Sunshine Coast Regional District

Conditional Water Licence 502568
2025 Annual Report

Final Report

January 2026

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Executive Summary

The Church Road wellfield is a groundwater supply system at Granthams Landing near Gibsons, BC, supplementing the Sunshine Coast Regional District (SCRD)'s Chapman Water System. It operates under Conditional Water Licence 502568 and consists of three production wells (Church Road Wells 2 and 3, and Soames Well). The objectives of this 2025 annual report are to meet the conditions of the Adaptive Management Plan (AMP) and Monitoring Plan, which committed to an annual report that provides an overview of the data collected over the previous year, compares the results to established thresholds, and recommends any changes or adjustments to the AMP and Monitoring Plan for the following operating year and beyond. The report's findings reflect an improved understanding of the wellfield system and are intended to guide sustainable operations while ensuring compliance with regulatory requirements and protection of local aquifers and ecosystems.

Monitoring of fish habitat, groundwater, and surface water in 2025 yielded high-quality data that met the AMP's goals and informed management decisions. Fish and fish habitat assessments conducted as part of the AMP detected no significant changes in fish abundance or community structure in Soames Creek and found no evidence of spawning habitat being dewatered by wellfield operations. These results indicate that wellfield pumping and augmentation measures effectively maintained stream conditions for fish habitat.

Overall, measured surface water and groundwater quality and quantity parameters remained within expected ranges throughout 2025. A lag time of 7 days is still considered to be valid as the interaction between groundwater and spring flow was influenced by reduced precipitation. Soames Creek flows were largely maintained at or above the reliable EFN thresholds established for fish habitat. During the 2025 pumping season, no prolonged EFN shortfalls occurred due to pumping; only one brief dip below the 15.5 L/s EFN in early August was recorded when switching well pump duties, which was immediately mitigated (augmentation flow resumed within minutes) and resulted in no observed fish stranding or habitat impact. Apart from that momentary event, augmentation flows were successfully applied from June 12 to October 18, 2025 to meet EFN requirements during low-flow conditions. All required monitoring and reporting actions under the AMP were fulfilled, and the SCRD is deemed to have met the AMP's compliance requirements for 2025.

In summary, the 2025 monitoring program indicates that the Church Road wellfield operated successfully within environmental limits and provided valuable data to refine understanding of the groundwater–surface water system. The fish and aquatic habitat in Soames Creek were sustained under the current operations and mitigation strategy, and water quality in both the creek and the aquifer remained stable, generally reflecting previous years' results. The report recommends several updates to the AMP and Monitoring Plan for 2026 to further strengthen the management of the wellfield. These proposed changes include:

- Revised Groundwater Level Thresholds: Update and recalculate the AMP Initiative 5 (AMI 5) groundwater level thresholds using the abundant data now collected including new pumping test data from 2024. This will allow for drawdown trigger levels to be more accurately set with the most current hydrogeological information. This will refine the early warning limits for aquifer levels and help prevent any long-term depletion of aquifer storage.
- Updated Monitoring Plan: Implement the Revised Monitoring Plan for 2026, which has been prepared and summarized in this report. Key improvements in the plan include adjustments to monitoring frequencies and thresholds.

- Continued Fish and Habitat Monitoring: Continue annual fish and fish habitat assessments and stream surveys under the AMP to verify that wellfield operations (and any adjustments) have no adverse effects on fish populations or critical habitat, especially if operations extend later into the season. 2025 results showed no negative impacts, and maintaining this monitoring will ensure any future changes are detected promptly. Slight adjustments to monitoring frequencies are recommended to continue to obtain representative data.
- Ongoing Data Review and Adaptive Management: Carry forward the adaptive management approach by iteratively reviewing data as it's collected throughout 2026, respond accordingly and summarize in the next annual report. In particular, verify whether a potential downward trend in groundwater levels that was observed late in 2025 (similar to a trend noted in 2024) is due to natural variability or if it is influenced by wellfield pumping. Also, verify that augmentation volumes (which were higher in 2025 due to a longer pumping season and reduced precipitation) effectively support creek flows without unnecessary water use. Any persistent trends will be addressed through management responses or further AMP updates as needed.

These recommendations and the 2025 results highlight a proactive management strategy for the Church Road wellfield. By adhering to the AMP and Monitoring Plan, and updating them based on new data, SCRD aims to ensure a reliable supplemental water supply for the community while protecting Soames Creek's ecosystem.

An updated Monitoring Plan is presented and summarized for clarity throughout the report, incorporating recent changes. The 2024 Monitoring Plan was followed up until June 2025, at which point the revised Monitoring Plan began upon approval.

Table of Contents

APPENDICES

TABLES

FIGURES

1.0 Introduction

Project	Church Road Wellfield Compliance Monitoring
Company Name	Sunshine Coast Regional District (SCRD)
Water Licence Number	502568
Date Range for Data Presented	January 1, 2024 – December 12, 2024
Qualified Professionals	Soren Poschmann, P.Geo. (Hydrogeology) David Neufeld, R.P. Bio., B.Sc., Dipl.Tech. (Biology QP)

Report Distribution

SCRD	Sandi Bandara, Codi Abbott, Jesse Waldorf
BC MWLRS	Michele Lepitre, Scott Babakaiff, Elyse Sandl, Brynje Johnson

The Church Road wellfield is a water supply system at Granthams Landing near Gibsons, BC, (Figure 1.1) and supplements the existing potable water supply to the SCRD's Chapman Water System. The wellfield consists of groundwater production wells Church Road Well 2, Church Road Well 3, and Soames Well, operating under Conditional Water Licence (CWL) 502568. The Soames Well has been in operation under Water Licence 503423 with a priority date of 1990, while Church Road Wells 2 and 3 were more recently drilled and licenced. These production wells source water from Aquifer #560. In addition to these production wells, the system also includes a streamflow augmentation pipe, a water treatment plant, and a reservoir.

As per the requirements of the Leave to Commence and CWL, specifically clause (m), regular reporting of observations and provision of a Monitoring Plan was necessary to be presented and followed. An Adaptive Management Plan (AMP) and Monitoring Plan were developed by Associated Environmental Consultants Inc. (AE) (Associated Environmental, 2023). The AMP and Monitoring Plan are intended to be adaptive and updated as new data becomes available during the operation of the wellfield. It is also to be reviewed regularly to ensure it remains effective and the objectives can be re-evaluated. ISL Engineering and Land Services Ltd. (ISL) has been retained by the SCRD to assist with the ongoing monitoring and reporting requirements of the AMP and Monitoring Plan.

The wellfield began operations at 10:00 AM PST on July 11, 2023, with reports submitted monthly for the first six months of operations. In 2024, the wellfield began pumping on July 4, 2024, with notification provided to the Ministry of Water, Land and Resource Stewardship (MWLRS) by the SCRD. Data from January to April 2024 was presented in the AMP Update report, including results from a 72-hour pumping test conducted in April (ISL, 2024). The wells pumped throughout the high-demand summer months, with diversion halted at Church Road wells 2 and 3 on September 23, 2024 due to decreased demand. These two wells remained off to the end of 2024 outside of periodic testing, and the Soames Well continued to pump to provide water to the Granthams Landing/Soames Point Water System. All 2024 data (including the AMP Update data) along with an updated monitoring plan was then presented by ISL and submitted to MWLRS in April 2025 (ISL, 2025a). This approved monitoring plan was followed from July 2025 onwards.

In 2025 (this reporting season), the wellfield began operation on June 12 and ended on October 8, with mitigation at Soames Creek ending October 18 (beyond the seven-day requirement). Notification was provided to the MWLRS by the SCRD. The Church Road wellfield remained off to the end of 2025.

1.1 Intent of the 2025 Annual Report

The objectives of this report are to meet the conditions of the AMP and Monitoring Plan, which committed to an annual report that:

- Provides an overview of the locations, methodologies, frequencies, and results for data collected in 2025 for each of the six adaptive management initiatives (AMIs).
- Compares the results to the specified threshold levels, and discusses any actions that were taken if the thresholds were not met
- Recommends changes, removals, and/or adjustments to the AMP and Monitoring Plan for the following operating year and beyond, when appropriate.

This annual report reflects the approach of the previous submission in that it intends to provide a comprehensive overview of all the data collected in 2025 and a concise summary and recommended updates to the Monitoring Plan for the upcoming operational season.

The conclusions presented in this report reflect the increased understanding of the overall system and may differ from those in the previously submitted reports. These conclusions and associated requested AMP and Monitoring Plan updates better reflect the true risks of impacts to the aquifer, Soames Creek, as well as the fish and fish habitat. As such, this report should be considered to supersede previous submissions.

1.2 Background

The SCRD has faced recurring summer droughts, prompting Stage 4 water restrictions in multiple years and a state of local emergency in 2022. A 2018 water demand study (Integrated Sustainability, 2018) projected a significant supply deficit by 2025, driven by limited capacity in the Chapman Creek surface water system. To address this challenge, the Church Road Wellfield was developed to supplement supply during peak summer months, anticipating reducing the projected seasonal deficit by approximately 50% (Associated Environmental, 2023).

The wellfield and associated aquifer has been described in detail in the AMP and Monitoring Plan (Associated Environmental, 2023) and licence application technical report (Associated Environmental, 2019). Pertinent details are summarized below, with additional information regarding the increased understanding of the aquifer through the ongoing work provided in Section 5.4.

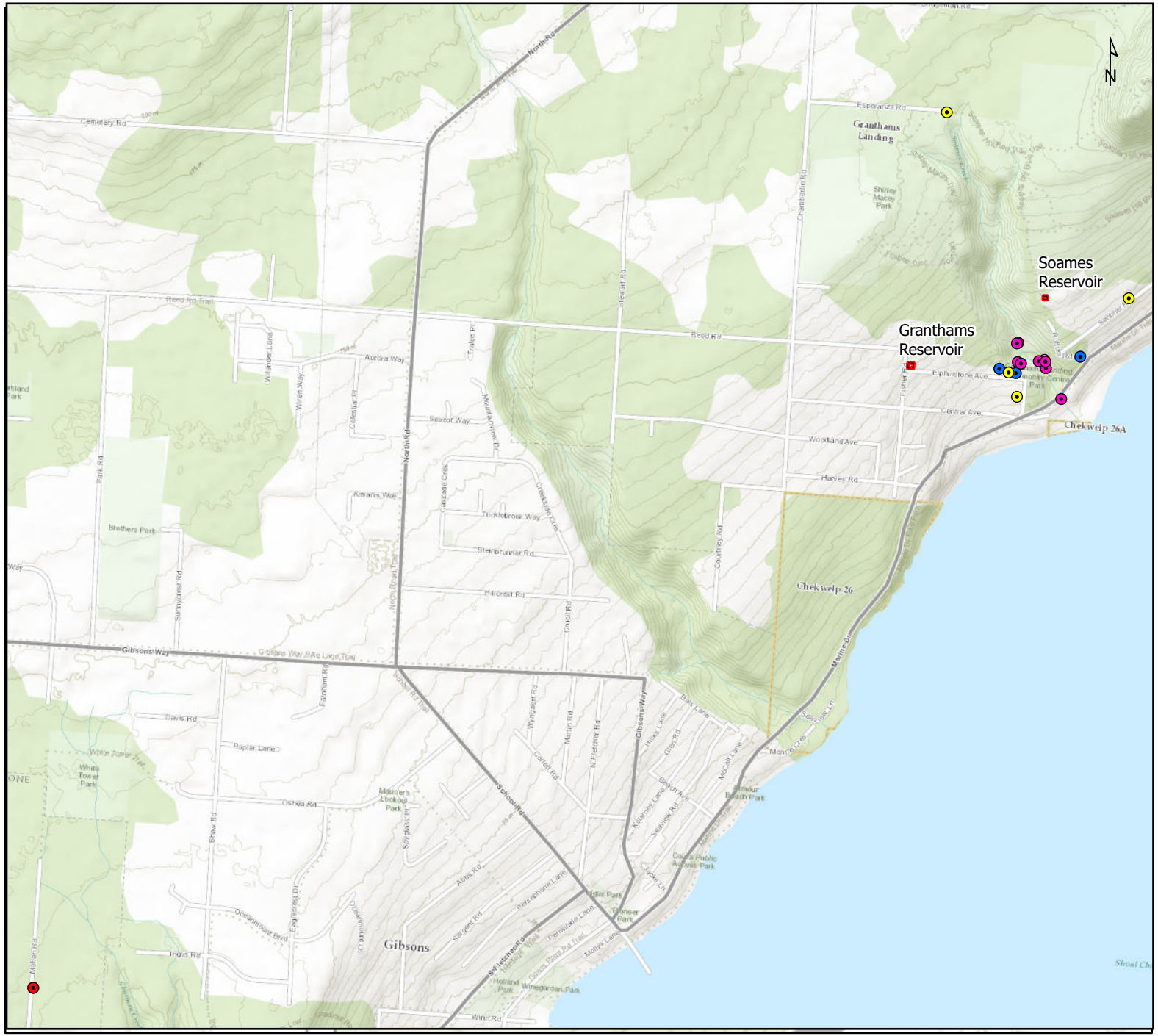
Additionally, the AMP Update report submitted to MWLRS in 2024 provided a summary of the 2023 operating season's data and included the results of a 72-hour pumping test conducted in April 2024 (ISL, 2024). It also requested some changes to the AMP and Monitoring Plan that were carried forward throughout 2024 after discussions with and approval from MWLRS, and as some were not approved till mid 2025, this report summarizes all changes.

The wellfield is installed within a confined to semi-confined sand and gravel aquifer interpreted to be part of Pre-Vashon surficial deposits (Aquifer #560). In the wellfield location the aquifer is hydraulically connected to Soames Creek, with springs occurring throughout the valley walls immediately east of Church Road Wells 2 and 3. The Granthams Landing Well is artesian and also supplies flows to the creek (further information can be found in ISL's November 2025 report "Granthams Landing Well Decommissioning Assessment Report). Soames Creek is fish bearing, with highly seasonal flows

influenced by precipitation and reliant on groundwater during dry periods (Associated Environmental, 2019).

Pumping tests confirmed that groundwater diversion can reduce creek flows, posing ecological risks. To mitigate these impacts, an Environmental Flow Needs (EFN) assessment was completed, and a creek augmentation system was incorporated into the project to maintain minimum flow thresholds when the wellfield operates. Compliance with CWL conditions ensures that augmentation occurs when water is used for potable supply. Given uncertainties around long-term aquifer response, the AMP guides monitoring and operational adjustments, ensuring sustainable water supply while protecting local ecosystems.

The groundwater and surface water monitoring locations used in 2025 are shown in Figures 1.2 and 1.3, respectively.



Legend

- Reservoir

Type

- Groundwater Monitoring
- Pumping Well
- Surface Water Monitoring
- Ceased Groundwater Monitoring

TITLE:

Area Map - All Monitoring Locations

PROJECT:

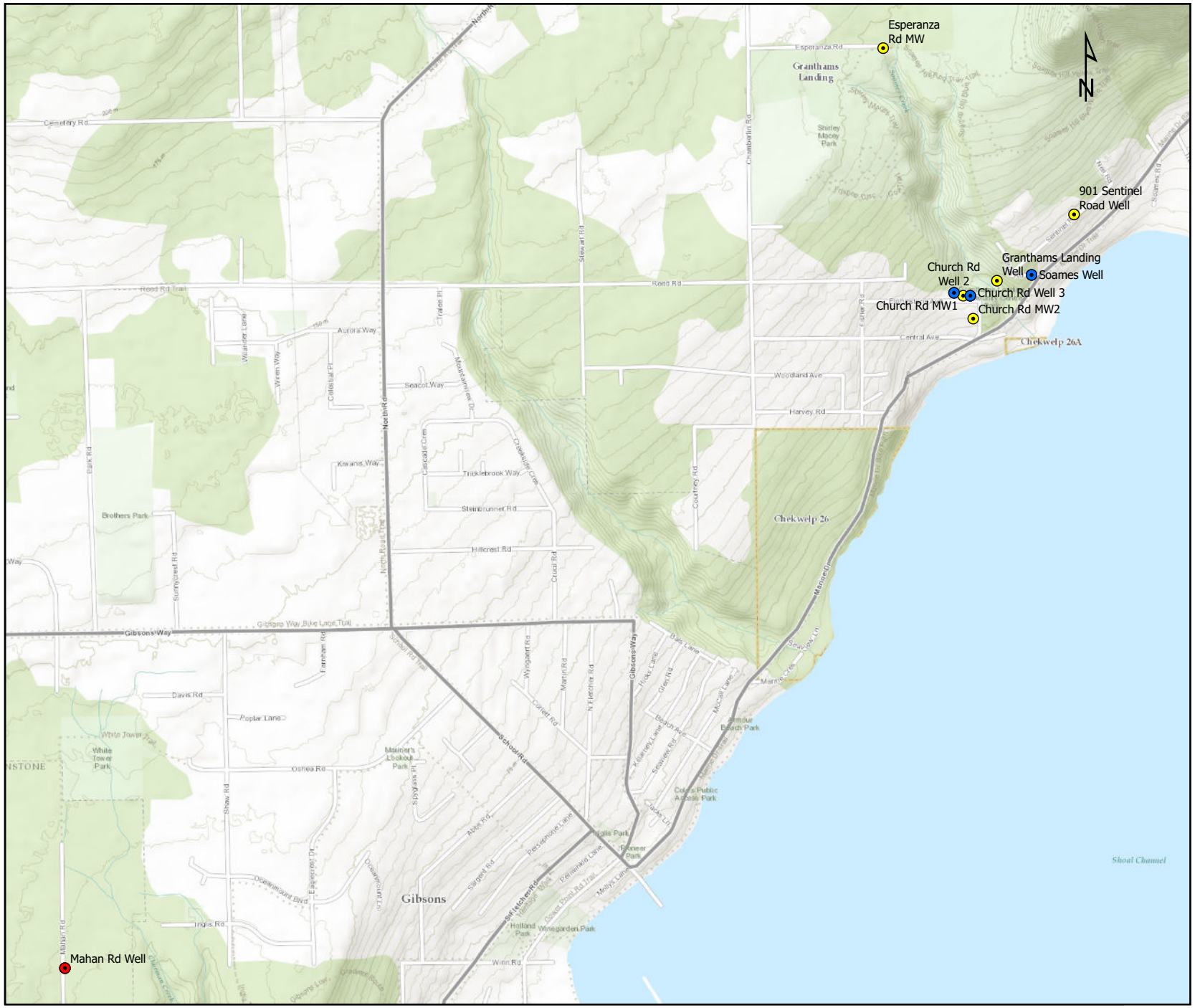
SCRD Compliance Monitoring Annual Report (2025)

0 0.05 0.1 0.2 0.3 0.4 Kilometers

NAD 1983 UTM Zone 11N

1:13,000

FIGURE	1.1
DATE	November 2025
PROJECT NO.	28395
AUTHOR	BK



Legend

Monitoring Location

Type

- Groundwater Monitoring
- Pumping Well
- Ceased Groundwater Monitoring

TITLE:

Groundwater Monitoring Locations

PROJECT:

SCRD Compliance Monitoring Annual Report (2025)

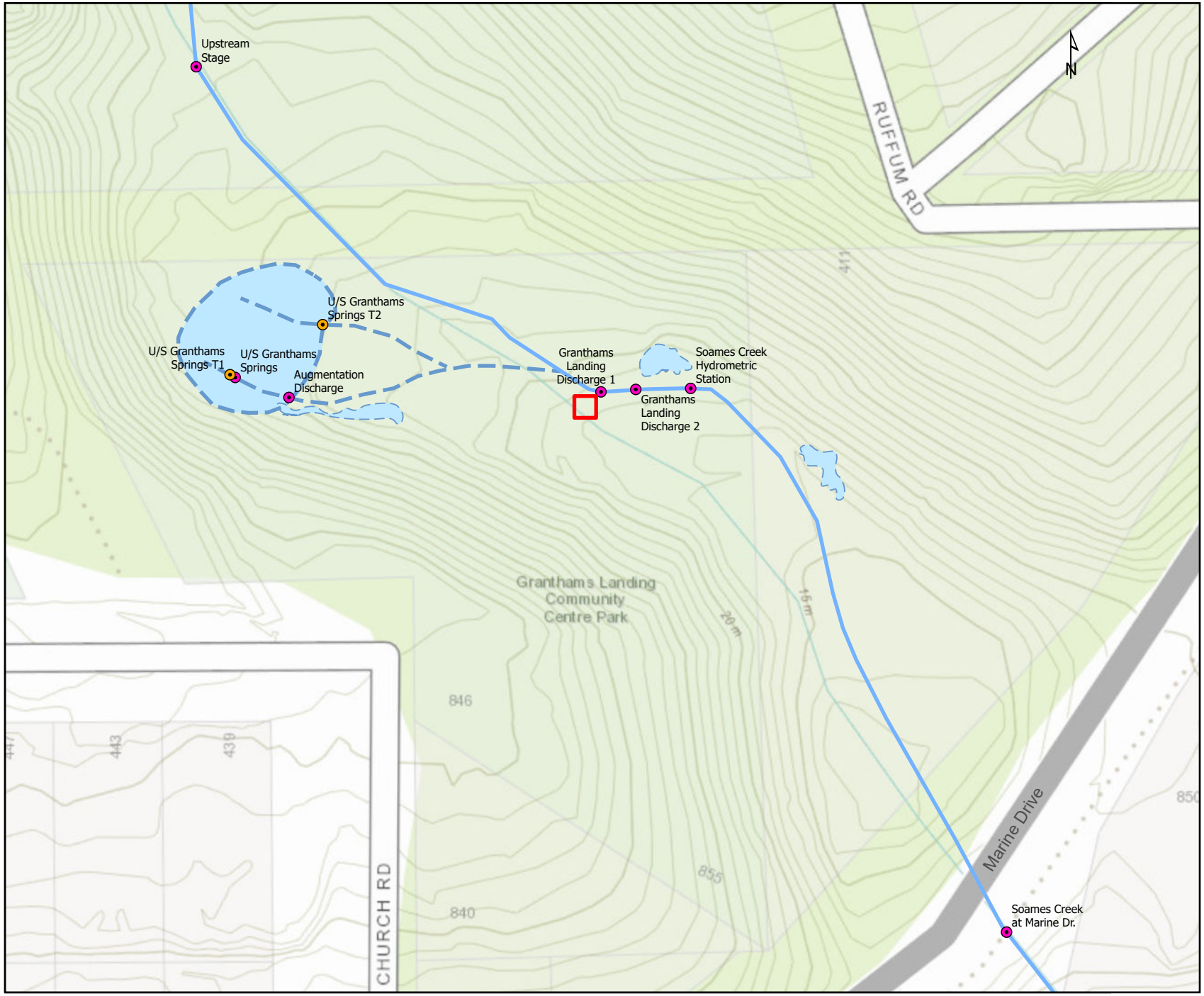
Kilometers

0 0.050.1 0.19 0.29 0.38

NAD 1983 UTM Zone 11N

1:13,000

FIGURE	1.2
DATE	November 2025
PROJECT NO.	28395
AUTHOR	BK



Legend

Monitoring Locations

Type

- Surface Water Monitoring
- Transducers
- Soames Creek
- Discharge Stream
- Discharge Area
- Pumphouse (approx. location)

TITLE:

Surface Water Monitoring Locations

PROJECT:

SCRD Compliance Monitoring Annual Report (2025)

Kilometers

0 0 0.01 0.01 0.02 0.02

NAD 1983 UTM Zone 11N

1:750

FIGURE	1.3
DATE	November 2025
PROJECT NO.	28395
AUTHOR	BK

2.0 AMI 1: Developing Reliable EFN Thresholds

AE developed the reliable EFN for Soames Creek flow requirements and presented it to MWLRS in a memo submitted in November 2024 (Associated Environmental, 2024). Feedback was received and responded to from the MWLRS in early 2025. The reliable EFN was considered as reasonable by MWLRS via email on February 4, 2025. The EFN for 2025 are provided in Table 2.1 below. Note that the reliable EFN were, for the most part, equivalent to the preliminary EFN with a 2 L/s buffer. Table 2.2 summarizes the surface water quality parameter thresholds related to the EFNs.

Table 2.1 Reliable EFN Thresholds for Minimum Flow Rates at Soames Creek

Month	Reliable EFN (L/s)
January	22.7
February	22.7
March	22.7
April	22.7
May	22.7
June	19.0
July	15.5
August	15.5
September	15.5
October	15.5
November	20.7
December	22.7

Note:

- These EFN values include a buffer of 2 L/s.
- These EFNs are the thresholds used in AMI 2, and are now based on the AE updated values (Associated Environmental, 2024), superseding the AE AMP ((Associated Environmental, 2023)

Table 2.2 AMI 1 Surface Water Quality Preliminary and Reliable EFN Thresholds

Parameter	Preliminary EFN [1]	Reliable EFN Threshold
Temperature (°C)	± 1 beyond 9 - 12	≤ 17 [2]
Turbidity	± 2 from 0.45 for 30 days. ± 8 from 0.45 for 24 hours [3]	Visual check of turbidity at the hydrometric station if the ramping rate is exceeded while the wells are operational.
DO (mg/L)	≤ 5 [4] (for information purposes, ideal DO for spawning is 6.5 mg/L and 9.5 mg/L for early rearing)	≤ 5 [4]
pH	< 6.5	< 6.5

Notes:
DO: Dissolved oxygen
TBC: To be confirmed
1. AMP (Associated Environmental, 2023)
2. 2025 Annual Report (ISL, 2025a)

3. Turbidity reference detailed in the AMP Table 3-2 (Associated Environmental, 2023)
4. “≥” 5 is used in the AE AMP and is assumed to be a typo based on the threshold reasoning provided (Associated Environmental, 2023)

Note that moving forward we propose that all preliminary EFN Thresholds be updated to Reliable EFN Thresholds as outlined in Table 2.2, above. Data collected to date verifies all values used as appropriate for the current environment. The exception within this report is when preliminary EFN Thresholds are used up until June 2025, after which time the (final) Reliable EFN Thresholds are referenced.

Upon review of the ramping rate threshold being tied to ramping down only (specifically looking at fish stranding), visual turbidity checking is no longer considered relevant to operations and is therefore proposed to be removed from all monitoring requirements. The visual turbidity check requirement was originally introduced in ISL’s 2024 annual report when proposing removal of field analysis of turbidity.

2.1 Fish and Fish Habitat Assessments

As part of developing the reliable EFN, fish and fish habitat assessments were required in 2025 as per the AMP and Monitoring Plan (Associated Environmental, 2023) and ISL’s update (ISL, 2025a). The results of the 2025assessments are presented in Appendix A along with a discussion on findings.

3.0 AMI 2: Surface Water Quantity (Streamflow)

3.1 Surface Water Quantity Monitoring Plan

The surface water quantity monitoring program was designed to collect streamflow data within Soames Creek to quantify any long-term effects of groundwater diversion from the wellfield. These are broken down into three objectives (further summarised in AE's 2023 AMP):

- **Objective 1**: Streamflow (assess whether streamflow remains within appropriate levels to meet the environmental flow needs of Soames Creek)
- **Objective 2**: Ramping rates (assess whether ramping rates in Soames Creek during wellfield pumping and flow augmentation are within appropriate levels to avoid environmental impacts)
- **Objective 3**: Granthams Landing Well Contribution to Soames Creek Flow (assess the relationship between the uncontrolled flowing artesian conditions and its contribution to Soames Creek streamflow and fish and fish habitat)

Monitoring surface water flows throughout 2025 followed the Monitoring Program designed by AE (Associated Environmental, 2023) and updated by ISL (ISL, 2025a), reflected in completeness in this report. A summary of the monitoring locations, frequency of data collection, and associated thresholds used to compare the collected data to is provided below in Table 3.1. Figures 1.1 and 1.3 show the locations of the monitoring locations within Soames Creek. Results are provided in Appendix B.

Table 3.1: AMI 2: Surface Water Quantity/Flows (Objective 1, 2 and 3)

Monitoring Location	Monitoring Type	Monitoring Frequency [1*]	Threshold (L/s) [2]
Soames Creek Hydrometric Station	Pressure transducer data logger connected to SCADA	Instantaneous readout logging data at 1-minute intervals	Jan: 22.7 Feb: 22.7 Mar: 22.7 Apr: 22.7 May: 22.7 Jun: 19.0 Jul: 15.5 Aug: 15.5 Sep: 15.5 Oct: 15.5 Nov: 20.7 Dec: 22.7 Ramping rates: decrease in creek stage > 5 cm/hr (ISL, 2024) [4]
	Review of discharge and ramping rate from gauging station [3]	Monthly while wells are operational [1]	
	Field measurement using wading discharge instrument or other suitable method (see Appendix D)	Monthly	
Augmentation Discharge [5]	SCADA-connected flow meter	Instantaneous readout, logging data at 1-minute intervals	-
Upstream Granthams Springs	Field measurement using wading discharge instrument or other suitable method (see Appendix D); visual notes	Monthly	-

Monitoring Location	Monitoring Type	Monitoring Frequency [1 *]	Threshold (L/s) [2]
	and photos of flow (or lack thereof)		
Granthams Landing Well Discharge 1	Flow rates: bucket and stopwatch	Monthly	-
Granthams Landing Well Discharge 2	Flow rates: bucket and stopwatch	Monthly	-
Upper Granthams Springs Piezometer 1	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	-
Upper Granthams Springs Piezometer 2	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	-

Note:
1. On-site monitoring begins prior to turning pumps on (except when used for emergency purposes), from June to October, assuming Church Road wells are not turned on prior to mid-June or turned off later than mid-September. If wells are kept on later than mid-September, a November monitoring event will occur.
* Bi-monthly Soames Creek and hydrometric station inspection walk-through November to May, intended for the non-operational season. Start date depends on the end of the operating season, as described in notes item #1 above. Bi-monthly refers to once every two months.
2. Approved toward the end of 2024, the EFNs were updated and are reflected throughout this report. These include the 2 L/s buffer. Note that the October EFN reduced from 26.0 to 15.7 L/s (ISL, 2024), and then to 15.5 L/s (Associated Environmental, 2024). AE's 2024 EFN updates are used going forward.
3. A qualified professional is responsible for calibrating the hydrometric station at least once per year prior to the operating season. If bed-mobilizing stream flow events occur that could alter the accuracy of the rating curve, defined as flows recorded greater than 75 L/s when they occur during the operational window, typically between June and September, a site visit will be conducted to examine the hydrometric station. If deemed warranted by the hydrology QEP, a recalibration and rating curve verification will be completed within 7 days of the threshold being exceeded.
4. If the ramping rate threshold is exceeded, a visual check must be done for turbidity (see AMI 1).
5. Soames Reservoir is a potential back-up source for augmentation water, as per AMP Update (ISL, 2024), and its flow rate monitoring should occur if it is used.

3.2 Surface Water Quantity Measurement Methods

Surface water flow and ramping rates are instantaneously measured at the Soames Creek Hydrometric Station and managed through the SCRD SCADA system. The station consists of a v-notch weir and an upstream rectangular section where pressure and temperature recording transducers are installed. The data is used to calculate stream depth, discharge, ramping rate, and stream temperature.

Augmentation discharge is measured with an in-line flow meter located at SCRD's water treatment plant. The flow meter is connected to SCRD's supervisory control and data acquisition (SCADA) system which records augmentation discharge rates at a one-minute interval.

In the case of augmentation not being possible from the Church Road Wellfield, the Soames Reservoir (Soames Well groundwater) is a back-up source for augmentation water, as per AMP Update (ISL, 2024). Conditions for activation and details on this methodology are found in the AMP Update. The Soames Reservoir flow rate should be monitored in such circumstances, following the same regime as the Church Road Wellfield Augmentation monitoring plan. If this occurs, the SCRD will collaborate with the qualified environmental professional (QEP) as well as inform them immediately upon the change between augmentation water sources.

Flow measurements at the Upstream Granthams Springs location were taken manually monthly throughout 2025, with the exception of December. A Hach FH950 handheld flow meter (or similar, if unavailable) and graduated wading rod was used to take measurements. The total width of the flowing channel was divided into and even number of stations where the depth and flow velocity was measured. Data from all the stations was used to calculate the total stream discharge across the flowing channel.

Discharge at Granthams Landing Well Discharge 1 and 2 locations were measured using a graduated 20 L pail and a stopwatch. The average of three (minimum) consecutive measurements were taken as the discharge at each location and the results averaged to obtain the flow rate.

As part of the AMP, Northwest Hydraulic Consultants (NHC) complete regular weir calibrations (see Table 3.1 notes). Weir calibrations were completed between May 30 and June 1, 2025. NHC also cleared around the weir plate on May 30 and took several flow measurements between 19 and 27 L/s.

3.3 Surface Water Quantity Results and Discussion

Objective 1: Streamflow

Results of stream flow measurements within Soames Creek are provided in Appendix B (Figures B.1, B1.1 and B.4, Tables B.1, B.2, B.5, and B.6). Discharge measurements at Soames Creek Hydrometric station were above the threshold limits for the majority of 2025, with the exception of the non-conformance discussed below. Exceedances appear to correlate with natural seasonal fluctuations and precipitation events. Results are comparative to previous years of data.

The one exceedance which occurred during the operational pumping season (1:50pm June 12 to 12:27pm October 8, 2025) is summarized as follows:

- August 4 Soames Creek fell below the 15.5 L/s EFN between 3:49pm and 3:57pm with the lowest measurement being 11.7 L/s at 3:56pm. The mitigation valve closed when the well duties were being alternated. The SCRD knew immediately, resulting from key 2024 programming improvements. In response, SCRD immediately walked the creek between the culvert to the mitigation line to ensure there were no stranded fish, and none were noted. The flow in the creek was 20.0 L/s as of 3:58pm. The SCRD investigated the SCADA program as the programming shouldn't allow for this. They found they could not replicate the issue. The SCRD suspects when the well duty was switched there was a momentary loss of run signal to the wells which may have caused the mitigation valve to reset. To mitigate this in the future the SCRD has written a code in the program that allows for a quick switch over of the well pumps.

On June 12 the Soames Creek flow rate dropped below the EFN sporadically from 2:18am to 1:22pm, after which point mitigation flows began, and the rate soon lifted from slightly below 19 L/s (the threshold) to approximately 22 L/s. Augmentation is noted in the SCADA system as turning on at 2:20pm. Based on

timing and the natural decline of the Soames Creek flow rate prior to pumps being turned on, this is not considered a breach of the EFN threshold as a result of pumping.

Upon mitigation flow being turned off on October 18, the Soames Creek flows dropped immediately to below the EFN of 15.5 L/s to 14.5 L/s. This highlights the pumping licence conditions are, at least at times, providing improved environmental flow conditions for Soames Creek.
The Granthams Landing Well discharge flow rates are depicted in Appendix B Figures B.3.3 and B.3.4 and Tables B.3 and B.4. Granthams Landing Well Discharge 1 reflects the artesian water from the inner casing of the well. Granthams Landing Well Discharge 2 reflects the artesian flow from outside of the Granthams Landing Well casing. Figure B.3.4 shows Discharge 1 having some inconsistent correlation to pumping, while Discharge 2 (Figure B.3.4) shows a more consistent correlation to pumping, and a potential gradual decreasing trend in flow since 2023. This slight decreasing flow rate may be correlated with reduced precipitation as well as pumping volume.

Augmentation Discharge (Figure B.4 and Table B.5) was active between June 12 and October 18, and depicts a significant increase in mitigation flows for the 2025 pumping season to meet Soames Creek EFNs. This increase in mitigation translates to 65% more than the previous year, and the volumes provided corresponds to less than 1% of the total volume pumped in 2025 (Table 3.2, below). These volumes were calculated based on the flow rate.

Table 3.2 Augmentation Volumes

Year	Annual Pumping Period	Total Church Road Wellfield Volume Extracted (m^3)	Total Annual Groundwater Volume Diverted to Soames Creek Mitigation (m^3) [1]	Mitigation Volume Percentage of Annual Wellfield Total (%)	Percentage Change From Previous Year (%) UP / DOWN
2023	July to September	114,526	0.23	> 1	NA
2024	July to September	155,425	0.06	> 1	75 DOWN
2025	June to October	225,048	0.16	> 1	65 UP

Notes:
Source: SCRD SCADA system volumes for Church Road Well 2 and 3.
1. Values are calculated based on flow rate.

Surface springs in the hydrometric station area observed year-round have been further documented and the locations are shown in Figure 1.3. These are a key indicator of hydrologic health in the Soames Creek area and have continued to contribute to the ecological health of the valley area monitored.

A contribution to the Soames Creek flow is uncontrolled sheet flow from Reed Road, exasperated during heavy rain events, noted to discharge into the creek upstream of the springs (Associated Environmental, 2019, and Alluvia Environmental Services, 2004). With recent investment in weir upgrades and a growing need for representative, reliable natural flow data, management of uncontrolled flow from such sources particularly in high flow events is considered relevant and beneficial.

Upstream Granthams Springs Flow varied throughout the year, with the springs visually going dry during the summer and pumping months (see Appendix B, Table B.2). Their return to flowing, immediately below the augmentation infrastructure, coincided roughly with the cessation of pumping and increasing precipitation events, regardless of if Soames Well is pumping. This is consistent with previous years. The springs above the augmentation infrastructure were not observed to be flowing at the surface after pumping ceased up to the last monthly monitoring round of 2025 on 20th November. Piezometer 1 had started to detect water in November (Table B.20).

Upper Granthams Springs Piezometers 1 and 2 showed varied flow through the year, responding to Church Road wellfield pumping and precipitation events (see Appendix B, Table B.20 and B.21 and Figure B.20). Both springs run dry in the summer months during pumping and return to flowing with the cessation and pumping and an increase in precipitation events. Piezometer 1 had not yet returned to flowing consistently by the last monitoring round on 20 November 2025, while it had by that time in 2024. This may be a result of the Church Road Wellfield operating into October, later that previous years, and comparably less precipitation in 2025.

Recovery of all surface water flows after pumping ceased and into 2026 will provide valuable data to further assess any potential trends and connection to climatic fluctuations as well as the operational pumping season.

Objective 2: Ramping Rates

No ramping rate exceedances occurred during the operational pumping season. Exceedances which did occur outside of this period appear to correspond with precipitation events. These are summarized in Appendix B, Figure B.4 and Table B.5. In early 2025 NHC reported that exceedances were due to the weir being out of calibration. The calibration was completed on 30 May and 1 June 2025, prior to the pumps being turned on.

Objective 3: Granthams Landing Well Contribution to Soames Creek Flow

While no thresholds are set for this objective, the continued observation of the uncontrolled artesian well's contribution to Soames Creek does appear to show a vital contribution of surface water flows to the creek and fish habitat. Discharge 1 appears to continue to vary predominantly naturally, and Discharge 2 appears to often be directly correlated to times of pumping from Church Road Wells 2 and 3 as well as Soames Well. There currently appears to be a decreasing trend since 2023 in the discharge rate of Discharge 2 (well outer casing). Neither were found to be dry during any monthly field monitoring in 2025. Results of surface water monitoring are summarized in Appendix B, Figure B.3.3, B.3.4 and Tables B.3 and B.4. Results of groundwater monitoring as a contribution to the Creek are summarized in Appendix B, Figure B.14 and Table B.14. A detailed assessment is available in ISL's 2025 report (ISL, 2025b).

As per the AE's threshold exceedance response guidance (Associated Environmental, 2023), the SCRD has reported as having met all AMP requirements for AMI 2.

4.0 AMI 3 & 4: Surface Water Quality & Temperature

4.1 Surface Water Quality Monitoring Plan

The surface water quality monitoring program was designed to collect data within Soames Creek and Upstream Granthams Springs to assess any long-term effects of groundwater diversion from the wellfield. Monitoring surface water quality throughout 2025 followed the Monitoring Program designed by AE (Associated Environmental, 2023) with various updates summarized in completeness in this report. A summary of the monitoring locations, frequency of data collection, and associated thresholds used to compare the collected data to is provided below in Table 4.1 below, and in Tables B.1 to B.6 in Appendix B. Figures 1.1 and 1.3 show the locations of the monitoring locations within Soames Creek.

Table 4.1: AMI 3: Surface Water Quality

Monitoring Location	Monitoring Type	Monitoring Frequency [3] *	Threshold
Soames Creek at Hydrometric Station	Water Sample [1] Field Measurements [2] Temperature Data Logger	Monthly Monthly Hourly	BCWQG AL [4] **January to June:** A 1.0°C change in monthly temperature statistics (Table 4.2) **July onwards [5]:** Above 17.0^{O}C (see Table 4.2)
Soames Creek at Marine Drive	Water Sample [1] Field Measurements [2]	Monthly Monthly	BCWQG AL[4]
Augmentation Discharge [6]	**January to June 2025:**		
	Water Sample [1] Field Measurements [2]	Monthly Monthly	BCWQG AL[4]
	July onwards: NA (removed)		
Upstream Granthams Springs	Water Sample [1] Field Measurements [2]	Monthly Monthly	BCWQG AL[4]

Notes:
1 Sampling consisted of measuring field parameters and collecting representative samples for laboratory analysis of physical parameters, anions and nutrients, and total and dissolved metals (Associated Environmental, 2023). DOC and hardness were added from July 2024 onwards.
2. Field parameters consist of electrical conductivity (EC), temperature, pH, and dissolved oxygen. Field alkalinity removed from July 2024 onwards. Turbidity removed from July 2025 onwards.
3. On-site monitoring begins prior to turning pumps on (except when used for emergency purposes), from June to October, assuming Church Road wells are not turned on prior to mid-June or turned off later than mid-September. If wells are kept on later than mid-September, a November monitoring event will occur.
* Bi-monthly Soames Creek and hydrometric station inspection walk-through November to May, intended for the non-operational season. Start date depends on the end of the operating season, as described in notes item #3 above. Bi-monthly refers to once

every two months.
4. BC Water Quality Guidelines for Aquatic Life (BCWQG AL) working and approved guidelines are required.
5. The Preliminary EFN Thresholds for temperature had previously been applied based on the Associated Environmental. (2023) AMP, AMI 1 (Table 3-2). The ISL Annual Report (ISL, 2025) proposed and received approval as of July 2025 for the presently used threshold, now considered the Reliable EFN Threshold and AMP Threshold, as one, using the naming of "Reliable EFN Threshold" for consistency through the report and aligning with AMI 1. See Table 4.2.
6. Removed from water quality monitoring requirements as of July 2025 (ISL, 2025a)

The AMI 3 for Soames Creek at Hydrometric Station references the below temperature thresholds.

Table 4.2: AMI 4: Soames Creek Surface Water Reliable EFN Threshold

Month	Temperature Threshold (°C)	Response
AMP Monthly Thresholds *(EXPIRED July 2025)*		
January	6.1 ±1	If the threshold is exceeded: • Initiate assessment of biological significance of water temperature change using biological indicator metrics (e.g., degree days, growing season degree sums). • If potentially biologically significant negative effects are determined, initiate options assessment to mitigate. • MWLRS will be notified of the incident and the steps taken. (Associated Environmental, 2023)
February	5.2 ±1	
March	6.4 ±1	
April	7.5 ±1	
May	9.0 ±1	
June	8.8 ±1	
Reliable EFN Threshold July 2025 Onwards (CURRENT)		
Year-round	17.0	If temperatures reach above 17^{O}C during the operating season: • Augmentation water is to be released from the wellfield to reduce stream water temperature. • MWLRS will be notified of the incident and the steps taken.

Note:
The ISL Annual Report (ISL, 2025) proposed and received approval as of July 2025 for the new temperature threshold 17^{o}C, now considered the AMI 1 Reliable EFN Threshold as well as the AMP AMI 4 Threshold. These are now considered as one threshold, using the naming of "Reliable EFN Threshold" for consistency through the report.

Additional water quality EFN thresholds for pH, turbidity and DO are summarised in AMI 1 (Section 2.0) of this report and discussed in this section for consistency of topic. Based on our understanding of the AMP (Associated Environmental, 2023), thresholds in Table 4.2 above have been conservatively used for all Soames Creek locations.

4.2 Surface Water Sampling Methods

Sampling procedures of surface water for this reporting period conformed to the British Columbia Field Sampling Manual Part E: Water and Wastewater Sampling (British Columbia Ministry of Environment, 2013). This includes procedures for the measurement of field parameters (pH, specific conductivity, temperature, and dissolved oxygen), stream flow measurements, and sample collection/storage for laboratory analyses.

Prior to collecting water samples, field parameters (pH, specific conductivity, temperature, dissolved oxygen) were measured and recorded using calibrated water quality monitors. The sampler wears a new pair of nitrile gloves at each sampling location.

Surface water and groundwater samples were collected using laboratory-supplied containers and were field-filtered and/or field preserved where applicable. Samples requiring filtration were filtered by the sampler on site using laboratory-supplied filters and syringes. The samples were transported in coolers and submitted to accredited laboratories.

The bottles were labelled and put into cool boxes packed with ice. The samples were then transported to the laboratory. Ideally, a temperature between freezing and 6°C is maintained. The samples were submitted to the laboratory and processed for analysis typically on the same day, if not within three days, which is the shortest holding time of any of the parameters being tested (colour, nitrate, nitrite, and orthophosphate). The exception is pH with a holding time of 0.25 days. A completed and signed chain-of-custody form is also submitted to the laboratory with the samples.

Laboratory results for surface water analyses were compared to BC Water Quality Guidelines for Aquatic Life (BCWQG AL); working and approved. Due to recent changes to guideline calculations, dissolved organic carbon (DOC) and hardness were added to the parameter suite as of July 2024.

All sampling events have a quality assurance/quality control (QA/QC) program. The QA/QC sampling for all water samples is summarized in Table 4.3. Further QA/QC details and results are outlined in the Appendix B summary, Tables B.18 and B.19.

Table 4.3: QA/QC Sampling Schedule

Sample	Monitoring Type	Monitoring Frequency
Duplicate [1]	Surface or Groundwater Sample	Monthly
Trip Blank	Water Sample	Annual
Field Blank	Water Sample	Annual

Notes:
1. While wells are operational. On-site monitoring begins prior to turning pumps on (except when used for emergency purposes), from June to October, assuming Church Road wells are not turned on prior to mid-June or turned off later than mid-September. If wells are kept on later than mid-September, a November monitoring event will occur.

4.3 Surface Water Quality Results and Discussion

AMI 1 and 4: Water Quality Field Parameters

Results were compared to the preliminary and reliable EFN thresholds across both AMIs. The ISL Annual Report (ISL, 2025) proposed and received approval as of July 2025 for the current threshold adjustments. Results prior to this approval (January to June 2025) have been compared to the initial thresholds based on the Associated Environmental (2023) AMP. See Table 2.2 for a comparison. Detailed results are provided in Appendix B, Table B.1, and Figure B.2.1 to B.2.3. Surface water quality results showed few exceedances throughout 2025. The following exceedances and observations were reported:

- **Temperature**:
  - Soames Creek Hydrometric Station:
    - January to June**:**
      1. AMP Threshold: Continuous measurements of temperatures at the hydrometric station exceeded thresholds from January to May, consistent with previous years. Temperature fluctuations within Soames Creek at the hydrometric station can be correlated with mean

average atmospheric temperatures (Figure B.2.1). Precipitation events also appear to influence stream temperatures to a lesser degree (Figure B.2.2).

2. AMI 1 Preliminary EFN Threshold: Temperatures breached the threshold of 9 - 12°C from January to March, further validating the shift to a threshold update.

- July to November, AMI 1 and 4 Reliable EFN Threshold: There were no exceedances of the updated temperature threshold (17°C).

- While temperature thresholds aren't required under the AMP to be applied to other locations, trends are viewed holistically in the system. Temperature in the remaining three surface water monitoring locations continued to reflect that of Soames Creek Hydrometric Station and that of previous years' data, with frequent exceedances reflective of atmospheric temperatures and precipitation events.

- **Surface water field pH:** The year showed a general increase in AMI 1 exceedances at all surface water monitoring sites between January and May, and a potential declining trend overall since 2023. Exceedances occurred outside of the operational pumping period. During some of these months of exceedances in 2025, field records did not confirm equipment calibration. Laboratory pH was therefore plotted with field pH in Figure B.2.3 (Appendix B) to demonstrate, though out of holding time for laboratory analysis, pH has remained generally consistent since 2023. Continued monitoring is particularly valuable in confirming any potential trend.
- **DO and turbidity**: There were no exceedances of their respective thresholds at any of the four monitoring locations during the 2025 monitoring events.

AMI 3: Surface Water Quality

These results were compared to the AMP AMI 3 thresholds (BCWQG AL, working and approved). Detailed results are provided in Appendix B, with laboratory certificates of analysis included in Appendix C. In general, surface water quality results showed comparable results to previous years and are reflective of background conditions. The following exceedances were reported during the 2025 monitoring period:

- Total alkalinity (as $CaCO_3$): Results reflected that of previous years. Soames Creek Hydrometric Station and Soames Creek at Marine Drive exceeded the minimum threshold under the BC Working Water Quality Guideline for Aquatic Life in February and March. Soames Creek at Marine Drive also exceeded it again in October. These coincide with the heaviest rain events of the year and reflect expected temporary reduction in total alkalinity.
- Total aluminum: Soames Creek Hydrometric Station and Upstream Granthams Springs both exceeded the BC Approved Water Quality Guidelines for freshwater aquatic life (Long-term chronic) in February and March. Soames at Marine Drive exceeded the same guideline in February and March, as well as April and August. Results are comparable to previous years, and there were no indications as part of this monitoring of any long-term chronic concern for aluminum in these or other surface water monitored locations.
- Total and dissolved copper: Results were consistent in all locations monitored, with exceedances occurring between January and May. This is generally consistent with previous years.

Augmentation discharge monitoring did not add key data due to timing of augmentation and monthly field visits. As this is not a reliable data collection location, and continuous flow data is collected via the SCADA system, and as approved based on the previous ISL annual report (ISL, 2025a) this location has been removed from the field monitoring plan as of July 2025. Field measurements of water quality continue to be collected downstream within fish habitat, which is a more relevant location.

While the last 12 months have depicted some increasing and decreasing concentrations in some analytes, no clear trends are evident in general chemistry or in the assessment for saline intrusion (AMI6, objective 3).

As per the AE's threshold exceedance response guidance (Associated Environmental, 2023), the SCRD has reported as having met all AMP requirements for AMI 3 and 4, including with the submission of this report.

5.0 AMI 5: Groundwater Quantity/Levels

5.1 Groundwater Quantity Monitoring Plan

The groundwater quantity monitoring program was designed to collect groundwater data within the wellfield area of influence to quantify any short and long-term effects of groundwater diversion. This management initiative was broken down into three objectives:

- **Objective 1**: Available drawdown (assess whether the maximum available drawdown in each well is sufficient to meet the licensed diversion quantities, noting the maximum available drawdown has been set to minimize the risk of saline intrusion).
- **Objective 2**: Other groundwater users (assess whether local groundwater users are detrimentally affected by wellfield operation).
- **Objective 3**: Aquifer recharge (assess if there is enough aquifer recharge available to sustainably meet the licensed diversion quantity and to potentially allow an increase in the licensed diversion quantity in the future).

These are further defined in AE's 2023 AMP. Monitoring groundwater levels and pumping rates throughout 2025 followed the Monitoring Program designed by AE (Associated Environmental, 2023) and updates summarized by ISL (ISL, 2025a). A summary of the monitoring locations, frequency of data collection, and associated thresholds used to compare the collected data to is provided below in Table 5.1 and 5.2, below. Figures 1.1 and 1.2 show the locations of the monitoring locations.

Table 5.1: AMI 5: Groundwater Quantity/Levels, Objectives 1 and 2

Well Name	Well Type	Monitoring Type	Monitoring Frequency [1]	Review Threshold (m asl)	Threshold (m asl)
Church Road Well 2	Pumping	Pressure Transducer connected to SCADA Manual using well sounder	Instantaneous readout, logging at 1-minute intervals Monthly	8.5 (32.58 m btoc)	2.0 (38.98 m btoc)
Church Road Well 3	Pumping	Pressure Transducer connected to SCADA Manual using well sounder	Instantaneous readout, logging at 1-minute intervals Monthly	8.1 (32.04 m btoc)	2.0 (38.14 m btoc)
Soames Well	Pumping	Pressure Transducer connected to SCADA Manual using well sounder	Instantaneous readout, logging at 1-minute intervals Quarterly	14.0 (17.92 m below manhole rim)	4.0 (27.82 m below manhole rim)

Well Name	Well Type	Monitoring Type	Monitoring Frequency [1]	Review Threshold (m asl)	Threshold (m asl)
Church Road Monitoring Well 1	Observation	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	19.1 (21.04 m btoc)	2.0 (38.04 m btoc)
Church Road Monitoring Well 2	Observation	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	-	2.0 (27 m btoc)
Esperanza Road Monitoring Well	Observation	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	-	-
901 Sentinel Road	Private	Pressure Transducer Manual using well sounder	Transducer logging data at 15-minute intervals Monthly	18.7 (26.7 m btoc)	12.5 (33 m btoc)
Granthams Landing Well	Observation	Pressure Transducer Manual pressure reading	Transducer logging data at 15-minute intervals Monthly	-	-

Note:
1. On-site monitoring begins prior to turning pumps on (except when used for emergency purposes), from June to October, assuming Church Road wells are not turned on prior to mid-June or turned off later than mid-September. If wells are kept on later than mid-September, a November monitoring event will occur.

Table 5.2: AMI 5: Groundwater Quantity/Levels, Objective 3

Well Name	Well Type	Annual Fluctuations Threshold (m asl)	Multi-Year Fluctuations
Church Road Well 2	Pumping	23.6	Assessed annually, see Appendix B, AMI 5.
Church Road Well 3	Pumping	23.5	
Soames Well [1]	Pumping	20.6 [2]	
Church Road Monitoring Well 1	Observation	23.6	

Well Name	Well Type	Annual Fluctuations Threshold (m asl)	Multi-Year Fluctuations
Church Road Monitoring Well 2	Observation	23.3 [3]	
901 Sentinel Road	Private	20.1 [3]	
Esperanza Road Monitoring Well	Observation	**25.2** [4]	

Note:

1. The Soames Well groundwater level is not possible to assess for AMI 5, Objective 3 while consistently pumping. Monitoring of this location will not be possible until pumping stops long enough to observe the groundwater level.
2. AE's 2023 report states 20.5 m asl; this is considered incorrect and 20.6 m asl is used.
3. Church Road Monitoring Well 2 and 901 Sentinel Road are **not** part of AMI 5, Objective 3 (Associated Environmental, 2023), and have been added to this list for consistent and robust groundwater monitoring across AMIs.
4. The proposed Esperanza Road Monitoring Well Threshold was calculated based on the AE AMP (2023) recommendation to establish one upon having enough data, and was based on their approach, establishing a static groundwater level based on the summer (June to September) mean, and subtracting 1.0 m to create the Annual Fluctuations Threshold.

In addition to AMI 5 monitoring outlined above, flow rate and volume from all pumping wells is monitored at 1-minute intervals using the SCRD's SCADA system, with the following thresholds applied (as per CWL 502568):

- The maximum allowable total quantity diverted from all three wells (Church Road Well 2 and 3, and Soames Well) **must not exceed 70.4 L/s**, depicted in Appendix B, Figure B.8.
- The maximum allowable annual quantity of groundwater diverted **must not exceed 1,250,000 m^3** (covered further in Table 5.3, below)

5.2 Groundwater Quantity Measurement Methods

All equipment used to monitor groundwater levels, such as pressure transducer data loggers and groundwater level well sounder, were calibrated before use and have an accuracy of 0.01 m (1 cm).

Pressure transducer data was barometrically corrected using a barometric pressure transducer located in Church Road Monitoring Well 1, and QA/QC'd using manual water levels. Water level and pumping rate data from Church Road Wells 2 and 3, and the Soames Well was provided by the SCRD from the SCADA system. The Augmentation Discharge flow was also provided from the SCADA system.

5.3 Groundwater Quantity Results and Discussion

Objective 1: Available Drawdown

Objective 1 focuses on the behavior of the following wells:

- Church Road Monitoring Well 1
- Church Road Monitoring Well 2
- Church Road Well 2
- Church Road Well 3

- Soames Well

Most groundwater levels remained above the review thresholds and responded as expected to pumping (Appendix B), except for minor outliers, and Church Road Well 3. Church Road Well 3 groundwater levels fell slightly below the Review Threshold multiple times throughout the pumping season.

In response to these breaches, ISL observed that the review threshold calculated for Church Road Well 3 is based on the following:

- The review threshold corresponds to the 184 day calculated combined total drawdown with all three wells pumping at maximum rates, noting these are all calculated estimates (Associated Environmental, 2020), as no pumping test was undertaken on all three wells simultaneously. It's also worth noting Church Road Well 3 hadn't been constructed yet for the other pumping tests and so calculated estimates were used to model the drawdown at Church Road Well 3.
- The Church Road Well 3 pumping Constant Rate Test (CRT) ran for 48 hours at 29 L/s, on its own, 28 to 31 July 2020 (Associated Environmental, 2020). Church Road Well 2 had a 24-hour CRT, approximately from 8 to 9 August, 2019. Soames Well received a 24 hour CRT from 13 to 14 August, 2020.

As the Church Road Well 3 threshold calculations are based on estimations, using data from tests done over an extended period, there is an opportunity, highlighted by these Review Threshold exceedances, for a re-assessment of the Church Road Well 3 threshold. We suggest ISL's 72-hour CRT (ISL, 2024), completed using all three wells, be used.

There was an odd occurrence where groundwater levels appeared to drop between approximately 8.0 to 10.0 m for a very short period (minutes) in the early hours (approximately 3:30AM) of 14 November in all wells monitored except for Soames Well (901 Sentinel is unknown due to being unable to download the data during the November monitoring round). The cause is unknown, and SCRD pumps were not operational. This drop in groundwater level caused some breaches of thresholds, outside of the operational pumping season.

In following the AMP, monitoring was extended to November 2025, as pumping ceased in October. This extension was estimated as enough time to capture most recovery of all wells monitored. Based on the 2025 data, an additional month of monitoring would have been beneficial so that more recovery data would be captured. As such, the monitoring period may better serve its purpose if adjusted for future monitoring of all wells to include two months following the end of pumping. A thorough review of the winter and early spring water level data is recommended two to four weeks prior to turning the pumps back on.

Objective 2: Other Groundwater Users

This objective focuses on assessing whether other local groundwater users are detrimentally affected by wellfield operation, using the private well at 901 Sentinel Road as an observation point. Water levels continue to appear to be influenced by both use of the well for a private residence, and by the Church Road wellfield. Total drawdown when the wellfield was in operation reflected that of the previous year. Since the Church Road wells were shut off, water levels have begun to recover with a similar response to previous years.

While 901 Sentinel Road Well does not require comparison to thresholds, we have done so for monitoring robustness. Groundwater levels remained above the calculated Annual Fluctuations Threshold, comparable to previous years. Multi-year fluctuation observations show a slight decline in groundwater level in 2025, while a trend is not clear.

Objective 3: Aquifer Recharge

Aquifer recharge in this objective was assessed for wells listed in Table 5.2 through the following platforms:

- **Annual Fluctuations**:

The annual fluctuations thresholds are thresholds a non-pumping aquifer is expected to recover to each year. The thresholds (Table 5.2) were created to allow for natural variation in the annual water level and the timing of wellfield operation. A 1.0 m change is set as a trigger to indicate a departure from the normal range. This threshold assumes that the wellfield will not typically be operated for five to six months (November to April inclusive) allowing recharge to the aquifer and groundwater level recovery.

The AE 2023 AMP referenced that Esperanza Road Monitoring Well would be valuable for this objective, and that a threshold would be added for annual fluctuations once enough data is collected. A threshold was calculated during this reporting period, based on AE's approach, establishing a static groundwater level based on the summer (June to September) mean from 2023 to 2025, and subtracting 1.0 m to create the Annual Fluctuations Threshold (Table 5.2).

Following the 2025 operating season, some wells were slow to recover to their spring pre-pumping levels. This is likely a continued aquifer-scale trend related to decreased recharge in summers, similar to 2024, and ongoing monitoring will continue to ensure this is the case and it is not related to wellfield operations. The combined flow rate from the wellfield remained below the licenced maximum rate throughout 2025.

- **Multi-year Fluctuations**:

The multi-year fluctuation thresholds monitor for potential multi-year, or long term, water level decline to track potential insufficient recharge to the aquifer. There is no specific threshold, where this is more an observation for a potential trend. While the annual fluctuations assessment can capture recent changes, any multi-year fluctuations and trends are intended to be captured here (e.g., capturing groundwater levels trending up or down over three consecutive years that don't trigger annual fluctuation thresholds).

In general, the wells monitored showed groundwater levels are declining slightly since monitoring began in 2023, where most of the decline is observed in the last year. As such, any trend is unclear until further data is collected. To further investigate the general slight decline in groundwater levels over the past year, Table 5.3, below, was produced to show the total annual volume pumped and period of pumping since monitoring begun in 2023.

Table 5.3: Church Road Wellfield Annual Extraction Total [1]

Year	Annual Pumping Period [1]	Total Volume Extracted (m^3) [2]	Annual Threshold (m^3)	Increase from Previous Year (%)
2023	July to September	168,339.5	1,250,000	NA
2024	July to September	204,928.0		18
2025	June to October	267,122.0		23

Note:
1. Not including testing pumping periods outside of the summer pumping season.
2. Total volume for Church Road Wells 2 and 3 and Soames Well.
NA: Not applicable
Source: SCRD SCADA system.

To demonstrate a comparison over the years of monitoring of recharge through precipitation and its contribution to fluctuating groundwater levels, Table 5.4, below, summarizes total precipitation for each year. This is, along with volumes extracted (Table 5.3), reflective of groundwater levels, suggesting a recent decline in groundwater level does not appear to be based solely on groundwater extraction. This further warrants continued monitoring to assess the long-term impacts of pumping at the Church Road Wellfield alongside climatic changes.

Table 5.4: Precipitation Summary

Year	Total Annual Pre-Pump Season Precipitation (mm)#	Total Annual Precipitation (Dec-Nov) (mm)*
2022	*NA*	1,377
2023	1,054	1,173
2024	1,346	1,400
2025	*NA*	1,270

Note:
Sourced from Gibsons Gower Point Station (Environment and Natural Resources, 2025)
Calculated from July the previous year to June the target year (e.g. July 2022 to June 2023: 1,054 mm), summing all precipitation adding to recharge (recovery) before pumping starts again.
* Calculated from December the previous year to November the following to accommodate November annual reporting.

ISL also notes that in December 2023, February 2024 and April 2024 Church Road Well 2 and 3 pumps were tested and operated as part of aquifer tests; these tests may have impacted overall aquifer stress and seasonal results. Overall, while there is a slight decline in groundwater levels in 2025 in most wells monitored, there is not a clear trend without additional data to assess the whole hydrologic system.

As per the AE's threshold exceedance response guidance (Associated Environmental, 2023), the SCRD has reported as having met all AMP requirements for AMI 5.

An observation approach as opposed to a numerical threshold has been used in the assessment of the multi-year fluctuations. While the AE AMP (Associated Environmental, 2023) suggests establishing thresholds for each location after approximately one year of data collection, we recommend that an alternate approach be taken. A numerical threshold is not considered to be viable given the objective and the variables associated with it, where a trigger scenario may be more applicable. That is, if a decline is observed, an investigation is triggered. I.e. investigating how results compare to precipitation for those seasons (if drought conditions align), etc. We suggest annual comparison of the average of the last two weeks of groundwater levels in May each year to observe general trends, starting in 2026 (once more data is available).

It's also noted that AE referenced that Esperanza Road Monitoring Well would be valuable for this objective, and that a threshold would be added for multi-year fluctuations once enough data is collected.

Aligning with ISL's recommendation above, a numerical threshold is not proposed, and this well is included in the multi-year trend assessment.

Additionally, Soames Well is listed as being required as part of the annual and multi-year fluctuation threshold assessments (Associated Environmental, 2023). We've excluded it as the constant pumping results in an inability to assess the groundwater level or any potential trends.

5.4 Conceptual Aquifer Model Update

Based on the ongoing monitoring, the overall conceptual model presented for the licencing application appears valid. The points presented in the AMP Update (ISL, 2024) remain accurate:

- The aquifer is locally confined but regionally semi-confined.
- The aquifer demonstrates a non-unique response to both leaky recharge through the aquitard and a constant head boundary.
- The aquifer, particularly evident through the long-term monitoring data collected at 901 Sentinel Road, experiences tidal influences. These influences appear to be stronger at some wells than others, without a direct correlation between their distances to the ocean and the tidal fluctuations observed.

The SCRD is not currently exchanging groundwater monitoring data with the Town of Gibsons, however assessments made in the 2024 Annual Report of Waterline's investigations (ISL, 2025a) are consistent with those of 2025. That is:

- Groundwater flow mapping completed by Waterline in the vicinity of the wellfield shows a groundwater discharge area within Soames Creek and groundwater flow directions towards the shoreline, which matches observations from the ongoing monitoring (Waterline Resources Inc., 2025).
- The partial penetration of the Granthams Landing Well results in less drawdown observed than in other monitoring wells.
- The wellfield is mapped as part of what Waterline referred to as the Soames Aquifer lobe, which is separated from the Gibsons Aquifer lobe to the southwest by Gibson Creek (Waterline Resources Inc., 2025). There is currently no evidence of well interference between the Soames Aquifer Lobe and the Gibsons Aquifer Lobe, suggesting that pumping by the SCRD and the Town of Gibsons are not interfering with each other (Waterline Resources Inc., 2025).

5.4.1 Lag Time

A key concept for the wellfield is 'lag time', which has been defined for this project as the length of time it takes for the springs feeding Soames Creek to recover flow to baseline conditions, past the point where the springs are impacted from pumping from Church Road Wells 2 and 3. The lag time has been requested by MWLRS to be defined and used as the timeframe in which augmentation flow is required to be provided to the creek, provided the EFN flow rates are not met naturally at that time. The SCRD has made operational changes such that augmentation flow can be provided at low flow rates from the existing high-capacity pumps in Church Road Wells 2 and 3.

Pumping at these low rates should not introduce much additional drawdown to the aquifer, but until the wells are allowed to fully turn off and stop augmentation flow, there could be minor effect on the spring levels.

It was hypothesized by AE in a memo provided in October 2023 that the lag time is between 7 and 14 days (Associated Environmental, 2023). That estimate was based on straight-line interpolation methods from operational water level data and was not calculated or measured by any quantifiable means. The 2024 constant rate pumping test was utilized as a test case to calculate the lag time, as it would represent a near-worst case scenario in terms of water demands, with the entire wellfield pumping close to its maximum capacity for three days straight. The test is further discussed in the AMP Update report (ISL, 2024). Through review of this data and discussions with the MWLRS in 2024, it was determined that while four days appeared to correspond to 95% recovery time in the monitoring wells, the lag time was conservatively extended to 7 days for the 2024 operating period. In other words, the SCRD was required to augment Soames Creek flows to EFN threshold levels for 7 days following the cessation of pumping in Church Road Wells 2 and 3, provided EFN flows were not naturally met.

To further investigate the lag time, in August 2024 ISL installed two drive point piezometers with pressure transducers in spring locations to determine the points at which water levels dropped below ground surface (i.e. were not flowing) and when they recovered to above ground surface (flowing). The location of the piezometers is provided in Figure 1.3. Further details on installation can be found in ISL's 2024 report. The datasets collected for 2025 are provided in Appendix B, Figure B.16, noting a transducer malfunction on November 26, 2024 resulted in lost data up to January 30 2025. A summary of the manual data collected is provided in Tables B.20 and B.21 in Appendix B.

Both piezometers were flowing at the time the Church Road Wells 2 and 3 began pumping, and water levels slowly responded after they were shut off on October 8, and mitigation turned off October 18 (Figure 5.1).

Piezometer 1 flow varied throughout the year, with the springs visually going dry during the summer and pumping months. The return to consistent flow at the surface above the augmentation infrastructure was not yet observed at the end of the 2025 pumping season up to 20th November when the last monitoring round was completed. Piezometer 1 had started to detect water in November, indicating that water levels had recovered from pumping but had not yet reached surface.

Piezometer 2 flow varied throughout the year, with the springs visually going dry during the summer and pumping months. The return to flowing coincided roughly with the cessation of pumping and increasing precipitation events, regardless of if Soames Well is pumping. This is consistent with previous years observations.

Upstream Granthams Springs response to the Church Road Wellfield pumping being shut off in October was not as defined as the previous years', with water levels appearing to be generally lower. A general reduction in precipitation compared to 2024 is considered a primary cause. As a result, a lag time reassessment was not possible for the 2025 season, with the lack of a clear response to the end of the 2025 pumping season.

Piezometer 1 and 2 also showed an increase in intermittent surface water expression in October to November particularly in response to precipitation events after mitigation was turned off and precipitation events continued to increase into the wet season.

Overall, water levels at the piezometer 2 location showed influences from pumping when pumping from the Church Road Wellfield was higher than typical and close to the allowable maximum pumping rates (Figure 5.1). As piezometer 2 appears to generally be influenced by pumping only at higher rates, and

seemingly less impacted than piezometer 1, it suggests that the drawdown cone from the Church Road wells primarily impacts the springs closer to the wells. This is consistent with the previous assessment (ISL, 2025a). consistent with the lower groundwater and surface water levels generally depicted in the 2025 data collected, as well as a later pump shut-off compared to 2024.

It continues to remain apparent that the lag time is influenced by the distance away from the Church Road Wellfield, the length of time the wells pump, the pumping rate of the wells, and by precipitation. Given the data collected, the SCRD will continue with the 7-day augmentation time requirement for the 2026 operating season. The piezometers and transducers will remain in place for 2026, and the lag time will be re-evaluated at the end of 2026.

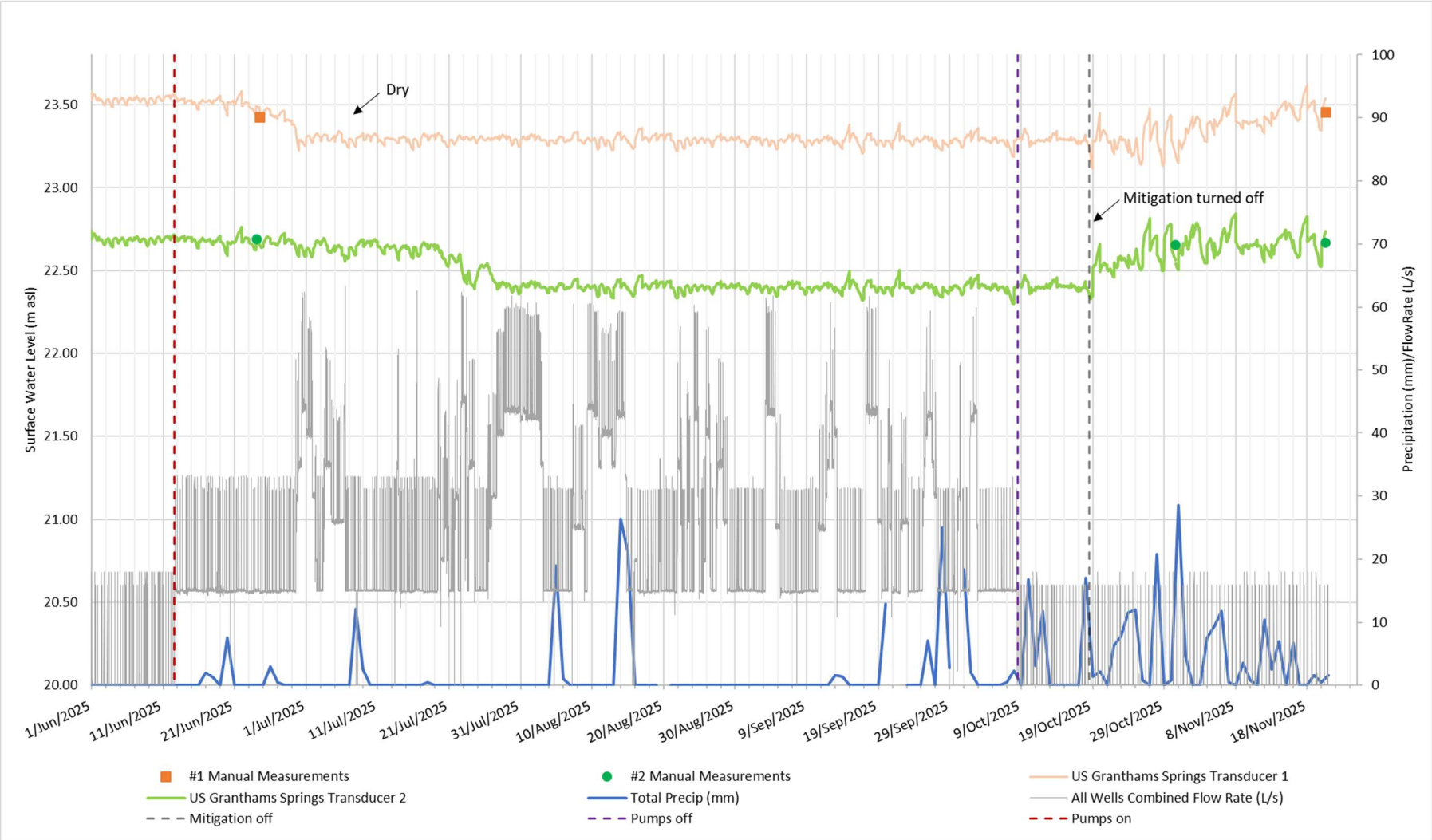


Figure 5.1: Upstream Granthams Springs Piezometer 1 and 2 Water Levels

6.0 AMI 6: Groundwater Quality

6.1 Groundwater Quality Monitoring Plan

The groundwater quality monitoring program was designed to collect groundwater quality data within the wellfield potential area of influence to assess any long-term effects of groundwater diversion. Monitoring groundwater quality throughout 2024 followed the Monitoring Program designed by AE (Associated Environmental, 2023) with various updates summarized in this report. A summary of the monitoring locations, frequency of data collection, and associated thresholds used to compare the collected data to is provided below in Table 6.1. Figures 1.1 and 1.2 show the locations of the monitoring locations.

Table 6.1: AMI 6: Groundwater Quality

Monitoring Location	Monitoring Type	Monitoring Frequency [3]	Threshold
Church Road Well 2	Water Sample [1, 2]	Monthly [4]	**Objective 1 and 2:** BCWQG AL[5] GCDWQ **Objective 3:** Chloride: 75 mg/L Specific Conductivity: 500 µS/cm TDS: 350 mg/L
Church Road Well 3	Water Sample [1, 2]	Monthly [4]	
Soames Well	Water Sample [1, 2]	Monthly	
Church Road Monitoring Well 2	Water Sample [1, 2] Pressure and Conductivity Transducer at 1-hour intervals	Monthly Monthly	

Notes:
1. Sampling consisted of measuring field parameters and collecting representative samples for laboratory analysis of physical parameters, anions, nutrients, and total and dissolved metals. DOC and hardness were added from July 2024 onwards.
2. Field parameters are also taken, while not an AMI requirement, and consist of electrical conductivity (EC), temperature, pH, and dissolved oxygen. Field alkalinity removed from July 2024 onwards. Field turbidity removed from July 2025 onwards.
3. On-site monitoring begins prior to turning pumps on (except when used for emergency purposes), from June to October, assuming Church Road wells are not turned on prior to mid-June or turned off later than mid-September. If wells are kept on later than mid-September, a November monitoring event will occur.
4. Samples can only be taken when the pumps are running, predominantly during the summer months.
5. BCWQG AL working and approved guidelines are required.
TDS: Total dissolved solids

6.2 Groundwater Quality Sampling Methods

Sampling procedures of groundwater for this reporting period conformed to the British Columbia Field Sampling Manual Part E: Water and Wastewater Sampling (British Columbia Ministry of Environment, 2013). This includes procedures for the measurement of field parameters (pH, specific conductivity, temperature, and dissolved oxygen), and sample collection/storage for laboratory analyses.

Prior to collecting water samples, field parameters (pH, specific conductivity, temperature, dissolved oxygen) were measured and recorded using calibrated water quality monitors. The sampler wears a new pair of nitrile gloves at each sampling location.

Surface water and groundwater samples were collected using laboratory-supplied containers and were field-filtered and/or field preserved where applicable. Samples requiring filtration were filtered by the

sampler on site using laboratory-supplied filters and syringes. The samples were transported in coolers and submitted to accredited laboratories.

The bottles were labelled and put into cool boxes packed with ice. The samples were then transported to the laboratory. Ideally, a temperature between freezing and 6°C is maintained. The samples were submitted to the laboratory and processed for analysis typically on the same day, if not within three days, which is the shortest holding time of any of the parameters being tested (colour, nitrate, nitrite, and orthophosphate). The exception is pH with a holding time of 0.25 days. A completed and signed chain-of-custody form is also submitted to the laboratory with the samples.

Laboratory results for groundwater analyses are compared to AMI 6 Objective 1 and 2 thresholds; BC Water Quality Guidelines for Drinking Water (BCDWG) (Government of British Columbia, 2024) and Guidelines for Canadian Drinking Water Quality (GCDWQ) (Health Canada, 2024). Due to recent changes to guideline calculations, dissolved organic carbon (DOC) and hardness were added to the parameter suite as of July 2024. Results are also compared to AMI 6 Objective 3 thresholds for saline intrusion (chlorine, specific conductivity and TDS).

Groundwater samples at Church Road Monitoring Well 2 were taken using the updated sampling technique (Hydrasleeves) included in the AMP Update (ISL, 2024).

The QA/QC sampling schedule is summarized in Table 4.3 (Section 4.2). The QA/QC results are outlined in Appendix B, Tables B.18 and B.19.

6.3 Groundwater Quality Results and Discussion

Detailed results are provided in Appendix B, with laboratory certificates of analysis included in Appendix C. In general, groundwater quality results showed no exceedances beyond the naturally occurring total and dissolved metals. General exceedances of the AMP selected guidelines are summarized below:

- Various total and dissolved metals primarily in Church Road Monitoring Well 2.
- Sporadic dissolved iron in Church Road Well 2 and 3 (as well as Church Road Monitoring Well 2).
- While the last 12 months have depicted some increasing and decreasing concentrations in some analytes, no clear trends are evident in general chemistry or in the assessment for saline intrusion (AMI6, objective 3).

The following subsections provide further detail on key objectives and analytes of interest.

AMI 6 Objective 1 (Drinking Water) and 2 (Aquatic Life)

Exceedances of various analytes including total and dissolved metals were noted in all sampling events and are likely naturally occurring, comparable in occurrence and concentration to previous results. This includes alkalinity, ammonia, aluminum, chromium (III+VI), copper, iron, lead, manganese, and zinc.

Church Road Monitoring Well 2 has shown a greater number of exceedances compared to other wells, comparable to past results. All key analytes of higher concentration are noted in previous sampling events and some are likely naturally occurring, comparable to other wells. Key analytes that exceed guidelines include ammonia, aluminum, chromium (III+VI), copper, iron, lead, manganese, and zinc. This signifies the well may be impacted by other environmental factors such as water infiltration from the surface (due to being flush-mounted with the ground surface, between houses with abundant flower and

fruiting gardens). The use of a different sampling technique (Hydrasleeves) began in April 2024, and in comparing water chemistry before and after its use, the Hydrasleeve does not appear to contribute to these exceedances. As the wellhead is at ground level, rainwater can carry fertilizers, yard chemicals, and other pollutants from the surrounding gardens and road directly into the well. While the well head is covered, there is potential for this potential contamination as there is not a water-tight seal. These anthropogenic inputs – especially lawn fertilizer (a major source of nitrogen/ammonia) and micronutrient additives or pesticides (often sources of metals like Cu, Zn, Fe, Mn) may best explain the elevated ammonia along with aluminum, chromium, copper, iron, lead, manganese, and zinc in this groundwater. Natural soil minerals may also contribute baseline levels, but the flush-mount design and proximity to landscaping significantly amplify potential of contaminant intrusion from the surface. As a precautionary measure, it would be beneficial to explore additional measures to ensure Church Road Monitoring Well 2 is sealed at the PVC well opening between sampling events, to reduce the chance of potential surface contamination.

In general, wells showed consistent exceedances of the following analytes, comparable to previous years:

- Dissolved copper at all wells, for BCWQG AL, Chronic and Acute.
- Total iron at all but Soames Well, above the Guidelines for Canadian Drinking Water, aesthetic objective for Church Road Well 2 and 3, in June and July (respectively), and Church Road Monitoring Well 2 for all months monitored. Church Road Well 3 was also above the BC Source Drinking Water Quality (aesthetic objective) and BCWQG AL (acute) for most months monitored.
- Dissolved zinc at Church Road Well 2 and 3 was found to be consistently above the BCWQG AL, Chronic and Acute. Church Road Monitoring Well 2 was above the BCWQG AL, Chronic and Acute in September.

When comparing these results to Soames Creek surface water sample results (Section 4.3), exceedances are shared in surface water results for copper.

AMI 6, Objective 3 (monitoring for potential saline intrusion)

AMI 6, Objective 3 (monitoring for potential saline intrusion) has been assessed at all wells monitored. Church Road Monitoring Well 2, located between the Church Road Wellfield and the coast, was installed to provide an early warning of potential saline intrusion into the aquifer (required under clause (j) part (3) of CWL 502568). Groundwater samples analyzed for specific conductivity, TDS, and chloride, and the specific conductivity monitored using the datalogger in Church Road Monitoring Well 2, indicate there does not appear to be saline intrusion occurring in this location. Laboratory conductivity, TDS and chloride are all well below the site-specific guidelines. Chloride shows a slight increase over the past 12 months for most wells, and more data is required to validate any long-term trend. TDS does not appear to be trending upwards in any wells monitored. Specific Conductivity appears to increase slightly in Soames Well and Church Road Well 3 over the past 12 months. All are depicted in Figure 6.3, below. Continued monitoring is necessary to confirm any trends and what is responsible, including weather conditions and groundwater use.

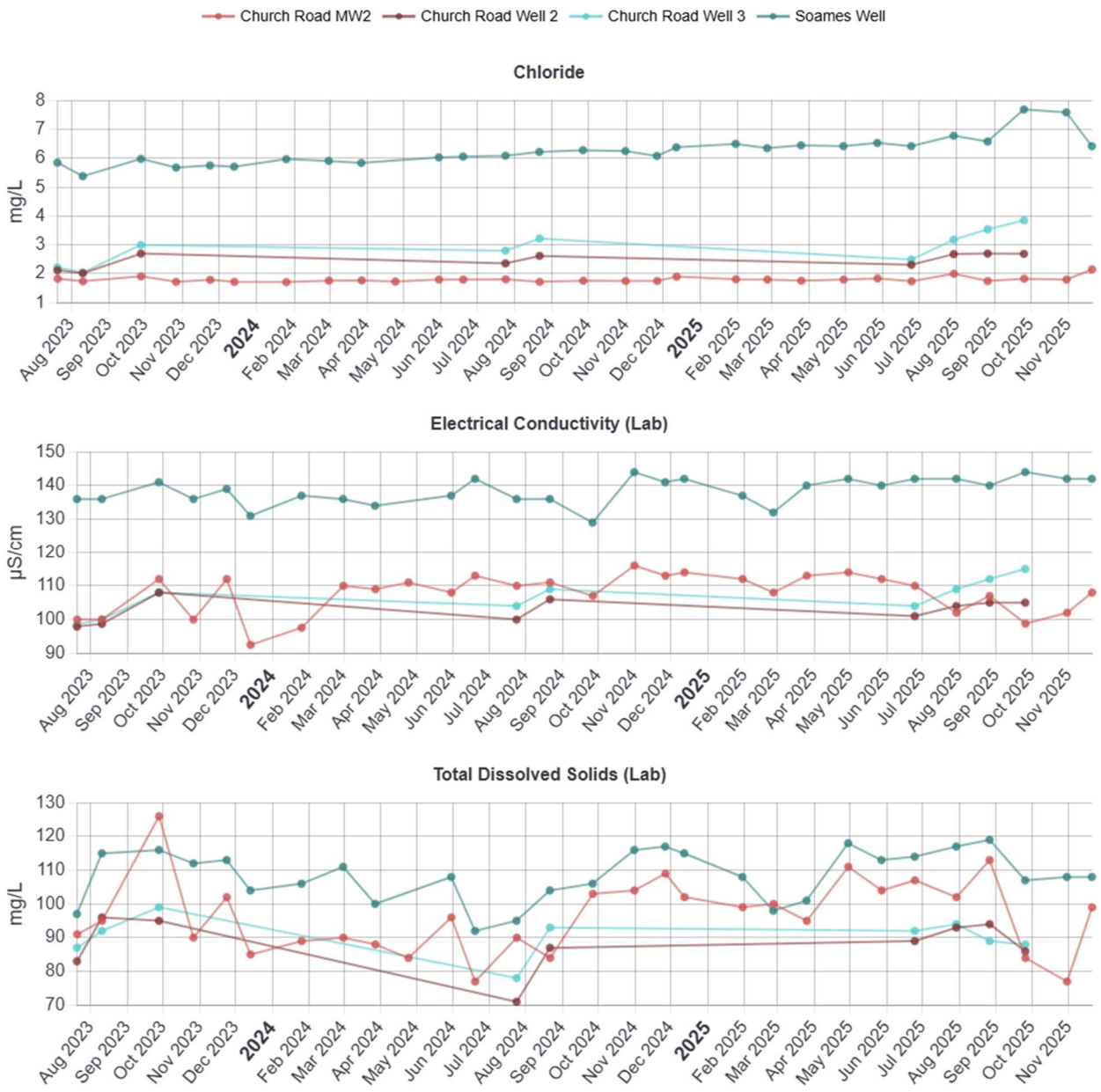


Figure 6.3 AMI 6, Objective 3: Saline Intrusion Laboratory Monitoring 2023 to 2025

7.0 Proposed 2026 Monitoring Plan

The 2025 Monitoring Plan followed the plan as summarised in the relevant sections above, where any changes to previous versions were agreed to by MWLRS. Appendix A and Tables 3.1, 4.1, 4.3, 5.1, and 6.1 outline the monitoring plan followed in 2025. A summary of new proposed Monitoring Plan changes is provided in Table 7.1, below.

Table 7.1 Summary of Proposed Changes to the 2025 Monitoring Plan

Proposed Change or Modification	Reference
Review and re-calculate AMI 5 Thresholds for Church Road Well 3 following the 2026 monitoring.	This report, Section 5.3
Frequency of on-site monitoring is two to four weeks prior to turning on the wells for the season (except when used for emergency purposes), and up to two months following the end of pumping for the season to monitor aquifer recovery.	This report, Section 5.1
Most recent winter and spring groundwater levels should be thoroughly reviewed two to four weeks before the wellfield operations begin, to confirm aquifer recovery has been reached. If recovery has not been reached, an investigation is triggered into causes of this and to ensure groundwater can be sustainably extracted from the aquifer.	This report, Section 5.3
AMI 5, Objective 3 (Associated Environmental, 2023) suggested development of an annual aquifer recharge threshold for Esperanza Road Monitoring Well once enough data was collected. We suggest this be updated to 25.2 m asl.	This report, Section 5.1
The AMI 5, Objective 3 multi-year fluctuations assessment method is suggested to be conducted as an observation and triggered investigation approach as opposed to a numerical threshold. We suggest annual comparison of the average of the last two weeks of groundwater levels in May each year as a method to observe potential multi-year trends.	This report, Section 5.3
The remaining water quality parameters tied to the preliminary EFNs (DO and pH) have been confirmed as reliable EFN water quality thresholds.	This report, Section 2.0
Suggestion for AMI 1 temperature threshold be combined with and left as AMI 4 to monitor surface water temperature, removing temperature from AMI 1 for clarity.	This report, Section 2.0
Remove Soames Creek at Marine Drive as a surface water monitoring and sampling point	This sampling location is on private property and access issues prevent personnel from safely collecting samples at the site. It is downstream of the potentially impacted area of the creek and of a fish barrier

Proposed Change or Modification	Reference
Remove visual turbidity check requirement from AMI 1 (introduced as a ramping rate exceedance response in ISL's 2024 annual report).	This report, Section 2.0
Fish sampling (e-fishing) change from annually in July to annually between late-July and September. Electrofishing needs to continue since the Gee trapping appears to be biased against adult sized fish (>170 mm) capture. Fish sampling (Gee trapping) change from annually in July, to twice annually, once between March and April, and again in July, but with the July gee trapping either preceding electrofishing or separated from electrofishing by a week. Recommended changes in the trapping schedule due to potential trap shyness due to lower water levels and/or e-fishing interactions. Riffle crest and pool measurements change to once, concurrent with the low discharge in the period of late August to mid-September period and during summer Gee trapping and electrofishing assessments.	This report, Appendix A

Table 7.2 summarizes the proposed monitoring plan going forward in its entirety, incorporating the changes outlined in Table 7.1 (highlighted in grey). Further details including thresholds and objectives for each item are detailed in the relevant sections of this report.

Table 7.2 SCRD Conditional Water Licence 502568 Monitoring Plan for 2026

Location	Monitoring [1]	Proposed Frequency
Surface Water		
Upstream Granthams Springs	Field flow measurement, visual notes and photos of flow Water sample Field parameters	Monthly During Operational Season [2]
Upstream Granthams Springs Piezometer 1 and 2	Transducer download Manual level using well sounder	Monthly During Operational Season [2]
Soames Creek at Hydrometric Station	Pressure transducer data logger connected to SCADA Review of discharge, temperature and ramping rate from gauging station	Monthly During Operational Season [2]

Location	Monitoring [1]	Proposed Frequency
	Flow measurement Water sample Field parameters	
	Fish sampling (e-fishing) [3]	Annually (between July * and September)
	Fish sampling (Gee trapping) [3]	Twice annually, once between March and April, and again in July *
	Fish habitat (riffle crest analysis) [3]	Once annually concurrent with low discharge period between July and September
Augmentation Discharge	Flow rate measurement - SCADA-connected flow meter	Monthly During Operational Season [2]
Granthams Landing: Well Discharge 1 and 2	Flow rates: bucket and stopwatch	Monthly During Operational Season [2]
Groundwater		
Church Road Well 2	Pressure Transducer connected to SCADA Water sample (during pumping) Field parameters Manual level using well sounder	Monthly During Operational Season [2]
Church Road Well 3	Pressure Transducer connected to SCADA Water sample (during pumping) Field parameters Manual level using well sounder	Monthly During Operational Season [2]
Church Road Monitoring Well 1	Transducer download (groundwater and barometric) Manual level using well sounder	Monthly During Operational Season [2]
Church Road Monitoring Well 2	Transducer download Water sample Field parameters	Monthly During Operational Season [2]

Location	Monitoring [1]	Proposed Frequency
	Manual level using well sounder	
Granthams Landing Well	Transducer download Manual pressure reading	Monthly During Operational Season [2]
Soames Well	Pressure Transducer connected to SCADA Water sample Field parameters Manual level using well sounder	NA Monthly During Operational Season [2] Monthly During Operational Season [2] June and August
901 Sentinel Road Well	Transducer download *Manual level (once able) using well sounder*	Monthly During Operational Season [2]
Esperanza Road Monitoring Well	Transducer download Manual level using well sounder	Monthly During Operational Season [2]
QA/AC samples	Duplicate water sample Field and Trip Blanks	One per sample round Annually
Reporting	Review of all groundwater data prior to pumping, including: • Transducer download • Manual level using well sounder Reporting of data	Annually two to four weeks before pumping starts [4] Annually

Notes:
1. Changes summarised in Table 7.1.
2. Monitor two to four weeks prior to turning on the wells for the season (except when used for emergency purposes), and up to two months following the end of pumping for the season to monitor aquifer recovery.
3. Irrespective of calendar dates the crew should try, to the extent feasible, to read the hydrograph from the Soames station and attempt to match discharge to those in 2023, 2024 or 2025. Fish sampling should be undertaken through a six-year period which would approximate a resident cutthroat trout life span plus one young of year (YOY) generation.
4. Review of groundwater data to review status of aquifer recovery compared to previous years.
* If e-fishing is scheduled for July it needs to occur **after** Gee trapping, below low water.
- "-" indicates no change.
- NA – Not applicable.
- TOC: Top of casing
- Changes from the 2025 program.

7.1 Roles and Responsibilities

The design of the monitoring plan is curated to collect key data during the pumping season. All key monitoring locations are instrumented enabling the continuation of data collection through winter months. With the monthly monitoring during the operating season, the SCRD is responsible for conducting walk-throughs on a bi-monthly basis along Soames Creek in the non-operating season. This is to inspect for any damages to instrumentation, stream morphology changes, sediment buildup on the weir, etc. Table 7.3 summarizes the roles and responsibilities of each key item under the monitoring plan. There are no changes proposed from the 2025 program.

Table 7.3 Roles and Responsibilities

Work Item	Frequency	Responsibility
Ensuring augmentation flow is provided to meet EFN	Automated	SCRD
Operation and monitoring of live pumping quantity, ramping rate, and SCADA-monitored groundwater levels and temperature, within thresholds	Automated	SCRD
Weir inspection and maintenance	Re-calibration annually, site visits conducted when flows recorded greater than 75 L/s occur during the operational window, between June and September. If required, recalibration and rating curve verification completed within 7 days of the threshold being exceeded	SCRD (site visits) Hydrometric QEP (re-calibration and rating curve verification)
Fish and fish habitat, surface water and groundwater in-field monitoring and sampling	Water Monitoring: Monthly During Operational Season [1] Fish and Habitat Monitoring: • E-fishing: Annually • Gee trapping: Twice Annually • Riffle crest analysis: Annually Bi-monthly Soames Creek and hydrometric station inspection walk-through in non-Operational Season [2]	QEP QEP SCRD
Reporting	Annual	QEP

Notes:
1. Monitor during operating season two to four weeks prior to turning on the wells for the season (except when used for emergency purposes), and up to two months following the end of pumping for the season.
2. Intended for the non-operational season. Start date depends on the end of the operating season, as described in notes item 1 above. Bi-monthly refers to once every two months.

8.0 Conclusions and Recommendations

Overall, the fish habitat, groundwater and surface water monitoring over the 2025 period produced quality, valuable data, meeting intentions and informing steps forward.

An EFN nonconformance during the operating season was reported for the Soames Creek August flow rate EFN (15.5 L/s), lasting approximately 8 minutes. This was due to infrastructure malfunction, and the SCRD quickly added corrective measures built into the SCADA system coding to mitigate the issue.

All surface water and groundwater quality and quantity parameters remained generally within expectations, in general showing comparable results to previous years. Groundwater levels have responded to this pumping season, impacting creek water flows, continuing to show a clear connection between the groundwater usage at the Church Road wellfield and surface water flows at Upstream Granthams Springs and Soames Creek. Groundwater-surface water response lag time was not updated due to lower precipitation in 2025. The 7-day lag time is considered to remain valid and conservative. A potential downward trend in groundwater levels throughout the aquifer was noted at the end of 2024, and 2025 has continued to reflect this observation. Reduced precipitation during this time suggests there may not be a long-term trend caused by groundwater extraction, further warranting the continued monitoring at the Church Road wellfield in 2026.

Piezometers 1 and 2 were valuable surface water monitoring locations, showcasing the response to pumping in differing climates (compared to 2024), as well as surface water expression in a drier season such as 2025. This data supports the general observation of lower ground and surface water levels across the locations monitored.

The shut-off of the Church Road Wellfield later in the year (October 8, 2025, compared to September 23, 2024) contributed to a delayed recovery in ground and surface waters. This delay was compounded by reduced precipitation in comparison to previous years. As such, expected aquifer recovery extended past the monitoring period predicted based on previous data. Based on this, we suggest a revision of the AMP monitoring period, detailed below and in Table 7.1.

Overall, while a slight decline in groundwater level data was present in 2025 in most wells monitored, a long-term trend is not evident without additional data.

Fish sampling has detected similar fish abundance to that before the well-field went into service and there is no significant change in community structure that could be attributed to well-field operation. The increase in YOY fish and the reduction in juvenile age classes in 2025 appear to be related to factors unrelated to the well-field.

ISL recommends the following (also summarised in Table 7.1 and 7.2 where relevant):

SURFACE WATER:

- **Fish and Fish Habitat**: Electrofishing and gee trapping should be undertaken in 2026 as discrete sampling events, not events undertaken on consecutive days. The monitoring program should continue to monitor changes in population age classes until such time as sufficient yearly data is gathered to determine that the population, and its age class distribution, persist irrespective of well-field operations. We recommend that the monitoring program extend through at least one life cycle for cutthroat trout

and then an additional YOY recruitment class, which would be 6 years. Slight changes to monitoring frequencies are recommended to continue to obtain representative data. Details on recommended AMP updates can be found in Appendix A.

- **Soames Creek Flow and Stormwater Management:** A contribution to the Soames Creek flow is uncontrolled sheet flow from Reed Road, exasperated during heavy rain events. With recent investment in weir upgrades and a growing need for representative, reliable flow data, management of uncontrolled flow from such sources particularly in high flow events is vital. ISL recommends that the SCRD contact the Ministry of Transportation and Transit to express that Reed Road sheet flow stormwater management be employed to dampen flow rates.
- **Soames Creek Temperature Threshold:** We suggest AMI 1 temperature be collapsed into and left as AMI 4 to monitor surface water temperature, removing temperature from AMI 1 for clarity.
- **Remove visual turbidity check from AMI 1 ramping rate exceedance response**: The ramping rate threshold is tied to ramping down (specifically looking at fish stranding), not ramping up (which may cause an increase in turbidity). As such, visual turbidity checking is not considered relevant to operations and is proposed to be removed from all monitoring requirements. The visual turbidity check requirement was introduced in ISL's 2024 annual report when proposing removal of field analysis of turbidity.
- **Reliable EFN Confirmation:** Confirm the final (reliable) EFN thresholds for DO and pH (AMI 1), thus revising all remaining preliminary EFNs (see Table 2.2, Section 2.0).
- **Remove Soames Creek at Marine Drive as a sampling point:** Private property and access issues limit the accessibility of this point, which is beyond a fish barrier and has provided limited useful data.

GROUNDWATER

- **Revise Church Road Well 3 Threshold:** As the Church Road Well 3 threshold calculations are based on estimations, there is an opportunity, highlighted by this year's Review Threshold exceedances, for a re-assessment of the Church Road Well 3 threshold. We suggest ISL's 72-hour CRT (ISL, 2024) on the three production wells be used to estimate a more accurate guideline.
- **Annual Groundwater Fluctuations Analysis:** AMI 5, Objective 3 (Associated Environmental, 2023) suggested development of an annual aquifer recharge threshold for Esperanza Road Monitoring Well once enough data was collected. A threshold was calculated, based on AE's approach, establishing a static groundwater level based on the summer (June to September) mean from 2023 to 2025, and subtracting 1.0 m to create the Annual Fluctuations Threshold (Table 5.2). We suggest this be updated for Esperanza Road Monitoring Well to 25.2 m asl.
- **Multi-year Groundwater Fluctuation Analysis:** With an accumulation of valuable data, the AMI 5, Objective 3 multi-year fluctuations assessment is beginning to depict potential trends. The assessment method as an observation approach as opposed to a numerical threshold has been used in the assessment of the multi-year fluctuations. While the AE AMP (Associated Environmental, 2023) suggests establishing Reliable Thresholds for each location, it's recommended that an alternate approach be taken. A numerical threshold is not considered to be viable given the purpose of objective and the variables associated with it, where a trigger scenario may be more applicable. That is, if a decline is observed, an investigation is triggered. I.e. investigating how results compare to precipitation for those seasons (do drought conditions align?), and align an appropriate response, etc. We suggest annual comparison of the average of the last two weeks of groundwater levels in May each year as a method to observe potential multi-year trends.
- **Church Road Monitoring Well 2 Maintenance:** Ensure Church Road Monitoring Well 2 is sealed at the surface well opening between sampling events to reduce the chance of potential surface

contamination and explore a lockable surface covering (given the close proximity to the Church Road wellfield and ease of entry).

- **Groundwater Protection:** Consider a revised wellhead protection assessment for the wellfield and high-risk potential contaminant entries such as Church Road Monitoring Well 2. This is based on observed groundwater chemistry particularly at Church Road Monitoring Well 2 and avoidable exposure points putting the increasingly vital water source at risk.
- **Lag Time:** The 7-day lag time is considered to remain valid and conservative, and a reassessment in 2026 is recommended as the hydrological and climatic system evolves, potentially impacting aquifer response.

GENERAL:

- **Monitoring Period Revision**: Two to four weeks prior to turning on the wells for the season (except when used for emergency purposes), and up to two months following the end of pumping for the season.
- **Monitoring Requirements**: Following on from above, groundwater levels should also be reviewed two to four weeks before the wellfield operations begin by a hydrogeological professional, to confirm aquifer recovery has been reached.
- **Continued Monitoring:** Continuing with the monitoring plan and incorporating proposed adjustments as indicated in this report.

The existing monitoring plan will be followed until this revised monitoring plan is approved.

9.0 Disclaimer

This document entitled “Conditional Water Licence 502568 2025 Annual Report” has been prepared by ISL Engineering and Land Services Ltd. (ISL) for the use of the Sunshine Coast Regional District. The information and data provided herein represent ISL’s professional judgment at the time of preparation. ISL denies any liability whatsoever to any other parties who may obtain this report and use it, or any of its contents, without prior written consent from ISL. Information provided by third parties is believed to be accurate, but is not guaranteed

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Appendix A

Fish and Fish Habitat Assessments

201-8506 200 Street, Langley BC V2Y 0M1, T: 604.371.0091

January 29, 2026
ISL Reference: 28395

Sunshine Coast Regional District
Sunshine Coast Regional District
1975 Field Road, Sechelt, BC

Attention: Jamie Giberson, Utility Operations Manager

Dear J. Giberson:

Reference: 2025 Annual Monitoring Program: Fish and Fish Habitat Assessment Report

1.0 Fish and Fish Habitat Monitoring Program Background

The Sunshine Coast Regional District (SCRD) is operating the Church Road Wellfield under Conditional Water License 502568, issued by the provincial Ministry of Water, Land and Resource Stewardship. The permit conditions required the SCRD to complete annual monitoring per the Annual Monitoring Plan (AMP), prepared by Associated Engineering (AE) who updated the AMP with Final Environmental Flow Needs (EFNs) with assistance from ISL Engineering and Land Services Ltd (ISL), who assumed responsibility for the AMP monitoring in 2024 and in 2025. A component of the AMP was intended to assess whether fish and fish habitat changes as a result of the operation of the Church Road Wellfield and associated streamflow mitigation (Soames Creek augmentation). The fish habitat monitoring techniques included:

- Fish sampling (electrofishing and Gee trapping);
- Riffle depth measurements; and,
- Stream transects and weighted usable width determination.

Duplicating the monitoring program year-over-year, as close as possible to the past conditions (i.e. similar climatic conditions, water clarity, temperature and discharge) was considered the best means of obtaining the most reliable and comparable data. However, the 2024 Annual Monitoring Program Report recommended reducing the number of fish sampling episodes to annual, since winter sampling (with high flows and colder water temperatures) tended to return few fish and the repeated seasonal trapping and electrofishing was thought to be an unnecessary risk to this small, isolated above barrier resident fish population during the spawning period. ISL also recommended removing transect measurements and weighted usable area calculations from the assessment as the reliable Environmental Flow Need had been established by the end of 2024. The transects upstream of Marine Drive had also been too disrupted through channel bed aggradation and bank disturbance to allow for meaningful comparisons year over year.

2.0 Fish and Fish Habitat Methods

As part of Annual Monitoring Plan (AMP) requirements, fish and fish habitat was to be monitored to:

- Assess whether fish and fish habitat changes occur as a result of the operation of the Church Road wellfield and associated streamflow mitigation (creek augmentation).

2.1 Fish and Fish Habitat Frequency, Monitoring and Location

To determine whether fish and fish habitat changes were occurring as a result of the wellfield operation and associated streamflow mitigation (Soames Creek augmentation), the program undertook periodic electrofishing, Gee trapping and riffle crest measurements. The type and frequency of monitoring and thresholds for adjudicating effects are summarized in Table 1.

Table 1 2025 Fish and Fish Habitat Monitoring Methods, Frequency and Thresholds

Monitoring Location	Method	Monitoring Period	Threshold
Marine Drive culvert to confluence with Granthams Spring *	Electrofishing: Total fish captured Fork length Age class Activity	July 2025 [1]	50% reduction in total captured fish from March 2023 (12 fish). Missing age classes. Lack of spawning fish captured.
	Gee trapping: Total Fish Captured Fork length Age class Activity	First Quarter Second Quarter July 2025 [2, 3]	50% reduction in total captured fish from March 2023 (7 fish). Missing age classes. Lack of spawning fish captured.
Riffle 1 - 5	Depth and connectivity	First Quarter Second Quarter July 2025 [2, 4]	≤ 4 cm depth. Loss of connectivity.

Notes:
* Trapping below Marine Drive removed as of July 2025 due to updated AMP (ISL, 2025a). Prior to this, trapping reported total fish for both sites, as per the AE AMP.
1. 2026 and ongoing monitoring is proposed to be completed between July and September, following Gee trapping.
2. Quarterly monitoring requirements removed as of July 2025 (ISL, 2025a).
3. Twice annually March and July.
4. Once annually concurrent with low discharge period between July and September.

2.2 Thresholds

Thresholds, that is criteria against which fish sampling and riffle measurement results are compared, are set out in Table 1. Some natural variance in total fish numbers is expected, but the variance year-over-year should not show dramatic, unexplained and persistent declines in fish numbers or shifting age classes as that could be indicative of ecological change, potentially (but not exclusively), related to well operation.

The threshold for fish abundance was set at a 50% reduction in total captured from the baseline data from March 2023. A 50% reduction from the electrofishing baseline condition would be 12 fish. A 50% reduction from the baseline fish trapping data from March 2023 would be 7 fish.

The second fish sampling threshold would be a determination of missing age classes, particularly the lack of spawning individuals.

Riffle 1 to 5 depth thresholds have been set as a water depth drop of less than 0.04 m (4.0 cm) depth or a loss of connectivity between habitats.

2.3 Locations

The locations for fish sampling (electrofishing and Gee trapping) riffle depth measurement locations, are outlined in Table 2.

Table 2 Georeferenced Locations for Fish Sampling and Fish Habitat Monitoring in Soames Creek

Soames Creek Monitoring Location	Easting	Northing	Rationale
Fish Sampling (Point of commencement) = Ocean	464298	5473497	Gee trapping (with locations shown per Figure 1) Electrofishing
Fish sampling (Point of Termination) = Confluence with Grantham Springs	464160	5473646	Fish measurement and visual observation to identify any changes in fish population including activity, age class, spawning compared to the March 2023 and July 2024 data.
Riffle Depth Measurement 1	464262	5473521	Riffle and pool depth measurements
Riffle Depth Measurement 2	464247	5473525	
Riffle Depth Measurement 3	464213	5473561	
Riffle Depth Measurement 4	464207	5473597	
Riffle Depth Measurement 5	464188	5473606	

The fish sampling locations and riffle analysis locations referenced to pertinent features such as the Church Road Wellfield, Granthams Spring Pumphouse, Marine Drive and Ocean are shown in Figure 1.

2.4 Fish Sampling (Electrofishing)

Following submission of the 2024 AMP, modifications to the fish sampling program were accepted by the Ministry, and fish sampling (electrofishing and Gee trapping) was to be conducted once per year in July, to compare annual data to background data obtained in March 2023 and July 2024. Annual electrofishing was to be completed at a temperature of >5 ^{O}C, and otherwise in accordance with fish collection permit conditions.

Parameters measured in situ or calculated from field data included: fish species identification, fish activity, total fish captured, fish age class (from length), and catch per unit effort (CPUE).

2.5 Fish Sampling (Gee Trapping)

In addition to annual electrofishing, Gee traps were to be set in the same locations as in previous years (Figure 1). No fish trapping or electrofishing was performed downstream of Marine Drive after the first winter and spring of 2024, as it had been recommended that this downstream reach be deleted from the sampling program. Traps, baited with a mix of salmon-flavoured, dry, cat food and salmon roe, were set for between 12 and 24 hours. Like the electrofishing parameters outlined above, data capture included: fish species identification, fish activity, total fish captured, fish age class (from length) and CPUE.

2.6 Riffle Analysis

Depth measurements were recorded at various flows at riffle-pool crest's locations to determine the deepest point within the thalweg of the crest (measure the deepest point along the crest or shallowest channel cross section at the crest). Five sites were identified and are presented in Table 1 and Figure 1. Riffle 1 to 5 depths thresholds have been set as a water depth drop of less than 0.04 m (4.0 cm) depth or a loss of connectivity between habitats.

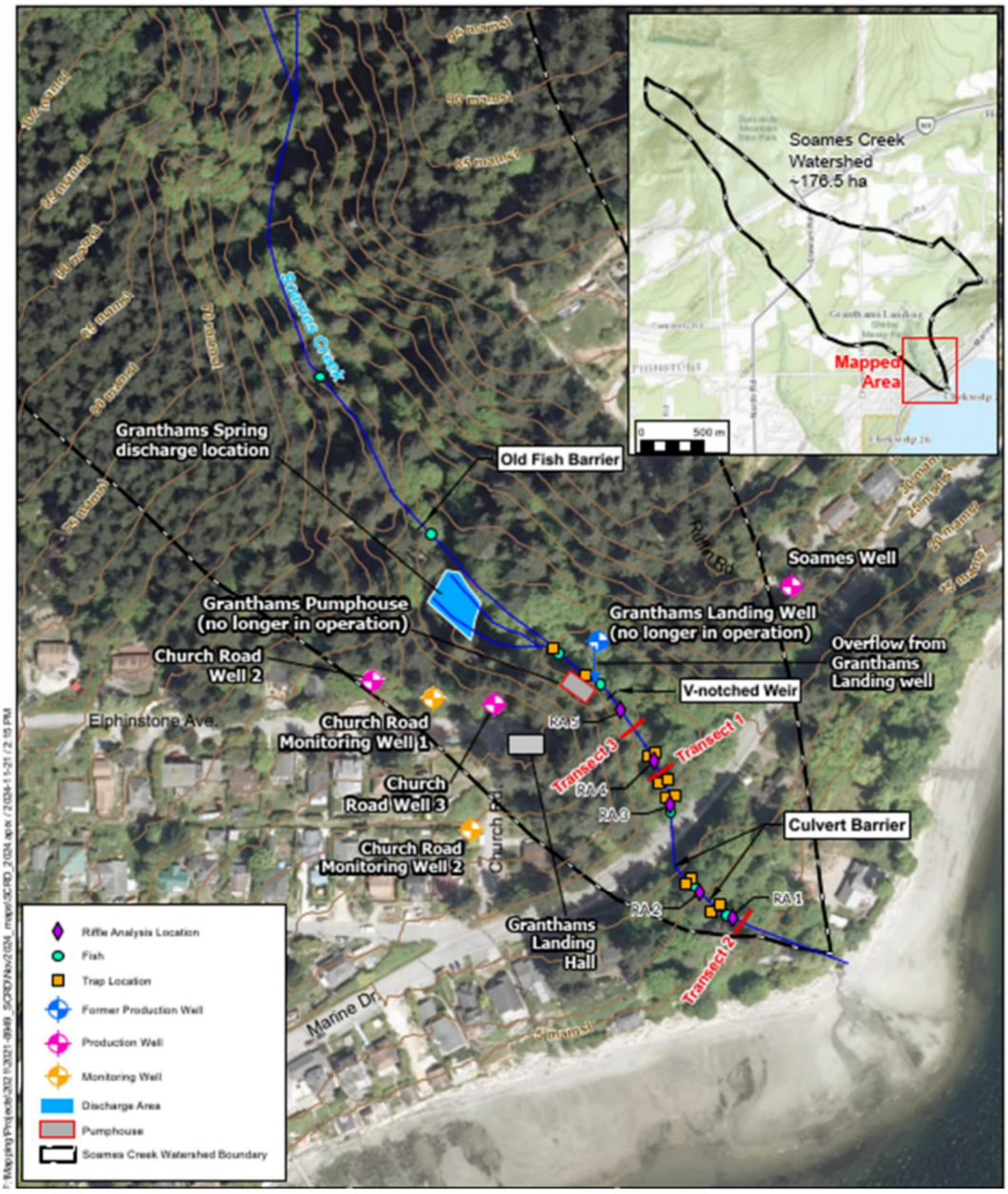


Figure 1 Trapping Locations (note that no trapping was undertaken downstream of Marine Drive after June 2025)

3.0 Fish and Fish Habitat Results

3.1 Annual Fish Sampling

Fish sampling was to be completed in the winter and spring of 2025, up to adoption of the recommendations of the 2024 Annual Report which recommended changing fish sampling to a once per annual episode in July. This proposed change was intended to correlate the fish sampling episode to seasonal low water periods and at a point in time where young of year (YOY) fish have reached a catchable (via Gee trap and electrofishing) size. Focusing on fish sampling and behaviors in the summer has numerous advantages, over the March baseline, including:

- Reduced interference with cutthroat pre-spawning/spawning behavior.
- Low water with better visibility requiring less electrofishing.
- The low water season is the period of greatest potential risk to fish and fish habitat in this reach so having direct observations of stream conditions in summer is more advantageous than in March when the hydrometric data suggests that the natural stream flow in Soames Creek is sufficient to support overwintering, rearing and spawning activities.

3.2 Electrofishing Results

Fish sampling could not be undertaken in July as crew availability and ferry scheduling logistics prevented crew access at that time. This change in date does not broadly affect the data collected in 2025 as YOY fish are easily identified a month later and monthly discharges within Soames Creek between July and August are not dissimilar. The later date does provide an opportunity to measure riffle depths at lower discharge.

Discharge on August 25, 2025 was 0.019 m^3/s (Table 3), which matched the October 14, 2024 discharge and was similar to the July 8, 2024 discharge (0.025 m^3/s), but was considerably (and unsurprisingly) less than the March 1, 2023 discharge (0.031 m^3/s). Turbidity was clear and visual clarity was good in August.

Table 3 Fish Sampling Episodes Undertaken in 2025, Referenced Against Previous Years (2023, 2024) Sampling Conditions.

METHOD DATE	FLOW m^3/s (L/s)	WATER TEMPERATURE °C	EFISHING	FISH TRAPPING N = no X = yes (n = traps)
August 25, 2025	**0.019 (19)**	**9.2**	**Y**	**Y**
March 25, 2025	**0.044 (44)**	**7.8**	**N**	**Y**
February 25, 2025	**0.047(47)**	**6.7**	**N**	**Y**
DECEMBER 23, 2024	0.037 (37)	8.0	N	Y
OCTOBER 14, 2024	0.019 (19)	8.6	N	Y
JULY 8, 2024	0.025 (25)	10.1	Y	Y
FEBRUARY 29, 2024	0.081 (81)	5.5	Y	Y
MARCH 1, 2023*	0.031 (31)	4.8 - 5.0	Y	Y
JANUARY 17, 2023*	0.310 (310)	5.0	N	N
Note: *Sampling by Associated Engineering (AE)				

Discharges in both February and March 2025 were higher than the March 2023 baseline but lower than the January 2023 and February 2024 fish sampling periods.

All fish captured were collected in a bucket or clear plastic bag and then transferred to a fish viewer to be identified to species and measured for length before being released close to the site of capture.

Catch per unit electrofishing effort in August 2025 (Table 4) was 6.9, which was the highest catch per effort that has been recorded amongst all sampling episodes. The CPUE was similar to the July 2024 CPUE (6.0) and was 67% higher than the March 2023 baseline CPUE. Higher CPUE in the summer versus winter have been observed by ISL on many other fish monitoring assignments. This is largely due to better visibility, lower discharge and fish are more responsive to the electrical current at higher temperatures. In July 2024 electrofishing effort was only 90 seconds as at that time the biologist felt that there would be undue risk to young of year fish, particularly in light of the 38 fish captured through Gee trapping in July 2024. In 2025, that situation was reversed (see Section 3.3), with few fish captured by Gee trapping. In 2025 the crew did not have the same concerns about electrofishing as YOY fish were larger and more robust (a month and a half longer period of growth).

3.3 Gee Trapping Results

Summer 2025 Gee trapping captured only five fish, and the CPUE was correspondingly low (0.004). This low CPUE, comparable to February 2024 (during cold, high water conditions), clearly is not indicative of the actual population (as evidenced by electrofishing) and the anomalous threshold result can be attributed to two factors:

- Low stream discharge which made trap sets difficult to ineffective because the trap entrances were very close or above water levels.
- Extensive electrofishing in the previous 24 hours prior to the trap set, creating trap shy fish.

Gee trapping results in February 2025 returned 7 cutthroat trout (CT), an increase from the 4 fish captured in February 2024. This number is at the threshold for Gee trapping, but the March capture data returned 9 fish and both these samples were only 12 hour sets with a CPUE of 0.008 and 0.013.

Table 4 CPUE by Sample Date (February 25, March 25 and August 25, 2025) Compared Against Fish Capture Technique in 2024 with 2023 CPUE (Current Years data in dark text previous years in light text)

SAMPLING DATE	Fish Captured by Gee Traps n	Effort for Minnow Trapping minutes (hrs)	CPUE Gee Trapping	Fish Capture by EF n	EF Effort Min (s)	CPUE EF
August 25, 2025	**5**	**1,200 (20)**	**0.004**	**38**	**5.5 (332)**	**6.9**
March 25, 2025	**9**	**720 (12)**	**0.013**	**-**	**-**	**-**
February 25, 2025	**7**	**720 (12)**	**0.008**	**-**	**-**	**-**
December 23, 2024	16	1,320 (22)	0.012	n/a	n/a	n/a
July 8, 2024	36	1440 (24)	0.025	9	1.5 (90)	6.0
October 14, 2024	27	1,320 (22)	0.020	n/a	n/a	n/a
February 29, 2024	4	1,320 (22)	0.003	12	3.3 (200)	3.6
September 13, 2023*	19	720 (12)	0.026	n/a	n/a	n/a

SAMPLING DATE	Fish Captured by Gee Traps n	Effort for Minnow Trapping minutes (hrs)	CPUE Gee Trapping	Fish Capture by EF n	EF Effort Min (s)	CPUE EF
March 1, 2023*	14	960 (16)	0.015	23	5.0 (300)	4.6
Note:*Sampling by AE; n = number; EF = Electrofishing						

3.3.2 Fish Age Class

Upon capture fish were measured based on size class categorized as young of year fish, juveniles and subadults (Table 5). Fish sampled via electrofishing were plotted as an ordered bar graph, based on age class (Figure 2) and length frequency histogram (Figure 3) to aid in analysis. The fish captured by Gee trapping were not plotted to age class, as that sample method appears to be biased against adult capture (larger fish may simply not fit the size of the trap entrance).

Table 5 Cutthroat Trout Age Classes in Soames Creek in 2025 (Dark Text), With Reference to Past Year's Fish Capture Data (Light Text).

SAMPLING DATE	TEMPERATURE °C	STREAM FLOW m^3/s (L/S)	AGE CLASS				TOTAL CAPTURE
			Young of year (≤75 mm)	Juveniles (75-130 mm)	Pre-adults (>130-170 mm)t	Adult (>170 mm)	
August 25, 2025	**9.2**	**0.019 (19)**	**15**	**5**	**14**	**4**	**38**
March 25, 2025	**7.8**	**0.044 (44)**	**2**	**6**	**2**	**0**	**9**
February 25, 2025	**6.7**	**0.047(47)**	**3**	**3**	**1**	**0**	**7**
February 29, 2024	5.5	0.081 (81)	4	12	0	0	16
April 9, 2024[1]	7.8	0.029 - 0.037	2	2	0	3	7
July 8, 2024	10.1	0.025 (25)	6	30	0	0	45
October 14, 2024	8.6	0.019 (19)	3	19	5	0	27
December 23, 2024	8.0	0.037 (37)	3	11	2	0	16

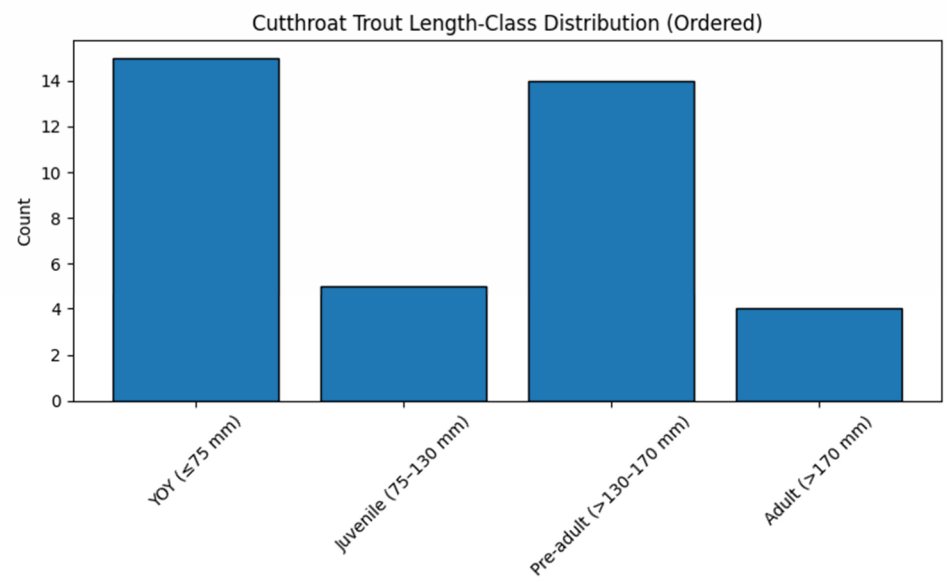


Figure 2 Cutthroat Trout Length to Age Class Distribution for fish captured via electrofishing.

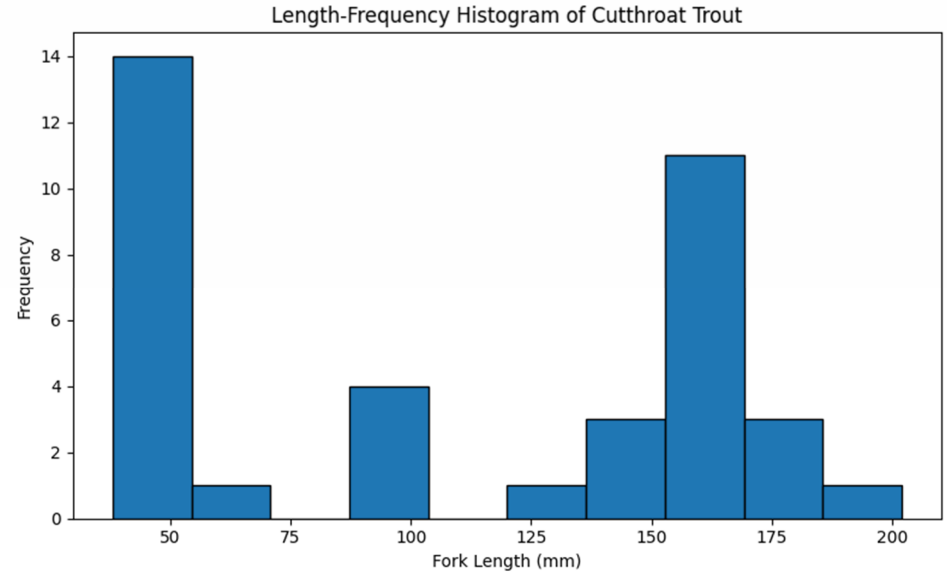


Figure 3 Length-frequency Histogram for cutthroat trout captured by electrofishing in 2025.

The 2025 data suggest that there was significant recruitment of 0+, YOY cutthroat trout (CT) in Soames Creek compared to previous years. Interestingly the paucity of YOY identified in the 2023 and 2024 sampling episodes now appears as a dearth of juvenile class fish in 2025. Similarly, 2023 and 2024 sampling identified an abundance of fish in the “juvenile” size class and it appears that those juveniles have in 2025 reached a size to be classed as ‘pre-adults’ and that is why there is a proportionally larger number of fish in that pre-adult category. The adult category remains relatively low, but that is not surprising since we think this small coastal stream would only be capable of supporting a very low number of large fish. Potentially the presence of too many large-bodied adult fish, that have to adopt a piscivorous behavior to maintain body mass, may have population level of effects that end up self-regulating the population, by reducing YOY age classes. There is a hint in the data collected from 2023 to 2025 that this may have occurred in Soames Creek, but there are other possible explanations for low YOY representation in past years.

All CT age classes were represented in the 2025 sampling program, although Gee trapping alone would suggest a reduced adult population, greater than actually exists. Based on the results of the electrofishing analysis outlined above, this bias against adult fish in the Gee trapping data is indicative of fish of that size being unable to enter the traps or that adult fish are more trap 'shy' than younger fish.

Monitoring this resident CT population over the next several years is considered important to track the progression of the YOY through juvenile to pre-adult and then adult age classes to ensure there is a viable breeding population year-to-year.

3.3.3 Riffle-Pool Crest Assessment

During the August 25, 2025 investigation a discharge of 0.019 m^3/s, which matched the October 24, 2024 discharge, the field crew measured water depth over riffle depths of between 7.0 - 12.0 cm. The field crew also noted that all pools and riffles were fully connected, when they completed low flow season sampling.

Baseline Riffle-Pool crest assessment by AE identified that at low flows (0.013 m^3/s) on September 13, 2023 there was sufficient depths (at least 6.0 cm) for fish passage between pool habitats. ISL's low flow (0.019 m^3/s) assessment in October 2024 identified similar conditions with at least 5.5 to 9.5 cm of depth over riffle crests.

Ancillary site visits (in association with monthly well water sampling) in July and September 2025 confirmed that riffles and pools remained fully connected through the low flow period. This finding is consistent with AE's baseline sampling and ISL's 2024 riffle and transect measurement results.

Table 6 Riffle-pool Crest Measurements Along Soames Creek

DATE	STREAMFLOW m^3/s (L/s)	RANGE OF RIFFLE POL CREST DEPTHS (cm)
August 25, 2025	**0.019 (19)**	**7.0-12.0**
December 23, 2024	0.037 (37)	8.5-12.5
October 14, 2024	0.019 (19)	5.5-9.5
July 8, 2024	0.025 (25)	6.0-9.5
February 29, 2024	0.081 (81)	12.0-17.0
September 13, 2023	0.013 (13)	6.0-10.0
May 15, 2023	0.021 (21)	8.0-10.0
March 1, 2023	0.031 (31)	8.0-12.0

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Fish Sampling

The reach above Marine Drive supports resident CT exclusively and this population is largely confined to a <100 m long perennially wetted reach downstream of the confluence with Granthams Spring. Starting in approximately May to June, Soames Creek upstream of the confluence with Granthams Spring goes dry and stays dry through to the onset of the rainy season in late September or early October. The available habitat available to resident CT is considered to of moderate quality. The moderate rating is related to the lack of instream large woody debris (LWD), few deep pools, few off-channel areas and what appears to

be a lack of spawning habitats. The presence of an old, failing concrete weir structure in the stream channel would also limit intra-reach fish migration and potentially genetic exchange. Since the population is small, confined to a limited number of reaches, and sub-reaches, and is isolated from downstream populations by multiple downstream barriers (Marine Drive culvert, and Driveway culvert), it is inherently at risk from natural stochastic events in addition to potential human caused perturbations.

Electrofishing sampled greater total numbers of cutthroat trout than in previous years and electrofishing CPUE was higher than previous years. Gee trapping CPUE was similar to the March baseline trapping CPUE. The August CPUE, was low as were total fish captured. Electrofishing data clearly suggests that this is related to an inability to find water deep enough to wet the trap to a depth that fish appear to be comfortable to enter the trap. None-the-less, based on relative abundance measurements such as CPUE, the small population of resident CT appears stable, and there appears to be no populations changes that could be attributed to operation of the wellfield.

4.2 Fish Age Class

All age classes were represented in the samples taken in 2025, and there are clearly more YOY and pre-adults than in past sampling episodes or years. Juvenile numbers were lower than in previous years as that age class has grown to the sub adult stage. It should be noted that the sub-adult age class is somewhat arbitrary since that category includes fish >170 mm to 200 mm and CT >170 mm could be in breeding condition, but in this small stream we have only viewed three fish >200 mm in spawning condition (i.e. either exhibiting breeding behavior or developing obvious colour changes associated with being in breeding condition).

Relatively few young of year would be expected in a stream with a dearth of viable spawning habitat, and relatively few breeding adults. Only the most dominant fish are likely able to secure limited breeding sites. As such the viable breeding adult population, irrespective of wellfield operation is thought to be quite small. Gee trapping appears to be biased against adult capture.

4.3 Riffle-Pool Crest Assessment

At lowest flow conditions there is not less than 7.0 cm of water at riffle crests and as such there is connectivity between pools. There is no evidence that the operation of the well-field is having any effect on fish habitat connectivity.

Habitat connectivity in Soames Creek has however been disrupted by anthropogenic barriers (the driveway culvert, Marine Drive culvert, an old concrete weir), and a temporal obstacle formed by the hydrometric weir. The hydrometric station weir was repaired in October 2025 by AE, through downstream pool reconstruction and removal of exposed wooden cross braces. It is no longer an obstacle to fish.

5.0 Recommendations

Fish sampling has detected similar fish abundance to that before the well-field went into service and there is no significant change in fish community structure that could be attributed to well-field operation. The increase in YOY fish and the reduction in juvenile age classes in 2025 appear to be related to factors unrelated to the well-field. In the 2024 Annual Report ISL expressed an interest in moving away from electrofishing with the hopes of using Gee trapping as the means for fish sampling.

Unfortunately, we can see there is an apparent sampling bias in the Gee trap data against sampling adult fish. There may also be possible issues with trapping during low water conditions. Accordingly, we recommend that electrofishing be undertaken as a discrete event from Gee trapping so that some sense

of adult relative abundance can be captured in the monitoring program. We would recommend this dual fish sampling program (electrofishing and Gee trapping) continue until such time as sufficient yearly data is gathered to determine that the population, and its age class distribution, persist irrespective of well-field operations. We recommend that the monitoring program using electrofishing and Gee trapping be extended until such time as there is confidence in a July Gee trapping baseline, and its catch effort approximates that achieved through electrofishing. Once the July-August Gee trapping baseline is established, electrofishing could be eliminated from the monitoring program (desirable in the opinion of the author) and Gee trapping could be relied upon as the sole fish capture method. Gee trapping should extend through at least one life cycle with one additional YOY recruitment class, which would be 6 years in total. After 6 years of adult persistence and accumulation of corresponding trapping data YOY presence could be used as an analogue to adult persistence and potentially electrofishing could be dropped from the monitoring program.

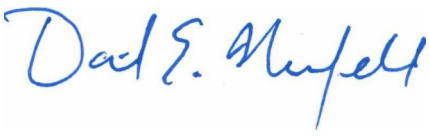
We recommend electrofishing occur once in the period of late July to September and Gee trapping (with a 24-hour trap set) be undertaken twice annually, once between March and April and again in July, before low water. While the earlier trapping period does overlap with the cutthroat spawning period the technique is believed to be less invasive than electrofishing. The second trapping period in July would ameliorate the risks identified in this report about trap shyness and low water. Gee traps should be baited with a mix of salmon roe and salmon-flavoured cat food, contained within nylon or cotton perforated bag to maintain consistency with past sampling effort. If electrofishing is scheduled for July, it must be conducted after Gee trapping is completed, with a minimum one-week gap between the end of Gee trapping and the electrofishing event.

Riffle pool connectivity has not been found to be an issue at any time during our low flow investigations. None-the-less, we recommend visual inspection of riffle pool connectivity and depth measurements, at the deepest part of the riffle crest to the deepest part of the pool, during the annual low discharge period, which occurs typically in late August through approximately mid-September. This low discharge riffle-pool connectivity inspection would be in addition to riffle-pool connectivity inspections undertaken concurrently with Gee trapping and electrofishing assessments, described above. There is no need to measure riffle crest to pool depth in the winter, spring or mid-late fall, as those seasons would not be low flow periods, where disconnection of riffles and pools would occur.

6.0 Closure

We trust this report provides information necessary to satisfy AMP requirements for fish and fish habitat assessment. Please do not hesitate to contact the undersigned if you have questions or wish to discuss the findings in this report.

ISL ENGINEERING AND LAND SERVICES



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