - 7.1)	21.6 (15.7 - 27.4)	-	-
2023-2024	20.2 (12.7 - 30.4)	10.1 (7.6 - 13.6)	6.5 (6.1 - 6.9)	18.7 (12.9 - 25.2)	3.0 (0 - 11.3)	6.7 (6.1 - 7.1)
2024-2025	18.7 (15.0 – 23.1)	7.7 (4.9 – 10.5)	7.1 (7.1 – 7.5)	18.9 (13.2 – 27.6)	4.0 (0.6 – 5.8)	7.2 (5.2 – 8.5)

Table 2-3: Summary results (mean ± 95% confidence interval) and Mann-Kendall trend analysis results of macroinvertebrate community metrics for the Mangakura Upstream and Downstream monitoring sites (2016-2025).

Monitoring site	Metric	Mean ± 95% CI	Tau	p-value	Trend
Upstream	EPT taxa	0.3 (± 0.1)	-0.11	0.21	No significant trend
Downstream	EPT taxa	1.0 (± 0.2)	-0.24	0.00	Decreasing
Upstream	Individuals	42.9 (± 7.7)	-0.06	0.39	No significant trend
Downstream	Individuals	122.1 (±42.0)	-0.30	0.00	Decreasing
Upstream	MCI	60.9 (± 4.6)	0.17	0.03	Increasing
Downstream	MCI	71.9 (± 4.1)	0.05	0.47	No significant trend
Upstream	QMCI	3.0 (± 0.3)	0.36	0.00	Increasing
Downstream	QMCI	3.2 (± 0.3)	0.16	0.05	No significant trend
Upstream	Taxa richness	4.6 (± 0.4)	-0.18	0.03	Decreasing
Downstream	Taxa richness	5.6 (± 0.5)	-0.28	0.00	Decreasing

The summary results presented in Table 2-3 indicate that at the Upstream site, QMCI shows a statistically significant increase over the historical monitoring period, whereas taxa richness exhibits a small decrease. The number of individuals, EPT taxa, and MCI score show no significant changes over time. Overall, the Upstream site has a mean MCI of 60.9 (Poor) and a QMCI of 2.9 (Poor). In comparison, the Downstream site shows a significant decrease in the number of individuals, taxa richness, and EPT taxa, with no significant change in MCI (72.1 – Poor) or QMCI (3.1 – Fair). The greater declines in individuals and EPT taxa at the Downstream site may indicate impacts of the dam and/or surrounding land use on habitat stability in the downstream environment.

Overall, both sites exhibit poor to fair macroinvertebrate community quality, although the MCI and QMCI scores are slightly higher at the Downstream site, suggesting a greater presence of sensitive taxa. Similarly, the EPT taxa and overall taxa richness are generally higher at the Downstream site, indicating that habitat quality may be slightly higher there. Nevertheless, the MCI and QMCI scores for both sites remain within the “Poor” quality class.

2.7 Summary

- Upstream: primarily stable or improving macroinvertebrate metrics (MCI, QMCI), but slight loss of taxa richness.
- Downstream: declining community macroinvertebrate community health with regards to abundance and diversity, despite MCI and QMCI remaining stable. In particular, the reduction of EPT taxa indicates ecological stress in this location.

3 ENVIRONMENTAL MONITORING – OHIRANGI STREAM

3.1 Overview

Environmental monitoring is required at two sites in the Ohirangi Stream in accordance with condition 10 and 11 to assess the effects of the stream abstractions. Monitoring is undertaken by Watercare Laboratory Services.

3.2 Monitoring sites

The location of the monitoring sites is shown in Figure 2-3.

3.2.1 Ohirangi upstream (control)

36°42'35.9"S 174°25'14.3"E

The Ohirangi Upstream location is within the Bradley Road Swamp along a stretch of straightened farm drain, approximately 20 m upstream of Sandhills Weir. The site is shown in Figure 3-1. The channel is relatively homogenous and deep, dominated by dense grasses. Substrate composition is sand and silt, beneath grass matts.

3.2.2 Ohirangi downstream

36°42'31.9"S 174°25'19.4"E

The downstream location is within the straightened channel section approximately 50 m downstream of the Sandhills Weir. This section of stream is a straightened farm drain, with some riparian planting on both banks providing instream shading. The reach is shallow and entirely sand/silt. No wood or organic matter are typically observed within the reach, and minimal macrophyte growth.

Figure 3-1: Ohirangi upstream (control) monitoring site, looking upstream (February 2025).

Figure 3-2: Ohirangi downstream monitoring site, looking upstream (February 2025).

3.3 Methods

3.3.1 Water quality – continuous monitoring

Summer continuous water quality monitoring for dissolved oxygen and pH is required for at least 15 days between January and February annually. Water temperature monitoring is required continuously for a 5-month period from December to April (inclusive).

Sensors monitoring dissolved oxygen and pH were deployed between 28 January and 18 February at both sites. Temperature monitoring occurred throughout the required period at the upstream site, from 1 December 2024 to 30 April 2025. Data logs at 10-minute intervals. During a high flow event, the temperature sensor at the downstream site was dislodged from its waratah and washed away, therefore no temperature data is available for the 2024-2025 reporting period.

3.3.2 Macroinvertebrate monitoring

Analysis of macroinvertebrate community structure is required at each site on one occasion each in January/February and June/July every year. The collection of five replicate samples was undertaken using kick net sampling techniques in accordance with Protocols for sampling macroinvertebrates in wadeable streams (Stark et al., 2001). This report presents results from last year's winter (June/July 2024) and this year's summer (January/February 2025), irrespective of the financial year in which each winter sample was collected. All future annual reports follow this format, transitioning from reporting on this year's summer and winter results as in previous reports.

3.4 Results

3.4.1 Macroinvertebrate monitoring

Table 3-1: Summary results (mean ± 95% confidence interval) of macroinvertebrate community metrics for the Ohirangi monitoring sites 2024-2025.

Season	Metric	Upstream	Downstream
Winter	EPT taxa	2.4 ± 1.9	2.2 ± 1.4
Summer	EPT taxa	1 ± 1.2	0.2 ± 0.6
Winter	Individuals	71.8 ± 38.4	32.2 ± 31.3
Summer	Individuals	27.4 ± 12.2	10.8 ± 7.2
Winter	MCI	101 ± 16.3	92 ± 18.4
Summer	MCI	95 ± 15.7	70.4 ± 23.6
Winter	QMCI	5.4 ± 0.7	4 ± 0.9
Summer	QMCI	4.4 ± 0.7	3 ± 0.9
Winter	Taxa richness	8 ± 3.6	5.4 ± 2.3
Summer	Taxa richness	4.8 ± 1.6	2.6 ± 1.4

3.4.2 Trend analysis (2016-2025)

Water quality data for the Ohirangi Upstream and Downstream sites collected between 2016 and 2024 is summarised in Table 3-2. Water temperatures during each monitoring period are very similar between the two sites. Within each period, temperatures at both sites generally vary by ≤ 10 C°, with lows of 10 – 13 C° and highs of 19 – 21 C°. Mean temperatures are also very similar between the two sites and over time, varying by < 2 C° across all monitoring periods. Temperature analysis between the two sites cannot be completed for 2024-2025, however the Upstream site remains similar to previous monitoring.

Dissolved oxygen concentrations are also very similar between the two sites both and generally fluctuate within a tight concentration range of < 3 mg/L for each period. However, the 2024-2025 monitoring period marks the first detection of dissolved oxygen below 5 mg/L in addition to larger variation than previously found at the Upstream site. The Downstream site remained consistent with previous monitoring periods in both mean result and overall range, indicating stable conditions.

Table 3-2: Mean (min - max) water quality data for annual water quality monitoring at the Ohirangi monitoring sites.

	Ohirangi Upstream			Ohirangi Downstream		
Monitoring Period	Temperature (C°)	Dissolved Oxygen (mg/L)	pH	Temperature (C°)	Dissolved Oxygen (mg/L)	pH
2016-2017	16.5 (11.4 - 19.9)	8.0 (7.5 - 8.7)	7.8 (7.7 - 7.9)	16.7 (12.1 - 20.8)	7.7 (7.1 - 8.3)	8.0 (7.7 - 8.3)
2017-2018	17.3 (12.4 - 20.9)	7.7 (6.9 - 8.4)	7.9 (7.8 - 8)	17.4 (12.6 - 21.4)	7.5 (6.8 - 8)	7.3 (7.2 - 7.5)

Monitoring Period	Ohirangi Upstream			Ohirangi Downstream		
	Temperature (C°)	Dissolved Oxygen (mg/L)	pH	Temperature (C°)	Dissolved Oxygen (mg/L)	pH
2018- 2019	16.5 (9.9 - 20.7)	7.7 (7.2 - 8.1)	7.6 (7.4 - 7.6)	16.7 (10.5 - 21)	7.5 (6.9 - 7.9)	7.3 (7.2 - 7.6)
2019-2020	16.2 (11.2 - 20.6)	6.9 (6.3 - 7.8)	7.6 (7.6 - 7.6)	16.3 (11.1 - 21)	7.6 (7.0 - 8.3)	7.6 (7.5 - 7.7)
2020-2021	16.1 (10.6 - 18.9)	8.7 (8.1 - 9.6)	7.7 (7.7 - 7.7)	16.2 (10.6 - 19.2)	8.8 (8.2 - 9.5)	7.7 (7.6 - 7.8)
2021-2022	16.9 (11.4 - 21.4)	8.4 (7.4 - 9.2)	7.8 (7.7 - 7.8)	16.8 (11.3 - 21.4)	8.6 (7.9 - 9.2)	7.7 (7.6 - 7.8)
2022-2023	16.5 (11.6 - 20.4)	7.3 (5.2 - 7.8)	7.4 (6.9 - 7.6)	17.3 (13.2 - 20.4)	7.4 (5.6 - 8)	7.1 (6.7 - 7.2)
2023-2024	16.7 (11.4 - 20.9)	11.7 (10.1 - 12.8)	7.9 (7.8 - 8)	16.7 (11.7 - 20.9)	11.7 (9.8 - 12.9)	7.8 (7.8 - 7.8)
2024-2025	16.7 (12.4 – 19.6)	9.0 (4.5 – 11.5)	7.9 (7.8 – 7.9)	-	7.5 (7.3 – 7.5)	7.2 (7.0 – 7.3)

Table 3-3: Summary results (Mean ± 95% confidence interval) and Mann-Kendall trend analysis results of macroinvertebrate community metrics for the Ohirangi Upstream and downstream monitoring sites (2016-2025).

Monitoring site	Metric	Mean ± 95% CI	Tau	p-value	Trend
Upstream	EPT taxa	1.5 (± 0.2)	0.34	0.00	Increasing
Downstream	EPT taxa	1.8 (± 0.3)	0.17	0.04	Increasing
Upstream	Individuals	143.9 (±36.8)	-0.00	0.97	No significant trend
Downstream	Individuals	191.2 (±42.4)	-0.41	0.00	Decreasing
Upstream	MCI	99.3 (± 3.1)	0.31	0.00	Increasing
Downstream	MCI	90.7 (± 4.5)	0.21	0.01	Increasing
Upstream	QMCI	3.6 (± 0.3)	0.16	0.05	Increasing
Downstream	QMCI	3.5 (± 0.3)	0.52	0.00	Increasing
Upstream	Taxa richness	5.4 (± 0.4)	0.07	0.35	No significant trend
Downstream	Taxa richness	6.0 (± 0.6)	-0.16	0.05	Decreasing

3.4.3 Summary

In the Ohirangi Stream, the results are generally similar between the upstream and downstream sites. These findings indicate the water abstraction is having no more than minor adverse effects. The continuous water quality monitoring data indicates that water quality parameters recorded at the Upstream and Downstream sites have remained within a suitable range for stream ecological health over the entire monitoring record, supported by the macroinvertebrate results. Water quality data has also been very similar between the two sites within each annual monitoring period over the duration of the consent monitoring, indicating that the Sandhills Weir and water take are not having a long-term detectable effect on downstream water quality.

4 DROUGHT MANAGEMENT PLAN

The Mangakura and Ohirangi resource consents require a summary of any events that trigger the Drought Management Plan (DMP) for the Helensville water supply and an assessment of the effectiveness of the DMP.

Watercare did not trigger the DMP for the Helensville water supply in 2023-2024. Consequently, there is nothing further to report for the July 2024 to June 2025 period.

5 DISCHARGE VALVE MONITORING

Condition 20 of the resource consents authorise discharge from the Mangakura dams for the purpose of maintenance or safety at a flow rate of no greater than 10 m^3/s for up to 4 hours for any one event, or as agreed with Auckland Council. The scour valve sizing ensures discharges from Mangakura Dam 1 or Dam 3 do not exceed the flow rate. For the reporting period, only one discharge occurred, detailed in Table 5-1.

Table 5-1: Discharges from the Mangakura Dams in 2024-2025.

Location	Date	Duration
Mangakura 1	11 September 2024	20 minutes

6 DAM SAFETY

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

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.

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

8 CONCLUSION

This report covers the annual reporting requirements for the consents related to Mangakura Dams and Ohirangi (Sandhills) stream in the period 1 July 2024 to 30 June 2025. Watercare has been fully compliant with its consent obligations.

Appendix A. Dam Safety Compliance Certificate

23 September 2025

Shreesh Basnyat
Dam Safety Manager
Watercare Services Limited
73 Remuera Road
Remuera
Auckland 1050

Dear Shreesh,

2025 Annual Dam Safety Compliance Certificate for Ardmore, Cosseys, Wairoa, Rosedale, Hays Creek, Mangakura No.1 and Mangakura No.3 dams.

Purpose

This letter forms the annual dam compliance certificate for Watercare's dam Resource Consent requirements (Appendix A) as per the brief (Appendix B). This letter covers the following dam sites, henceforth referred to as the dams:

- Ardmore Attenuation Dams
- Cosseys
- Wairoa
- Rosedale
- Hays Creek
- Mangakura Dam No.1 and Dam No.3

This assessment is based on evidence of the respective 2025 Intermediate Dam Safety Reviews and dam safety surveillance information to 17 September 2025[1], and a sighting of the Emergency Preparedness Plan Section A, Section B for Ardmore Attenuation Dams and the Procedure Manual for Wairoa Dam as example documents. The EPP Section A was updated in August 2025. We maintain a high-level overview of Watercare's Dam Safety Management System. The Dam Safety Assurance Programmes for Cosseys, Wairoa, Rosedale and Hays Creek Dams were certified by a DSI Recognised Engineer in accordance with the Building (Dam Safety) Regulations 2022 in June and July 2025.

Dam Safety Management System

Watercare's Dam Safety Management System for the dams is documented in:

- The Dam Safety Management Systems standard operating procedure.
- The scope of services for dam safety assurance (Surveillance and Intermediate Dam Safety Reviews).
- Procedures Manuals detailing operations, maintenance and surveillance requirements.
- Emergency Preparedness Plans – generic to all Watercare dams with site-specific appendices.

These measures are consistent with the NZ Dam Safety Guidelines (NZSOLD 2024) and are appropriate to the respective dam Potential Impact Classifications (PIC).

[1] The Mangakura Dam No. 1 and Dam No. 3, Ardmore Attenuation Dams and Hays Creek Dam IDSR reports were in progress at the time of writing this letter.

Potential Impact Classifications

Potential Impact Classifications (PIC) of the dams are in the table below.

Dam	PIC	Reference for latest PIC assessment or comment (e.g. CDSR)
Ardmore Attenuation Dams	Medium	Ardmore Dams – Dam-Break Flood Hazard Assessment and Potential Impact Classification, Damwatch Engineering. 2024
Cosseys	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Mangakura No.1 Dam	Low	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Mangakura No.3 Dam	Low	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Wairoa	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Rosedale	High	Potential Impact Classification Assessment, Watercare Northern Auckland Wastewater Dams, Rileys, July 2024.
Hays Creek	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.

Routine Surveillance

Cosseys, Wairoa, Rosedale and Mangakura No.3 dams continue to be monitored under a routine surveillance programme.

Enhanced Surveillance

The following dams are currently under enhanced surveillance.

Hays Creek Dam

Hays Creek Dam is under enhanced surveillance due to a potential dam safety deficiency arising from uncertainty surrounding piezometric levels and material properties of the downstream shoulder[2]. Watercare have acted on several risk reductions and also planned further action for future financial years, including:

- A new weir was installed to improve observation and measurement of chimney drain seepage. The new weir replaced an existing weir that was susceptible to flooding and stormwater flow. The new weir has been observed to be susceptible to sedimentation since installation and investigations have been undertaken. Through investigations it has been found that the likely source of sediment is from backflowing water during storm events and/or sediment emerging from upstream joints. Watercare investigations are ongoing with a current focus to confirm the source of the sediment in a period of sustained drier weather, followed by appropriate remediation works.
- A stability assessment has been planned for FY2027, or once a site-specific seismic study has been completed.

Ardmore Dams No. 1 and 2

Ardmore Dams No. 1 and 2 were placed under enhanced surveillance in 2005 because seepages from unknown sources were identified at both dams.

[2] Hays Creek Dam Comprehensive Dam Safety Review, Pickford Consulting Ltd & Hydropower Engineering Ltd, March 2018

In April 2016 the surveillance was revised from daily to twice weekly following a surveillance frequency review. The surveillance level remains enhanced as a potential dam safety deficiency still exists (risk of internal erosion) as confirmed by the 2019 Comprehensive Dam Safety Review[3] and supported by the 2023 Comprehensive Dam Safety Review[4].

In January 2025 the surveillance frequency was increased from twice weekly to daily following the observation of a wet spot at the toe of Dam No. 1. A filter blanket with drain was constructed over the wet area beginning on 24 January and additional gravel placed over a further wet area on 19 February. There have been no significant adverse trends or anomalies in instrument data. Enhanced surveillance reduced from daily to three-weekly in June 2025 following 4 months with no other abnormal observations. Watercare have initiated investigations to better understand the mechanism for the seepage, with remedial works subsequently proposed as appropriate.

Mangakura No. 1 Dam

Enhanced surveillance of Mangakura No.1 Dam is undertaken because there are potential dam safety deficiencies relating to cracking at the crest, upper embankment stability, effective length of the spillway crest, potential spillway leakage, identification of voids beneath the spillway invert and overtopping the spillway chute. Enhanced surveillance was moved from daily to twice daily in January 2024 following the commencement of the upgrade works. The upgrade works were completed in September 2024 and addressed the potential dam safety deficiencies relating to cracking at the crest and upper embankment stability. Enhanced surveillance moved to a daily frequency in June 2024 and then to weekly in December 2024.

Review Criteria

This certificate uses the NZ Dam Safety Guidelines (NZSOLD 2024) as the basis for its review of Watercare's Dam Safety Management System.

Review of Operation, Maintenance and Monitoring with Respect to Dam Safety

On the basis of the 2025 Intermediate Dam Safety Reviews' performance evaluations and our familiarity with the dams, we assess that the dams are operated, maintained and monitored to ensure that they are structurally sound and do not pose unacceptable risks to life, property or the natural environment. They are operating within acceptable dam safety limits in accordance with NZ Dam Safety Guidelines (NZSOLD 2024).

Certification

We confirm in this letter, for the dams listed, that Watercare's dam safety and surveillance measures meet the relevant Resource Consent requirements (Appendix A).

Yours sincerely,

Katy Cottingham

Katy Cottingham
Principal Dam Safety Engineer

[3] Ardmore Dams 2019 Comprehensive Dam Safety Review, Damwatch Engineering Limited, May 2019
[4] Ardmore Dams Comprehensive Dam Safety Review 2023, Stantec, July 2024

Appendix A: Watercare Dam Resource Consent Conditions relevant to this Certificate

12(i) The dams and associated structures shall be operated, maintained and monitored to ensure that they are structurally sound, pose no undue risk to life, property or the natural environment and are able to perform satisfactorily to their approved design standard.

12(ii) The Mangakura No. 1 dam, spillway, and associated structures shall be inspected quarterly and during and after extreme weather events.

12(iii) The dam, spillway, and associated structures shall be inspected annually by an appropriately qualified and experienced engineering professional to check the structural integrity and functioning of the dam and associated structures, and to advise on any upgrade or maintenance works that are required.

12(iv) Dam safety and surveillance measures (the measures) shall be identified and documented in accordance with the publication “New Zealand Dam Safety Guidelines” (New Zealand Society of Large Dams) to ensure the dam is able to perform satisfactorily and in accordance with the NZSOLD guidelines. These measures shall be appropriate for the dam’s Potential Impact Classification.

12(v) The documented measures required by condition (iv) shall be updated without delay to incorporate any required remedial measures or additional actions identified by the Dam Safety Assurance Programme or Annual Dam Compliance Certificate.

12(vi) The updated measures required by condition (iv) and (v) shall be implemented thereafter.

12(vii) State whether there are any non-compliances with these conditions, specifying whether any of the non-compliance items are a dam safety deficiency and identify any changes (with timescales for implementation) to measures necessary to address any non-compliance.

Appendix B: Watercare's Brief

Summary

An annual dam safety compliance certificate for part of Watercare's dam inventory is required in order to meet Watercare's dam safety consent compliance.

Background

Those dams covered by this compliance certificate comprise:

- Ardmore Attenuation Dams,
- Cosseys,
- Wairoa,
- Rosedale,
- Hays Creek, and
- Mangakura dams No's 1 and 3

Watercare's dam safety and surveillance measures for each dam are documented in:

- The Dam Safety Management Systems standard operating procedure;
- The scope of services for dam safety assurance (surveillance and Intermediate dam safety reviews);
- Procedures manuals detailing operations, maintenance and surveillance requirements; and
- Emergency preparedness plans – generic to all Watercare dams with site-specific appendices.