EDMONTON WATERWORKS

ANNUAL REPORT TO ALBERTA ENVIRONMENT AND PROTECTED AREAS

Approval Number 638-04-01

2024

TABLE OF CONTENTS

1.1 Overview

Through 2024, EPCOR Water Services (EWS) continued to satisfy all water demand requirements while meeting our strict water quality criteria. Total demand in 2024 was similar to 2023, 389 ML/d average versus 386 ML/d in 2023, and higher than the previous 10-year average.

On January 29, water entered the electrical switchgear feeding the high lift pumps at EL Smith WTP, leading to an electrical fault and damage to the electrical system (AEPA Reference No. 424473). Without the high lift pumps, system capacity was restricted and mandatory water restrictions were invoked. High Lift Pumps 1 and 2 were returned to service late January 29, restoring partial capacity, after partial repairs were completed. High Lift Pumps 3 and 4 remained out of service until the morning of February 1, after a shutdown through the off-peak hours to complete all required repairs. Water restrictions were rescinded on the morning of February 2 after the high lift pumps were confirmed in working order and storage levels had partially recovered. The treatment process and water quality were not affected through this event.

Rossdale and EL Smith WTPs converted from direct filtration (DF) to conventional filtration on January 15 due to unseasonably high raw water color, a result of dam operations upstream. Raw water color peaked at 14 TCU on January 16. Raw water quality did not stabilize and the WTPs did not convert back to DF prior to spring runoff.

Creeks upstream of Edmonton – including Strawberry, Modeste and Tomahawk – began to show signs of flow with runoff mid-March. Raw water color (and organic nitrogen) began to increase on March 16, peaked at 45 TCU on March 20 and returned to winter levels by month end. Raw water turbidity remained below 10 NTU throughout the event. Both plants fed carbon March 15 through 25 for taste and odor control. The 2024 Spring Home Analysis Runoff Program (SHARP), the annual program whereby customer volunteers provide real-time feedback on any detectable taste and odor, concluded on May 19. The average score was 95.0% satisfied over the 90-day period, slightly above the 94.4% PBR target.

Raw water conditions were generally favorable through the summer and fall.

E.L. Smith converted to DF on October 15 and Rossdale followed on October 17. In 2024, the WTPs achieved an average of 91 days in DF, below the internal target of 120 days for DF operations due to unfavorable raw water conditions. DF operation resulted in a reduction of total solids discharged to the NSR by 42.9% during the months of January, February, November, and December compared to baseline conventional operation. In 2024, the plants operated several days in DF in October. During this Extended DF period, the total solids reduction was 28.7% compared to baseline conventional operation.

In 2023, EWS began collecting water quality samples as part of the Wastestream Monitoring Program, which was approved by AEPA in December 2022. The goal of the program is to improve wastestream load quantification to better determine if acute and/or chronic guidelines and regional water quality triggers and limits are being met. A report summarizing the results to date is included as an appendix.

The WTPs continue to improve the integrated safety and environmental management system in accordance with the ISO 14001:2015 and 45001:2018 standard. In 2024, an external auditor completed a surveillance audit of the WTPs and reservoirs to both of these standards. There was only one minor non-conformance identified, related to document control. The minor non-conformance has been corrected.

EWS continued to upgrade the water treatment plants and the reservoir assets. Total expenditures in 2024 were approximately $46.6M. Some of the major projects are as follows:

- EL Smith Stage 1 Filter Upgrades is on-going. Filter 5 upgrades were completed in 2024 and so, to date, Filters 1 through 5 are complete. Filter 6 is scheduled for 2025. This upgrade program addresses structural issues and allows for future deep bed filtration implementation.
- Construction continued on the Rossdale WTP Aqua Ammonia (AA) conversion to Liquid Ammonium Sulphate (LAS). This conversion will provide a safer chemical for injection into potable water for converting free chlorine to chloramine. AA off-gasses easily and is a hazard to plant staff. The conversion has already been completed at the EL Smith WTP.
- Plants Flood Protection work progressed well in 2024 on this multi-year project. Design work for EL Smith was completed and barrier construction commenced in September.

Outfall control gate work for waste stream 2 also continued. At Rossdale, barrier design progressed to 85% and 2 outfall control gates were installed with a third one underway.

- Construction commenced on the new High Lift Pumphouse 5kV Switchgear and Electrical Room project, to address end of life electrical assets that feed all 6 pumps in the existing high lift pumphouse, along with air blowers and other ancillary equipment.

In 2024, Water Distribution and Transmission repaired 242 water main breaks on the distribution system in Edmonton, with the majority of main breaks occurring on cast iron pipes. EWS generally experiences a higher volume of breaks in the first quarter of the year attributed to deeper frost penetration as we incurred 76 in this time frame. The overall reliability of the water distribution system can be attributed to the water main replacement and cathodic protection programs as well as the use of more reliable pipe materials in both replacement and new water main construction.

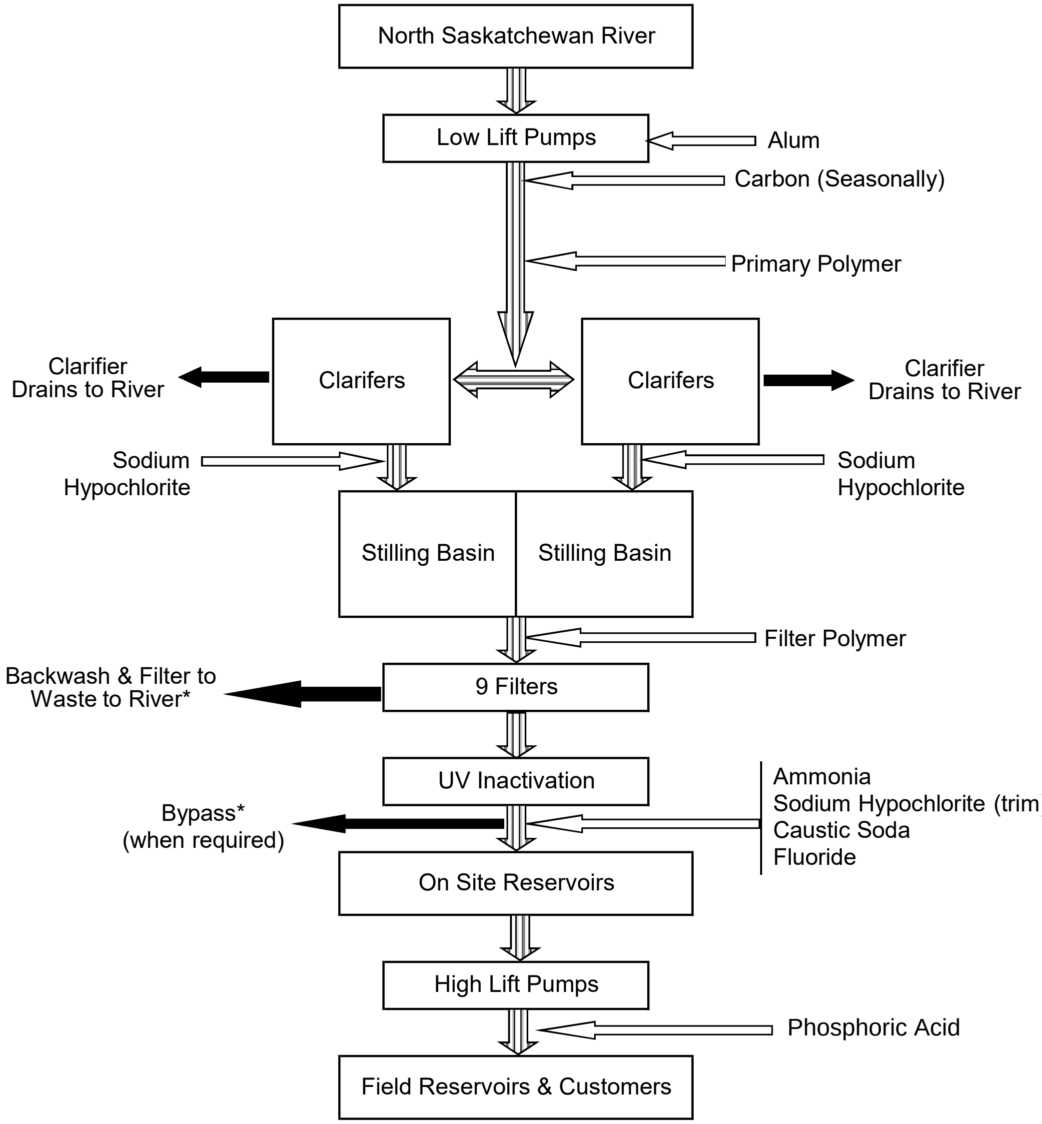
The Uni-Directional Flushing program completed flushing and valve exercising in about 35% of Edmonton (2536 runs). This program is now an eight-year cycle with area prioritization emphasis placed on water quality parameters, percentage of Cast Iron Mains, and the relative success of the previous flush.

In 2024 there were 10 events that related to failed bacteriological samples. Within those events, there were 16 individual test results that were either Total Coliform Positive (TC+) or E. Coli Positive (EC+) for the Edmonton system. All failed bacteriological sample results were followed up and resamples taken until all test results were satisfactory—meaning all results were non-detectable. There were zero Approval contraventions related to failed bacteriological samples in 2024. There were 45 main breaks reported to AEPA due to the proximity of release to the stormwater collection system and the North Saskatchewan River.

As we move into 2025, we will continue to focus our efforts on the production of and distribution of high quality water, customer satisfaction, protection of the environment, workplace safety and cost effectiveness. We will continue to ensure our customers receive best value for the services we provide them.

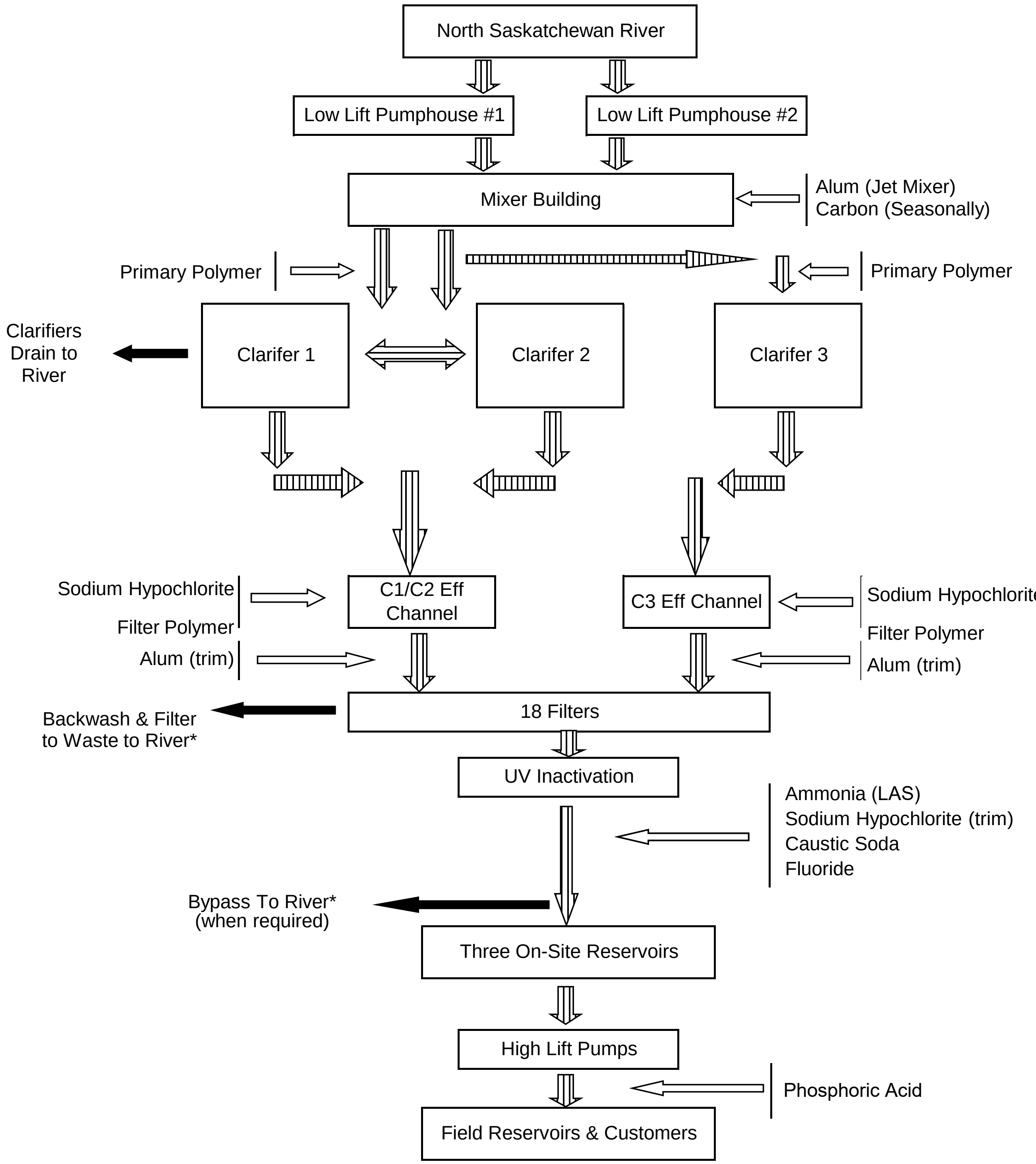
(End of Section)

1.2 Process Schematic - Rossdale (Plants 1 & 2)



* All chlorinated waste streams are dechlorinated prior to discharge to the river

1.3 Process Schematic - E. L. Smith (Plant 4)



* All chlorinated waste streams are dechlorinated prior to discharge to the river

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240110-983664-v1	About 0.1m^3 per hour of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. Dechlorination pucks were placed in the path of water, the water did not make it to drainage infrastructure before freezing.	January 8, 2024	423699
ENV-20240111-533019-v1	About 57m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	January 11, 2024	423710
ENV-20240112-524970-v1	About 73 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	January 12, 2024	423764
ENV-20240117-864191-v1	About 234 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. The release of water caused a distruption to traffic and garnered media attention. Fire services were contacted to secure the site so the crews could take appropriate action. The discharge was not directly into a watercourse.Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	January 16, 2024	423960
ENV-20240122-334193-v1	About 75 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	January 21, 2024	424094
ENV-20240121-531394-v1	About 108 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	January 21, 2024	424093

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240130-329641	At approximately 2 AM on January 29, electrical cables feeding High Lift Pumps 3 and 4 at the E.L. Smith WTP came in contact with water. The contact resulted in electrical gear failure along with damage to other electrical components. The resulting equipment system failure at E.L. Smith Water Treatment plant forced EPCOR to shut down the pumping facility. The issue had only impacted the pumps and while water could still be treated for use across the region, operations was unable to pump water from the E.L. Smith WTP plant into the distribution and transmission system. For the duration of the issue, all treated water quality parameters were met. A Measure C MANDATORY non-essential public water ban was put unto place. Repairs were completed and the water ban was lifted on February 2nd.	January 29, 2024	424473
ENV-20240208-107793-v1	About 3 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	February 7, 2024	424777
ENV-20240210-504731-v1	About 43 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	February 10, 2024	424858
ENV-20240213-279512-v1	About 1 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak will remain isolated until the repair is completed.	February 12, 2024	424942
ENV-20240219-557475-v1	About 36 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby sanitary sewer system. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	February 19, 2024	425088
ENV-20240229-981755-v1	About 61 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	February 29, 2024	425454

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240304-323997-v1	About 60 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	March 4, 2024	425553
ENV-20240308-809925-v1	About 47 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	March 8, 2024	425711
ENV-20240310-518862-v1	About 49 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	March 10, 2024	425749
ENV-20240326-654876-v1	About 333 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby sanitary sewer system. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	March 26, 2024	426300
ENV-20240412-009225-v1	About 45 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	April 12, 2024	426797

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240418-274915	On April 5, 2024, following a failed sample (total coliform positive) on Hydrant 16943, an EPCOR emergency response member was dispatched to site to collect four (4) resamples. The results showed 3 out of the 4 resamples passed. H16943 (Right cap) had a 2nd total coliform positive (TC+) Following the 2nd failed sample a super chlorination of the hydrant (H16943) occurred on April 18th and four (4) resamples were collected by EPCOR after 3 hours of the hydrant being super chlorinated. Again the results showed 3 out of the 4 resamples passed. H16943 (Right Cap) again had a 3rd TC+. Following the 3rd failed sample an EPCOR field crew replaced the hydrant body (H16943) on April 20th and four (4) resamples were collected by EPCOR. After samples were collected the hydrant control valve was closed as a precautionary measure. The lab reported all resamples passed.	April 18, 2024	426963 & 427119

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240424-744751	At 15:11Hrs, EPCOR was conducting routine maintenance at the Kaskitayo water truck fill station located at 1851 - 111 Street NW when personnel observed a hydrocarbon sheen at the site leading to a storm CB. The sheen is suspected to have originated from a third party vehicle using the truck fill station. EPCOR sampled the impacted CB for the six approval parameters and hydrocarbons. This CB discharges approximately 260 meters downstream into Blackmud Creek at Outfall 274 (OF274) located 30 meters west of the 111 Street bridge. There was no visual indication of hydrocarbons at the outfall or in Blackmud Creek. This release was reported to the regulator on April 24, 2024. Steps taken to minimize, control or stop the release: • EPCOR confirmed that a trace amount (<500 ml) of suspected diesel fuel had entered the CB and was contained at the first downstream manhole. Absorbent booms were placed inside the catch basin, the downstream manhole and as a precaution at the outfall to collect any trace hydrocarbons present. Absorbent pads were placed in the catch basin to remove residual hydrocarbons from the release and cleanup of the impacted surface was completed. Steps that will be taken to prevent similar releases: • EPCOR actively responds to reports of releases to the storm and sanitary collection systems working to minimize impact to the environment, customer and the collection systems. Further investigation is underway to determine if the responsible party can be identified for the release of the hydrocarbon at the Kaskitayo water truck fill station, but at this time the third party generator is not known.	April 24, 2024	424272
ENV-20240509-897820-v1	About 37 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	May 9, 2024	427795
ENV-20240616-499912-v1	About 172 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	June 16, 2024	429217

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240706-796174-v1	On July 4, 2024 EPCOR Operations collected a sample from a residence bathtub. On July 6, 2024, the laboratory results indicated that the sample failed for total coliforms. AEPA was notified of these lab results on July 6, 2024. Following the failed sample, an EPCOR emergency response member was dispatched to site to collect four (4) resamples: 1. One (1) at the original source location; 2. One (1) from a secondary source at the original sample location; 3. One (1) from less than five (5) service locations upstream from the original sample location, and; 4. One (1) from less than five (5) services downstream from the original sample location. On July 8, 2024 at 13:27 hrs, the lab reported that all four (4) resamples passed.	July 4, 2024	429948
ENV-20240712-475530-v1	About 74 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	July 12, 2024	430272
ENV-20240726-782763-v1	Estimated* 50m^3 of potable chlorinated water at 0.25 ppm was released to Blackmud Creek through Outfall 290. A main break occurred on the on ramp from Ellerslie Road east bound onto Highway 2 south bound (Calgary Trail). The potable chlorinated water from the break is suspected to have travelled through the stormwater system until it arrived at Outfall 290. Upon arriving to the site, the EPCOR Emergency Response Team verified the location of the water infrastructure to control the leak. Dechlorination pucks were placed in the overland path of water, the water entry point into the drainage infrastructure and outfall 290 into the Blackmud Creek The leak was isolated by the operations of the water infrastructure on July 30, 2024 at 12:10 hrs. The water could not be isolated sooner due to system impacts and inoperable valves.The water main will remain out of service until repairs can be completed.	July 21, 2024	431002

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240801-126220-v1	On July 31st, EPCOR Operations collected a sample from Hydrant 4976 as part of QA check and to be analytically tested. The laboratory results indicated that the sample failed for total coliforms and E. coli. AEP was notified of these lab results on August 1, 2024. Following the failed sample, an EPCOR emergency response member was dispatched to site to collect four (4) resamples on August 1, 2024 that included one hydrant upstream and another downstream of Hydrant 4976. After Samples were collected the hydrant control valve on H4976 was closed as a precautionary measure. On August 3, 2024 at 11:20 hrs, the lab reported that 2 out of the 4 resamples passed. H4976 Right Port had a 2nd positive TC+ and a E. Coli positive. H4976 Left port had a 2nd TC+. Following the 2nd failed sample a super chlorination of the hydrant (H16943) occurred on August 3 and four (4) resamples were collected by EPCOR after 3 hours of the hydrant being super chlorinated. After samples were collected the hydrant control valve was closed as a precautionary measure. On August 5, 2024 at 11:50 hrs, the lab reported all resamples had passed.	July 31, 2024	431255 & 431354
ENV-20240811-801105-v1	About 15m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to a nearby ditch south of Poplar Lake. Water did not enter the lake.	August 11, 2024	431617

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240813-451656-v1	On August 11, 2024 at 20:30 hrs, EPCOR Operations collected a sample from a manual air vent off a water transmission main. The main was fully isolated and was being recommissioned following a repair due to a main-break. WOn August 13, 2024 at 11:06 hrs, the laboratory results indicated that the sample failed for total coliforms. AEPA was notified of these lab results on July 13, 2024 at 11:15 hrs. Following the failed sample, an EPCOR emergency response member was dispatched to site to collect four (4) resamples: 1. One (1) at the original source location; 2. One (1) from a secondary source at the original sample location; 3. One (1) from less than five (5) service locations upstream from the original sample location, and; 4. One (1) from less than five (5) services downstream from the original sample location. On August 15, 2024 at 16:34 hrs, the lab reported that all four (4) resamples passed.	August 13, 2024	431689
ENV-20240821-563003)	During Analytical Operations' routine monthly review of analytical data, prior to electronically uploading to APEA, a reporting error was discovered. Data were incorrectly reported internally as part of a total coliform positive event from July 4, 2024 (EPCOR Incident: ENV-20240706-796174-v1). One of four follow-up resamples also tested positive for coliforms but was incorrectly transcribed on the field sheets and reported back as a non-detect.	August 21, 2024	429948
ENV-20240822-291278-v1	On August 21, 2024 at 02:15 hrs, EPCOR collected a sample from Hydrant 3083.On August 22, 2024 at 12:44 hrs, the laboratory results indicated that the sample failed for total coliforms. AEP was notified of these lab results on August 22, 2024 at 13:14 hrs. Following the failed sample, an EPCOR emergency response member was dispatched to site to collect four (4) resamples on August 22, 2024. After Samples were collected the hydrant control valve on H3083 was closed as a precautionary measure. On August 24, 2024 at 15:07hrs, the lab reported that 4 out of the 4 resamples passed.	August 22, 2024	432095
ENV-20240822-372111-v1	On August 21, 2024 at 03:29 hrs, EPCOR Operations collected a sample from Hydrant 22249. On August 22, 2024 at 15:18 hrs, the laboratory results indicated that the sample failed for total coliforms. AEPA was notified of these lab results on August 22, 2024 at 15:29 hrs. Following the failed sample, an EPCOR emergency response member was dispatched to site to collect four (4) resamples on August 22, 2024. After Samples were collected the hydrant control valve on H22249 was closed as a precautionary measure. On August 24, 2024 at 15:07hrs, the lab reported that 4 out of the 4 resamples passed.	August 22, 2024	432108

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20240824-118767-v1	About 163 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed	August 24, 2024	432187
ENV-20240825-037858-v1	About 84 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby storm catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	August 25, 2024	432207
ENV-20240904-764233-v1	About 60 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	September 4, 2024	432596
ENV-20240904-804269-v1	About 106 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	September 4, 2024	432598
ENV-20240904-810904-v1	About 107 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	September 4, 2024	432599
ENV-20241001-454534-v1	About 47 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	October 1, 2024	433671
ENV-20241008-056285-v1	About 83 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	October 8, 2024	434010

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20241016-003596-v1	About 63 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	October 16, 2024	434270
ENV-20241017-520170-v1	About 40 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	October 17, 2024	434275
ENV-20241022-930218-v1	About 42 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	October 22, 2024	434431
ENV-20241031-776201-v1	On October 29, 2024 at 14:08 hrs, EPCOR's Analytical Operations Water Quality Sampler collected a random distribution sample from Gold Bar Park, located at 10955 - 50 Street NW. On October 31, 2024 at 12:40 hrs, the laboratory confirmed a test result, indicating the sample tested positive for total coliforms. An EPCOR field crew was dispatched to flush the localized distribution area and collect re-samples. Re-sample results confirmed all samples passed for all parameters tested.	October 29, 2024	434786
ENV-20241105-458956-v1	About 20 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground.The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 5, 2024	434934
ENV-20241105-447900-v1	About 55 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground.The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 5, 2024	434936

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20241105-346973-v1	About 64 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground.The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 5, 2024	434931
ENV-20241115-035310-v2	About 43 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 15, 2024	435281
ENV-20241119-202057-v1	About 54 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 19, 2024	435374
ENV-20241128-893986-v1	About 26 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water.The leak was isolated until the repair was completed.	November 28, 2024	435628
ENV-20241214-862888-v1	About 49 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water. The leak was isolated until the repair was completed.	December 14, 2024	436130
ENV-20241216-757534-v1)	About 69 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	December 16, 2024	436171
ENV-20241218-240851-v1	About 27 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	December 18, 2024	436224

1.4 Summary of Violations and Notifications for 2024

EPCOR Incident Number	Description	Date of Incident	AEPA Reference Number
ENV-20241218-945450-v1	About 51 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	December 18, 2024	436201
ENV-20241225-370419-v1	About 55 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	December 25, 2024	436393
ENV-20241225-347211-v1	About 46 m^3 of potable chlorinated water at +/-1.5ppm was released to the surface due to a suspected leak within the water distribution system buried underground. The water drained to the nearby catch basin. Dechlorination pucks were placed in the path of water and the water entry point into the drainage infrastructure to dechlorinate the water The leak was isolated until the repair was completed.	December 25, 2024	436392

(End of Section)

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

ROSSDALE WATER TREATMENT PLANT (LEVEL IV)

Director, Edmonton Water Treatment Plants	
Senior Manager, Operations	**WT II**
Manager, Operations	**WT III, WWT III**
Title	Alberta Environment Certification Level
Operations Engineer	
Manager, Transmission Operations & Training	WT III
Operations Foreman	WT IV
HEI Foreman	WT IV
Operations Foreman	WT IV
Operations Foreman	WT IV
Operations Foreman	WT IV
Operations Foreman	WT IV
Transmission Foreman	WT III
Training Foreman	WT III
Lead Hand, Operator	WT II
Transmission Operator	WT III
Operator I	WT II
Lead Hand, Operator	WT II
Operator I	WT III
Operator I	WT III
Operations Trainer	WT III
Day Foreman	WT IV
Lead Hand, Operator	WT II
Lead Hand, Operator	WT III
Operator I	WT III
Operator I	WT II
Operator I	WT III
Lead Hand, Operator	WT III
Operator I	WT III, WD II
Operator I	WT III, WWT III
Operator I	WT II
Operator I	WT II, WD II, WWT II, WWC II
Operator I	WT II, WD I
Operator I (temp)	WT II, WD II, WWT I, WWC II

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

E.L. SMITH TREATMENT PLANT (LEVEL IV)

Director, Edmonton Water Treatment Plants	
Senior Manager, Operations	**WT II**
Manager, Operations	
Title	Alberta Environment Certification Level
Operations Engineer	
Operations Engineer	WWC I
Day Foreman	WT IV
HEI Foreman	WT IV
Training Foreman	WT IV
Operations Foreman	WT IV
Operations Foreman	WT IV
Operations Foreman	WT III
Operations Foreman	WT IV
Operations Foreman	WT IV
Lead Hand, Operator	WT IV
Lead Hand, Operator	WT IV
Lead Hand, Operator	WT II
Lead Hand, Operator	WT III
Lead Hand, Operator	WT III
Lead Hand, Operator	WT II, WD II, WWT I, WWC I
Operator I	WT III
Operator I	WT III, WWT II,
Operator I	WT II
Operator I	WT III, WWT III
Operator I	WT II
Operator I	WT II, WD I, WWT II, WWC I

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

DISTRIBUTION SYSTEM (LEVEL IV FACILITY)
WATER DISTRIBUTION (WD) - NETWORK MAINTENANCE

Senior Manager, Maintenance and Construction
Manager, Distribution Maintenance
Manager, Dist. Maint Schedule

Title	Alberta Environment Certification Level
Water Network Operator	WD IV WWC I
Water Network Operator	WD IV
Foreman III	WD III
Foreman III	WD III
Foreman III	WD III
Foreman III	WD III
Foreman III	WD II
Foreman I	WD III WWC I
Foreman I	WD III
Foreman I	WD IV
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Foreman I	WD III
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Foreman I	WD II
Equipment Operator III	WD II
Equipment Operator III	WD I
Equipment Operator III	WD II
Equipment Operator III	WD I
Equipment Operator III	WD II
Equipment Operator III	WD I
Equipment Operator III	WD I
Equipment Operator III	WD II
Equipment Operator III	WD II
Equipment Operator III	WD II
Equipment Operator III	WD II
Equipment Operator III	WD I
Equipment Operator III	WD II
Equipment Operator III	WD II
Labourer II	WD II
Labourer II	WD I
Labourer II	WD I
Labourer II	WD I
Labourer III	WD III
Labourer II	WD I
Labourer III	WD I
Labourer II	WD I
Labourer II	WD I

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)

Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

DISTRIBUTION SYSTEM (LEVEL IV FACILITY)

WATER DISTRIBUTION (WD) - NETWORK MAINTENANCE

Senior Manager, Maintenance and Construction

Manager, Maintenance and Construction

Manager, Dist. Maint Scheduling

Title	Alberta Environment Certification Level
Truck Driver III	WD I
Labourer II	WD I
Labourer II	WD I
Labourer II	WD I WWC I
Labourer II	WD I WWC I WT I WWT I
Truck Driver III	WD II
Labourer II	WD II
Truck Driver III	WD II
Truck Driver III	WD II
Truck Driver III	WD I
Truck Driver III	WD I
Welder	WD II
Maintenance Repairman I	WD II
Maintenance Repairman I	WD I
Maintenance Repairman I	WD I
Labourer II	WD I
Foreman I	WD I
Water Sys Tech Support Specialist	WD IV

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

DISTRIBUTION SYSTEM (LEVEL IV FACILITY)
WATER DISTRIBUTION (WD) - FIELD OPERATIONS

Title	Alberta Environment Certification Level
Senior Manager, Distribution Operations	
Manager, Field Operations	
Manager, Metering and Preventative Maintenance	**WD I**
	Manager, Water Trouble
Title	Alberta Environment Certification Level
Foreman III	WD IV
Foreman III	WD IV
Foreman I	WD II
Foreman I	WD II
Labourer III	WD II
Labourer III	WD I
Labourer III	WD I
Labourer III	WD II
Labourer III	WD I
Foreman I	WD I
Labourer III	WD III
Labourer II	WD I
Labourer II	WD II
Labourer II	WD I
Foreman I	WD II
Labourer II	WD I
Labourer III	WD II
Labourer II	WD II
Labourer II	WD I
Labourer III	WD I
Labourer II	WD II WWC I
Foreman III	WD III
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD III
Water Systems Serviceman	WD II
Water Systems Serviceman	WD III
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II
Water Systems Serviceman	WD II

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

DISTRIBUTION SYSTEM (LEVEL IV FACILITY)
WATER DISTRIBUTION (WD) - CUSTOMER SERVICE
Senior Manager, Customer Service

Manager, Dispatch

Manager, Inspections and Customer Service

Title	Alberta Environment Certification Level
Team Lead, Dispatch	
Dispatcher Coordinator	WD I
Dispatcher Coordinator	WD I WWC I WT I WWT I
Inspector – Water Metering	WD II
Inspector – Water Metering	WD I
Manager, Cross Connections	WD II
Inspector – Cross Connections	WD I

1.5 Alberta Environment Operator Certifications (Effective to year end 2024)
Operator Contact Number: EPCOR Water Services Dispatch (24 hr) (780) 412-4500

DISTRIBUTION SYSTEM (LEVEL IV FACILITY)
WATER METERING (WD)

Manager, Metering Operations	**WD I**
Title	Alberta Environment Certification Level
Foreman III	WD II
Meter Installer I	WD I
Meter Installer II	WD III
Meter Installer I	WD I WWC I
Meter Installer I	WD III
Meter Installer I	WD II
Meter Mechanic II	WD II
Meter Installer II	WD I
Meter Installer I	WD I
Meter Installer I	WD I

1.6 Demand/Production Statistics

2024

Month	ROSSDALE ZONE			E.L.SMITH ZONE			SYSTEM TOTAL			RESERVOIR PUMPAGE		
	Monthly Prod'n (ML)	Max Daily Prod'n (ML)	Peak Daily Demand (ML)	Monthly Prod'n (ML)	Max Daily Prod'n (ML)	Peak Daily Demand (ML)	Monthly Prod'n (ML)	Max Daily Prod'n (ML)	Peak Daily Demand (ML)	Rossdale Zone (ML)	E.L.Smith Zone (ML)	Total (ML)
JANUARY	4,226	179	222	6,762	253	249	10,989	395	379	1,451	2,466	3,917
FEBRUARY	3,750	165	183	6,828	278	301	10,578	433	371	1,507	2,211	3,718
MARCH	4,282	163	189	7,099	269	260	11,382	405	378	1,523	2,511	4,034
APRIL	4,610	183	212	6,550	246	232	11,159	419	389	1,250	2,653	3,902
MAY	4,521	183	204	7,297	272	318	11,818	438	422	1,546	2,841	4,387
JUNE	5,000	209	205	7,320	268	270	12,320	471	456	1,469	2,990	4,459
JULY	6,424	264	258	8,286	312	314	14,710	574	567	1,650	3,749	5,399
AUGUST	5,439	240	235	7,659	282	301	13,098	511	494	1,529	3,233	4,762
SEPTEMBER	4,814	192	206	7,441	284	327	12,255	466	445	1,361	3,040	4,401
OCTOBER	4,154	158	204	7,437	267	305	11,591	424	385	1,405	2,752	4,157
NOVEMBER	4,022	154	214	7,008	270	286	11,029	415	378	1,392	2,371	3,763
DECEMBER	4,073	154	155	7,253	272	293	11,326	415	379	1,451	2,389	3,840

2024 - HIGH 5-DAY DEMAND

	PLANTS PROD (ML/d)	RES. GAIN / LOSS (%)	RES. GAIN / LOSS (ML)	TOTAL DEMAND (ML)
17-Jul-2024	547	-0.8	-5.3	552
18-Jul-2024	555	-2.0	-12.4	567
19-Jul-2024	574	3.8	23.7	551
20-Jul-2024	512	0.4	2.3	510
21-Jul-2024	492	-5.7	-35.8	528
			AVERAGE:	542

Year to Date Data	2024	2023	% CHANGE
TOTAL PRODUCTION TO DATE (ML)	142,254	140,752	1.1
AVG. DAILY DEMAND TO DATE (ML)	389	386	0.8
PEAK DAILY DEMAND TO DATE (ML)	567	365	55.4
PEAK HOURLY DEMAND TO DATE (ML)	782	751	4.0
HIGH 5-DAY AVERAGE TO DATE (ML)	542	530	2.2

Peak daily demand of 567 ML/d occurred on July 18, 2024

Peak hourly demand of 782 ML/d occurred on July 18, 2024 at 21:00

1.7 Energy Consumption and Usage

Power Consumption:

	2024	2023	Change %
Rossdale WTP	34,412,501	31,610,814	8.86%
E.L Smith WTP	46,017,119	46,214,133	-0.43%
Field Pump Stations	17,247,797	16,187,133	6.55%
TOTAL	97,677,417	94,012,081	3.90%

Gas Consumption (GJ):

	2024	2023	Change %
Plants	87,087	87,094	-0.01%
Pumping Stations	4,605	4,578	0.59%
TOTAL	91,692	91,672	0.02%

Water Production/Pumpage(ML):

	2024	2023	Change %
Rossdale WTP	55,323	52,299	5.78%
E.L Smith WTP	86,939	88,456	-1.71%
Field Pump Stations	50,594	47,608	6.27%
TOTAL	142,262	140,755	1.07%

Note: The reservoirs and booster stations are not included into these totals.

Energy Usage

	2024	2023
Energy Consumption for Treatment and Pumpage (kWh)	97,677,417	94,012,081
Energy in kW.h per ML pumped	687	668
Gas Consumption – All Facilities (GJ)	91,692	91,672
Gas Consumption – All Field Pump Stations (GJ)	4,605	4,578

(End of Section)

1.8 Summary of Changes to the Operations Program

A summary of the significant changes to the 2024 Operations Program document from the previous year is as follows:

1. In 3.2.1.3, updates to the valve inspection preventative maintenance multi-level program.
2. In 3.2.1.4, updates to larger transmission valves repair planning and processes.
3. In Cross Connection Control Program, updates to the notification section.
4. In Cross Connection Control Program, following CSA B64.10/B64.10.1, backflow test results are to be provided to EWS within 5 days rather than 30.
5. In Water Quality Assurance and Monitoring, changes to the business unit name and update to the requirements captured under ISO/IEC 17025:2017.
6. In Water Quality Assurance and Monitoring section, the addition of work instructions as a method for completing testing in conjunction with lab methods and procedures.
7. In Water Quality Assurance and Monitoring, the removal of the removal the location section which included spatially distributed sampling.
8. In 4.1.1.1, an update to the City of Edmonton 2024 census population and corresponding adjustment to the minimum number of random samples required per month from 195 to 210.
9. In Table 4.1, adjustments to the minimum number of random samples and their locations.
10. In 4.1.1.3, updates to the other locations section outlines where random distribution samples may be collected.
11. In 4.1.1.5, updates to bacteriological testing which is done by consultants/contractors and the Provincial Laboratory for Public Health.
12. In 4.1.1.5, updates to the operator bench testing section with reference to frequency of online comparisons and removal of tracking bench testing in SCADA.
13. In 4.1.1.5, updates to document management and record keeping with reference to the quality management system which dictates the processes used in the laboratory.
14. In 4.2, updates to the online analyzer QA/QC program to outline the program and the procedures used within it for the control and validation of results.
15. In 4.4, the addition of the Lead Management Program and reference to updated processes and procedures used within the program.
16. In 4.3, updates to the Spring Home analysis runoff program (SHARP) include background information for the cause of odors and updated information about volunteer usage and reporting of results.

17. In 6.1, the Drinking Water Safety Plan was reviewed and updated (separate document).
18. In section 8, Emergency Response Plans, reference to historical EPCOR locations removed and updated to include the Aurum facility.
19. In Table 10.1, changes to the limit or acceptable range for flow at UV reactors at Rossdale and E.L. Smith (50;<150), Tranmittance % at E.L. Smith (88%) and UV dose at E.L. Smith and Rossdale (≥33;≥31).
20. In Table A-2, Cyanazine and p,p'–Methoxychlor are removed from Approval 638-04-01 and from Health Canada, Diclofop-methyl, Diuran, Tetrachlorophenol (2,3,4,6) and Trifluarin are removed from Health Canada but not approval.
21. In Table A-2, frequency of Total Organic Carbon changed to monthly from quarterly.
22. In Table A-5, frequency of NDMA sampling changed to five times per month when analyzing Haloacetic Acids.

2.1 Storage Capacities of Reservoirs

Reservoir Name	Available ML	Fire Storage (ML)	Operating Storage (ML)	Dead/ Emergency ML	Gross ML
Water Treatment Plant Reservoir Cells					
Rossdale Total	80.42	0.00	80.42	16.98	97.40
E.L. Smith Total	95.20	0.00	95.20	42.30	137.50
WTPs Sub Total	**175.62**	**0.00**	**175.62**	**59.28**	**234.90**
Field Reservoir Cells					
Rosslyn	97.54	12.56	110.10	12.93	123.04
Clareview	50.51	2.95	53.46	11.14	64.60
Papaschase	66.80	9.71	76.51	5.63	81.59
Londonderry	39.10	2.58	41.68	3.56	45.24
North Jasper Place	29.74	4.66	34.40	11.66	46.06
Ormsby	37.41	2.99	40.40	4.87	45.27
Thorncliff	37.10	2.93	40.03	3.40	43.43
Kaskitayo	21.78	3.96	25.74	3.20	28.94
Mill Woods	46.98	5.92	52.90	3.33	56.23
Castle Downs	22.70	2.41	25.11	8.93	34.04
Discovery Park	5.00	1.44	6.44	0.71	6.93
Field Sub Total	**454.65**	**52.11**	**506.77**	**69.36**	**575.37**
Grand Total	**630.27**	**52.11**	**682.39**	**128.64**	**810.27**

(End of Section)

2.2 Pumping Station Operating Pressure Ranges

		Current Alarms				Setpoints	
Treatment Plants Highlift Pump Stations	**Elevation, m**	**LOLO**	**LO**	**HI**	**HIHI**	**Low Pressure**	**High Pressure**
ELS North	620.85	910	940	1080	1100	-	1100
ELS South	620.85	910	940	1080	1100	-	1093
Rossdale West	622.25	800	830	950	980	500	980
Rossdale South	622.25	800	830	950	980	640	100
Reservoir Pumping Stations	**Elevation, m**	**LOLO**	**LO**	**HI**	**HIHI**	**Low Pressure**	**High Pressure**
Clareview Intake	649.73	365	410	640	670	-	-
Clareview Discharge	648.95	430	480	620	640	-	610
Papaschase 1 Intake/Discharge	693.3	45	95	270	385	-	-
Rosslyn 1 Intake/Discharge	669.87	295	345	475	595	-	-
Rosslyn 2 Intake/Discharge	671.42	280	330	465	580	60/140	-
Rosslyn 3 Discharge	669.14	510	540	630	700	-	610
Londonderry Intake	677.91	170	220	380	480	-	-
Londonderry Discharge	670.21	400	450	500	525	-	535
NJP Intake/Discharge	675.12	320	345	440	580	-	-
Thorncliff Intake	672.02	310	340	480	500	-	-
Thorncliff Discharge	672.02	350	380	495	515	-	-
Ormsby Intake	679.41	295	325	1000	1000	-	-
Ormsby Primary Discharge	679.41	325	355	460	490	-	600
Ormsby LE Discharge	679.38	525	575	680	710	-	700
Castledowns Intake	678.96	230	260	400	430	-	-
Castledowns Discharge	677.99	400	450	530	710	-	520
Kaskitayo Intake	673.84	280	315	480	550	-	-
Kaskitayo Discharge	673.84	490	550	690	720	-	690
Millwoods Intake	678.82	220	250	400	430	-	-
Mill Woods P6 Suction	678.82					60/140	
Millwoods Discharge	678.83	490	520	620	650	-	610
Papachase 2 Intake	689.06	40	70	700	700	-	-
Papachase 2 Discharge	690.42	350	380	500	530	-	520
Discovery Park Intake	716	350	400	460	510	-	-
Discovery Park Discharge	716	280	330	470	520	-	-
Booster Pumping Stations	**Elevation, m**	**LOLO**	**LO**	**HI**	**HIHI**	**Low Pressure**	**High Pressure**
Parkland Intake	682.353	270	290	380	400	60/140	-
Parkland Discharge 300mm	682.4	555	605	700		-	-
Parkland Discharge 600mm	682.4	555	605	700		-	-
Big Lake Intake	677.6					60/140	-
Big Lake Discharge	677.6	315	365	475	625	-	-
Terwillegar Intake	682.16	240	257	750	750	60/140	-
Terwillegar Discharge	683.00	440	480	650	690	-	-
Burnewood Intake	695.05	210	240	700	700	60/140	-
Burnewood Discharge	695.05	520	550	610	640	-	-
Laurel Intake	723.57	230	280	300	350	60/140	-
Laurel Discharge	723.57	280	300	400	450	-	-
Ellerslie Intake	695.2	250	280	500	540	60/140	-
Ellerslie Discharge	695.23	490	540	580	600	-	-
Walker Intake	723.6					60/140	-
Walker Discharge	723.6	360	410	500	650	-	-
Blackmud Creek Intake	690.104					60/140	-
Blackmud Creek Discharge	689.3	630	680	830	880	-	-

(End of Section)

2.3 Fire Stations & Other City Pressure Monitors

		Current Alarms			
Firehall Pressure Monitoring Stations	**Elevation, m**	**LOLO**	**LO**	**HI**	**HIHI**
Fire Hall #1 (Headquarters)	661.759	310	360	550	700
Fire Hall #2 (Downtown)	667.018	270	320	495	645
Fire Hall #3 (University)	667.792	370	420	520	670
Fire Hall #5 (Norwood)	663.986	235	285	515	665
Fire Hall #6 (Mill Creek)	663.863	360	410	520	670
Fire Hall #7 (Highlands)	655.873	280	330	550	700
Fire Hall #8 (Hagman)	674.153	295	345	450	600
Fire Hall #9 (Roper Station)	693.967	240	290	460	610
Fire Hall #11 (Capilano)	665	260	310	475	625
Fire Hall #15 (Coronet)	675.232	285	335	470	625
Fire Hall 12 (Meadowlark)	673.546	250	300	445	595
Fire Hall 13 (Rainbow Valley)	669.812	285	335	515	665
Fire Hall #16 (Mill Woods)	693.516	260	310	430	580
Fire Hall #17 (Castledowns)	680.669	230	280	470	620
Fire Hall #20 (Kaskitayo)	679.57	230	280	430	580
Fire Hall #22 (Oliver)	668.561	230	280	520	670
Fire Hall #24 (Terwillegar)	686	265	315	450	600
Fire Hall #26 (Meadows)	712.5	295	345	475	525
Firehall #27 (Ellerslie)	688.48	375	425	470	615
Fire Hall #28 (Heritage Valley)	697.73	290	300	400	550
Other City Pressure Monitoring Stations	**Elevation, m**	**LOLO**	**LO**	**HI**	**HIHI**
U of A #1 (Sask Dr)	669.63				
U of A #2 (83 Ave)	670.762				
U of A #3 (116st)		330	360	460	490
Sobeys	682	305	355	490	640
Northwest Line		420	450	580	610
Westview	696.7	320	340	500	
HD Windermere	682.7	410	460	550	770
HD 17st	707.6	340	390	490	640
TAMS	assume 679.44	270	320	410	560

(End of Section)

2.4 Regional Customers

Customer	Elevation (m)	Pressure (kPa)			HGL (m)		
		Min	Low Normal	High Normal	Min	Low Normal	High Normal
Regional Water Customer Group* (RWCG) Members							
CRPWSC (Parkland)	711.95	89	89	138	722.3	722.3	727.2
Sturgeon County	692	240	304	354	570	723	723
Strathcona County	664.384	349	379	438	700	703	709
Morinville	662.65	383	422	471	698	702	707
St. Albert Sturgeon	685.173	175	214	263	703	707	712
St. Albert Oakmont	655.45	402	441	491	696	700	706
CRNWSC (Northeast)	643.05	470	519	578	691	696	702
CRSWSC (Southwest)	716	390	430	495	755.7	759.8	766.4
Bulk Customers*							
Enoch Cree Nation	703.7	128	160	240	717	720	728
Namao	681.495	280	309	437	710	713	726

*Based on Water Supply Agreement

(End of Section)

2.5 Pumping Facilities

Zones	Facilities	Year Built	Number of Pumps: Fixed Speed	Number of Pumps: Variable Speed	Number of Pumps: Total	Best Efficiency Flow by Pump (ML/d)**: P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8
Primary	**Water Treatment Plants Highlift Pump Stations**												
	E.L. Smith Plant	1976	2	2	4	*95*	*95*	205	205				
	Rossdale Plant	1947	4	2	6	105	*105*	105	105	*95*	105		
	Field Reservoir & Booster Pump Stations												
	Ormsby*	1969	2	1*	3	16	16	*30*					
	Thorncliff	1970	3	0	3	12	12	12					
	North Jasper Place	1974	3	1	4	15	15	26	*26*				
	Rosslyn 1	1955	3	0	3	17	17	17					
	Rosslyn 2	1969	1	0	1				17				
	Clareview	1979	1	2	3	12	*30*	*30*					
	Papaschase 1	1976/82	2	0	2	20	20						
Secondary	Castledowns	1979	1	2	3			*20*	*19*	*18*			
	Rosslyn 3	1963	3**	0	3	2	4				*12*	*19*	*25*
	Londonderry	1974/79	1	2	3	*2*	*2*	*6*	*6*	*15*			
	Ormsby, Lewis Estates	1969	0	3	3	*16*	*16*	16					
	Parkland Booster***	1973	3	2	5		4			12	19	25	
	Big Lake Booster	2016	0	5	5	15	*15*	*21*					
	Terwillegar Booster	1998	2	1	3	17	17	*17*					
	Kaskitayo	1980	3	2	5	*7*	7	*21*	7	19			
	Mill Woods	1977	3	2	6	16	16	30	25	16	15		
	Papaschase 2	1968/71	2	1	3			*14*	21	21			
Teriary	Burnewood Booster	1985	2	2	4	11	14	*14*	*14*				
	Ellerslie Booster	2007	0	2	2	*6*	*6*						
	Laurel Booster	2018	0	2	2	*1*	*1*						
	Blackmud Creek Booster	1982	0	3	3		*17*	*35*	*22*				
	Discovery Park	2020	0	5	5	*1*	*3*	*3*	*11*	*11*			
Quat	Walker Booster	2015	0	5	5	*2*	*2*	*7*	*7*	*16*			
	TOTAL		**36**	**42**	**78**								

*Ormsby Pump #3 can be used to support Primary Pressure Zone or West Secondary Pressure Zone depending on the discharge header valve configuation. The totals include this pump once.

**Updated capacities to best efficiency flows as per pump curves.

***Parkland Pump #1 was decommissioned in Q2 of 2024.

(End of Section)

2.6 Production Summary

Water Production	2024	2023	2022
Treated and Pumped into the System	142,262	140,752	136,309
Water Treated at Rossdale Plants	55,324	52,297	54,690
Water Treated at E. L. Smith Plant	86,938	88,455	81,619
Supplied to Residential Customers	71,649	66,655	66,096
Supplied to Commercial/Industrial Customers	24,494	27,203	24,581
Supplied to Suburban Customers	37,245	37,252	36,254
Supplied to Customers via Truck Fill & Hydrants	640		
Percentage Accounted for from:			
Metered & Bulk Sources	94%	94%	94%
Assumed System Leakage	6%	6%	6%
Average Day Pumpage (ML)	389	386	373
Peak Day Demand (ML)	567	545	513

Population Served	2024	2023	2022
Approximate Population Served (City)	1,179,700	1,140,300	1,087,172
Approximate Population Served (Region)	370,000	365,000	360,000
Approximate Population Served (Total)	1,549,700	1,505,300	1,447,172

Per Capita Consumption (L/cap)	2024	2023	2022
Average Day Demand	251	256	258
Peak Day Demand	366	362	354

(End of Section)

2.7 Raw Water Intake (ML)

2024

Month	Rossdale									E.L. Smith				Plants Combined Total
	Plant 1				Plant 2				Plant Total	Min	Max	Avg	Plant Total	
	Min	Max	Avg	Total	Min	Max	Avg	Total						
January	0.0	53	3.6	111	128	163	149	4,629	4,740	55	304	270	8,370	13,110
February	0.0	80	15	443	25	150	129	3,734	4,177	183	331	273	7,920	12,096
March	0.0	60	19	589	101	150	137	4,254	4,843	146	311	275	8,526	13,368
April	52	69	58	1,749	100	125	113	3,385	5,134	141	300	264	7,925	13,059
May	0.0	80	45	1,394	15	170	118	3,650	5,044	126	320	279	8,650	13,694
June	60	95	69	2,061	85	125	111	3,336	5,397	226	314	285	8,562	13,959
July	60	98	80	2,486	97	182	141	4,362	6,848	248	360	312	9,674	16,521
August	54	95	70	2,183	88	155	117	3,630	5,813	241	321	285	8,844	14,658
September	59	100	76	2,213	0.0	120	99	2,964	5,177	159	320	285	8,547	13,724
October	0.0	59	34	1,067	0.0	170	117	3,624	4,691	126	321	286	8,877	13,568
November	0.0	0.0	0.0	0.0	130	171	157	4,540	4,540	65	321	285	8,556	13,096
December	0.0	140	66	2,057	0.0	160	81	2,502	4,559	251	321	277	8,573	13,132
Annual Total				16,352				44,610	60,961				103,023	163,985
Annual Min/Max/Avg	0.0	140	45		0.0	182	122			55	360	281		

2.8 Treated Water Production (ML)

2024

Month	Rossdale (Plant 1 & Plant 2)				E.L. Smith				Plants Combined	
	Flow Meters				Flow Meters				Avg	Total
	Min	Max	Avg	Total	Min	Max	Avg	Total		
January	18	223	136	4,227	0.0	303	218	6,762	354	10,989
February	0.0	211	129	3,751	0.0	306	235	6,828	365	10,579
March	31	210	138	4,282	0.0	347	229	7,100	367	11,381
April	0.0	212	154	4,610	0.0	318	218	6,550	372	11,160
May	0.0	210	146	4,521	0.0	329	235	7,297	381	11,818
June	8.9	298	167	5,001	0.0	300	244	7,320	411	12,321
July	55	312	207	6,425	0.0	362	267	8,286	475	14,711
August	0.0	306	175	5,440	165	300	247	7,659	423	13,099
September	0.0	249	160	4,815	0.0	303	248	7,441	409	12,255
October	0.0	210	134	4,155	0.0	301	240	7,437	374	11,592
November	16	206	134	4,022	0.0	343	234	7,008	368	11,030
December	4.2	209	131	4,074	0.0	297	234	7,253	365	11,327
Annual Total				55,323				86,939		142,262
Annual Min/Max/Avg	0.0	312	151		0.0	362	238		389	

NOTES: ' -- ' indicates plant offline

3.1 Raw Water Quality - North Saskatchewan River

2024

Month	Rossdale									E.L. Smith								
	Turbidity (NTU)			pH			Colour (TCU)			Turbidity (NTU)			pH			Colour (TCU)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	1.5	12	2.5	8.0	8.2	8.1	4.9	14.2	8.7	1.4	4.3	2.2	7.9	8.2	8.1	5.1	14.5	9.3
February	1.3	4.8	2.0	8.0	8.1	8.0	5.5	9.8	7.5	1.1	4.8	2.0	7.9	8.1	8.0	5.8	10.7	8.0
March	1.2	14	3.9	7.8	8.2	8.0	4.6	44.8	13.4	1.2	8.6	2.7	7.8	8.1	8.0	4.5	45.4	13.7
April	2.2	400	26	8.0	8.3	8.1	4.1	14.2	7.6	2.3	290	23	7.9	8.3	8.1	5.0	14.1	7.9
May	9.0	150	31	7.9	8.3	8.2	5.9	30.4	16.5	8.6	110	30	8.1	8.4	8.3	6.1	32.8	17.3
June	3.7	32	12	8.3	8.5	8.4	6.3	21.3	10.8	4.7	40	11	8.3	8.5	8.4	6.1	21.4	10.9
July	3.9	240	29	8.0	8.5	8.4	4.2	15.0	7.9	3.6	280	32	8.1	8.5	8.4	4.6	15.8	8.0
August	2.2	55	12	8.3	8.7	8.4	3.5	17.1	7.8	2.9	50	12	8.3	8.5	8.4	3.2	18.0	8.1
September	1.7	26	6.0	8.1	8.5	8.4	3.5	25.0	7.0	2.0	31	7.3	8.3	8.6	8.4	3.4	26.2	7.2
October	1.5	4.0	2.0	8.0	8.4	8.3	2.4	4.8	3.4	1.7	6.4	2.6	8.2	8.5	8.3	2.5	5.5	3.6
November	1.8	100	3.7	8.0	8.3	8.2	2.3	4.9	3.2	1.9	130	5.7	8.1	8.4	8.2	2.1	6.7	3.4
December	1.9	60	3.9	8.0	8.2	8.1	1.8	5.7	3.1	1.6	36	2.7	7.9	8.2	8.1	2.3	6.0	3.2
Annual Min/Max/Avg	1.2	400	11	7.8	8.7	8.2	1.8	44.8	8.1	1.1	290	11	7.8	8.6	8.2	2.1	45.4	8.4

NOTES: ' -- ' indicates plant offline

3.2 Treated Water Quality Entering the Distribution System

2024

Month	Rossdale													
	Turbidity (NTU)			Chloramine Residual (mg/L)			pH			Fluoride Residual (mg/L)			Total Hardness (mg/L as $CaCO_3$)	Colour (TCU)
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg	Avg
January	0.04	0.09	0.05	1.90	2.38	2.17	7.6	8.0	7.8	0.67	0.76	0.71	163	1.0
February	0.04	0.09	0.04	1.90	2.20	2.08	7.6	7.9	7.7	0.66	0.78	0.72	184	0.5
March	0.01	0.07	0.04	1.80	2.28	2.09	7.7	7.9	7.8	0.68	0.74	0.71	176	0.6
April	0.02	0.07	0.04	1.80	2.28	2.06	7.7	8.0	7.8	0.63	0.73	0.69	161	0.6
May	0.02	0.09	0.04	1.80	2.27	2.04	7.6	7.9	7.8	0.62	0.73	0.69	167	0.9
June	0.03	0.08	0.04	2.00	2.36	2.19	7.6	7.9	7.7	0.65	0.72	0.68	181	0.7
July	0.02	0.07	0.04	2.10	2.36	2.23	7.6	7.9	7.8	0.63	0.70	0.67	183	0.6
August	0.02	0.05	0.03	2.00	2.36	2.20	7.7	8.1	7.8	0.63	0.74	0.67	172	0.5
September	0.03	0.06	0.04	2.00	2.42	2.22	7.6	8.0	7.8	0.62	0.67	0.65	178	0.4
October	0.03	0.09	0.04	1.80	2.32	2.13	7.8	8.3	8.0	0.64	0.80	0.71	176	0.4
November	0.04	0.07	0.05	1.80	2.32	2.08	7.8	8.2	8.1	0.61	0.77	0.72	174	0.5
December	0.03	0.08	0.04	1.80	2.46	2.09	7.8	8.2	8.0	0.69	0.79	0.75	178	0.6
Annual Min/Max/ Avg	0.01	0.09	0.04	1.80	2.46	2.13	7.6	8.3	7.9	0.61	0.80	0.70	174	0.6

Month	E.L. Smith													
	Turbidity (NTU)			Chloramine Residual (mg/L)			pH			Fluoride Residual (mg/L)			Total Hardness (mg/L as $CaCO_3$)	Colour (TCU)
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Avg	Avg
January	0.02	0.08	0.06	1.91	2.18	2.03	7.4	8.2	7.7	0.64	0.76	0.71	167	1.2
February	0.05	0.07	0.06	1.91	2.14	2.04	7.5	7.9	7.7	0.64	0.81	0.73	183	1.0
March	0.05	0.07	0.06	1.88	2.11	1.98	7.4	7.9	7.7	0.64	0.80	0.74	178	0.8
April	0.05	0.07	0.05	1.88	2.12	1.98	7.6	8.0	7.8	0.64	0.80	0.75	160	0.7
May	0.05	0.08	0.06	1.83	2.20	1.96	7.6	8.0	7.8	0.61	0.79	0.70	167	1.1
June	0.06	0.09	0.06	1.98	2.22	2.13	7.7	7.9	7.8	0.62	0.79	0.75	182	1.2
July	0.05	0.10	0.06	1.98	2.31	2.11	7.5	8.0	7.7	0.64	0.80	0.72	182	1.0
August	0.05	0.07	0.06	1.99	2.30	2.12	7.5	7.9	7.7	0.68	0.80	0.76	172	0.9
September	0.06	0.08	0.06	1.88	2.29	2.15	7.5	7.6	7.6	0.71	0.77	0.75	177	0.8
October	0.06	0.09	0.07	1.84	2.28	2.05	7.5	7.9	7.7	0.60	0.80	0.75	175	0.6
November	0.07	0.09	0.08	1.88	2.14	2.01	7.8	8.1	7.9	0.72	0.79	0.74	177	0.7
December	0.06	0.09	0.06	1.88	2.08	1.97	7.6	8.2	7.9	0.69	0.73	0.71	177	0.7
Annual Min/Max/ Avg	0.02	0.10	0.06	1.83	2.31	2.04	7.4	8.2	7.8	0.60	0.81	0.73	175	0.9

NOTES: ' -- ' indicates plant offline

3.3 Rossdale Filters 1 - 9 Particle Counts (no./mL >2um)

2024

Filter	1			2			3			4			5			6			7			8			9		
Month	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	1	45	4	1	45	5	1	45	3	1	45	5	1	46	5	1	45	4	1	46	6	1	44	6	1	44	5
February	1	42	3	1	40	5	1	44	2	1	45	5	1	24	2	1	21	2	1	46	3	1	44	3	1	45	3
March	1	37	2	1	41	4	1	45	2	1	45	4	1	45	4	1	34	3	1	44	4	1	44	4	1	43	3
April	1	25	4	1	27	3	1	26	3	1	28	4	1	34	6	1	25	4	1	31	4	1	35	6	1	26	4
May	1	22	4	1	20	4	1	26	4	1	29	5	1	27	8	1	30	5	1	41	8	1	35	7	1	31	5
June	1	24	3	1	37	3	1	34	3	1	24	3	1	22	4	1	22	4	1	30	4	1	31	4	1	16	4
July	1	15	3	1	15	2	1	45	2	1	40	3	1	40	4	1	24	4	1	30	4	1	20	3	1	23	3
August	1	40	6	1	23	4	1	21	4	1	28	6	1	36	7	1	34	6	1	30	6	1	23	6	1	45	6
September	1	24	3	1	34	2	1	25	3	1	44	4	1	39	4	1	34	3	1	24	3	1	22	3	1	32	2
October	1	38	6	1	19	4	1	45	4	1	45	5	1	28	6	1	43	5	1	29	5	1	34	5	1	43	4
November	1	39	7	1	28	6	1	44	7	1	40	8	1	43	10	1	32	8	1	34	8	1	38	8	1	42	8
December	1	40	5	1	27	4	1	23	5	1	26	5	1	32	7	1	45	4	1	36	5	1	40	5	1	45	5
Annual Min/Max/Avg	1	45	4	1	45	4	1	45	3	1	45	5	1	46	6	1	45	4	1	46	5	1	44	5	1	45	4

NOTE: ' -- ' indicates filter offline

3.4 E.L. Smith Filters 1 - 9 Particle Counts (no./mL >2um)

2024

Filter	1			2			3			4			5			6			7			8			9		
Month	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
January	1	45	3	1	41	3	1	44	4	1	43	3	--	--	--	1	47	6	1	46	5	1	44	4	1	44	4
February	1	45	3	1	42	3	1	33	3	1	39	3	--	--	--	1	45	9	1	32	5	1	33	4	1	37	4
March	1	45	4	1	45	3	1	45	4	1	44	3	--	--	--	1	45	6	1	35	6	1	34	4	1	38	4
April	1	45	4	1	43	4	1	43	5	1	37	4	--	--	--	1	39	6	1	41	7	1	35	6	1	36	5
May	1	41	6	1	43	6	1	42	6	1	32	5	--	--	--	1	29	6	1	37	8	1	34	7	1	36	6
June	1	35	7	1	41	7	1	36	6	1	34	6	--	--	--	1	34	6	1	26	5	1	33	8	1	42	9
July	1	31	5	1	44	4	1	23	4	1	33	4	1	45	6	1	34	5	--	--	--	1	38	8	1	44	6
August	1	39	10	1	44	9	1	38	9	1	35	9	1	29	10	1	33	8	2	41	13	2	44	13	2	40	10
September	1	34	8	1	34	7	1	36	7	1	25	6	1	40	8	1	34	7	3	36	10	1	34	10	1	28	8
October	1	32	6	1	37	5	1	41	5	1	29	5	1	40	6	1	32	6	1	37	8	1	32	7	1	35	8
November	1	42	7	1	43	7	1	29	6	1	36	6	1	43	7	1	33	7	1	31	8	1	41	8	1	43	8
December	1	23	4	1	27	4	1	32	4	1	24	4	1	40	4	1	42	5	1	33	6	1	41	5	1	45	5
Annual Min/Max/Avg	1	45	6	1	45	5	1	45	5	1	44	5	1	45	7	1	47	6	1	46	8	1	44	7	1	45	6

NOTE: ' -- ' indicates filter offline

3.5 E.L. Smith Filters 10 - 18 Particle Counts (no./mL >2um)

2024

Filter	10			11			12			13			14			15			16			17			18		
Month	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
January	1	45	5	1	44	3	1	45	6	1	45	3	3	45	17	4	45	18	1	44	4	1	45	4	1	45	4
February	1	31	4	1	42	3	1	30	4	1	35	4	1	39	13	1	41	11	1	37	4	1	27	4	1	34	4
March	1	31	3	1	37	4	1	34	3	1	36	3	1	27	5	1	30	4	1	29	4	1	32	3	1	29	4
April	1	43	5	1	35	5	1	33	5	1	33	5	1	33	7	1	39	5	1	35	5	1	35	4	1	38	5
May	1	31	5	1	32	5	1	34	6	1	36	6	1	44	8	1	44	6	1	29	5	1	27	5	1	45	6
June	1	32	8	1	35	8	1	43	8	1	42	8	1	45	8	1	34	7	1	35	7	1	27	7	1	35	7
July	1	44	6	1	37	7	1	39	7	1	45	7	1	37	8	1	36	6	1	45	6	1	39	6	1	43	6
August	2	36	12	2	45	12	2	35	12	2	40	11	1	44	12	1	30	10	2	39	10	2	44	12	2	45	11
September	2	35	9	2	34	10	1	35	10	1	42	9	1	39	10	2	30	9	1	34	8	1	31	8	2	43	9
October	1	32	6	1	33	7	1	32	8	1	36	7	1	37	9	1	40	7	1	34	7	1	26	6	1	33	6
November	1	30	6	1	32	7	1	30	8	1	30	7	1	45	8	1	44	8	1	44	8	1	23	7	1	42	6
December	1	45	4	1	35	4	1	44	6	1	45	4	1	45	5	1	45	4	1	45	4	1	41	5	1	45	4
Annual Min/Max/Avg	1	45	6	1	45	6	1	45	7	1	45	6	1	45	9	1	45	8	1	45	6	1	45	6	1	45	6

NOTES: ' -- ' indicates filter offline

3.6 Rossdale Filters 1 - 9 Turbidity (NTU)

2024

Filter	1			2			3			4			5			6			7			8			9		
Month	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
January	0.02	0.09	0.03	0.02	0.09	0.04	0.01	0.07	0.02	0.01	0.08	0.02	0.02	0.08	0.03	0.01	0.08	0.02	0.02	0.08	0.04	0.02	0.08	0.03	0.02	0.09	0.03
February	0.02	0.08	0.02	0.02	0.07	0.03	0.01	0.05	0.01	0.01	0.08	0.02	0.02	0.07	0.03	0.01	0.06	0.02	0.02	0.08	0.03	0.02	0.07	0.02	0.02	0.06	0.02
March	0.02	0.08	0.02	0.02	0.07	0.03	0.01	0.08	0.02	0.01	0.07	0.02	0.02	0.07	0.03	0.01	0.06	0.02	0.02	0.06	0.03	0.01	0.08	0.02	0.01	0.08	0.02
April	0.02	0.07	0.02	0.02	0.07	0.03	0.01	0.08	0.02	0.01	0.06	0.02	0.02	0.08	0.03	0.01	0.06	0.02	0.02	0.07	0.03	0.01	0.08	0.02	0.01	0.05	0.02
May	0.02	0.08	0.03	0.02	0.07	0.03	0.01	0.07	0.02	0.01	0.08	0.02	0.02	0.09	0.03	0.01	0.08	0.02	0.02	0.08	0.03	0.02	0.08	0.03	0.02	0.08	0.03
June	0.02	0.07	0.02	0.02	0.06	0.03	0.01	0.05	0.02	0.01	0.07	0.02	0.02	0.07	0.03	0.01	0.08	0.02	0.02	0.07	0.03	0.02	0.08	0.02	0.02	0.07	0.02
July	0.01	0.07	0.02	0.02	0.06	0.03	0.01	0.06	0.01	0.01	0.08	0.01	0.02	0.07	0.03	0.01	0.06	0.02	0.02	0.08	0.03	0.02	0.06	0.02	0.01	0.08	0.02
August	0.01	0.07	0.02	0.02	0.07	0.03	0.01	0.07	0.02	0.01	0.07	0.02	0.01	0.08	0.03	0.01	0.07	0.01	0.02	0.07	0.03	0.02	0.06	0.02	0.01	0.07	0.02
September	0.01	0.06	0.02	0.02	0.05	0.03	0.01	0.06	0.01	0.00	0.05	0.01	0.02	0.06	0.03	0.01	0.05	0.01	0.02	0.06	0.03	0.01	0.05	0.02	0.01	0.06	0.02
October	0.01	0.08	0.03	0.02	0.08	0.03	0.01	0.08	0.02	0.01	0.08	0.02	0.02	0.09	0.03	0.00	0.09	0.02	0.02	0.09	0.03	0.01	0.09	0.03	0.01	0.09	0.02
November	0.01	0.09	0.03	0.02	0.08	0.04	0.01	0.08	0.03	0.01	0.09	0.03	0.02	0.08	0.04	0.01	0.09	0.03	0.02	0.09	0.04	0.02	0.09	0.03	0.02	0.09	0.03
December	0.02	0.10	0.03	0.02	0.10	0.03	0.01	0.09	0.02	0.01	0.09	0.02	0.02	0.09	0.03	0.01	0.09	0.02	0.02	0.08	0.03	0.01	0.08	0.03	0.01	0.09	0.03
Annual Min/Max/Avg	0.01	0.10	0.03	0.02	0.10	0.03	0.01	0.09	0.02	0.00	0.09	0.02	0.01	0.09	0.03	0.00	0.09	0.02	0.02	0.09	0.03	0.01	0.09	0.02	0.01	0.09	0.02

NOTES: ' -- ' indicates filter offline

3.7 E.L. Smith Filters 1 - 9 Turbidity (NTU)

2024

Filter	1			2			3			4			5			6			7			8			9		
Month	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
January	0.01	0.09	0.02	0.01	0.08	0.01	0.01	0.07	0.01	0.00	0.08	0.03	--	--	--	0.02	0.09	0.04	0.01	0.09	0.01	0.01	0.09	0.03	0.01	0.09	0.01
February	0.01	0.05	0.02	0.02	0.07	0.03	0.01	0.05	0.01	0.00	0.09	0.03	--	--	--	0.02	0.09	0.03	0.01	0.06	0.01	0.01	0.07	0.03	0.01	0.08	0.01
March	0.01	0.06	0.02	0.02	0.08	0.03	0.00	0.06	0.01	0.02	0.06	0.03	--	--	--	0.03	0.08	0.04	0.01	0.06	0.01	0.01	0.08	0.02	0.01	0.07	0.01
April	0.01	0.08	0.02	0.02	0.08	0.03	0.00	0.07	0.01	0.02	0.08	0.03	--	--	--	0.02	0.08	0.03	0.01	0.07	0.01	0.01	0.08	0.03	0.01	0.07	0.01
May	0.01	0.08	0.02	0.03	0.08	0.04	0.01	0.07	0.01	0.01	0.08	0.03	--	--	--	0.03	0.08	0.04	0.01	0.08	0.01	0.01	0.08	0.03	0.01	0.08	0.01
June	0.01	0.07	0.02	0.02	0.08	0.03	0.01	0.06	0.01	0.02	0.08	0.03	--	--	--	0.03	0.08	0.03	0.00	0.06	0.01	0.02	0.07	0.03	0.01	0.06	0.01
July	0.01	0.08	0.02	0.02	0.07	0.03	0.00	0.07	0.01	0.01	0.08	0.03	0.00	0.08	0.01	0.02	0.08	0.03	--	--	--	0.02	0.08	0.03	0.01	0.08	0.01
August	0.01	0.06	0.02	0.02	0.08	0.03	0.00	0.07	0.01	0.01	0.07	0.03	0.00	0.06	0.01	0.02	0.08	0.03	0.00	0.06	0.01	0.02	0.07	0.03	0.01	0.06	0.01
September	0.01	0.05	0.02	0.02	0.08	0.03	0.00	0.06	0.01	0.01	0.07	0.03	0.00	0.05	0.01	0.02	0.08	0.03	0.01	0.06	0.01	0.02	0.08	0.03	0.01	0.05	0.01
October	0.01	0.08	0.02	0.02	0.09	0.03	0.00	0.08	0.01	0.02	0.09	0.03	0.00	0.08	0.01	0.02	0.09	0.03	0.01	0.09	0.01	0.02	0.09	0.03	0.01	0.09	0.01
November	0.01	0.09	0.02	0.02	0.09	0.03	0.00	0.08	0.01	0.01	0.08	0.03	0.00	0.08	0.01	0.02	0.09	0.04	0.01	0.09	0.01	0.02	0.09	0.03	0.01	0.09	0.02
December	0.01	0.06	0.01	0.02	0.08	0.03	0.00	0.06	0.01	0.01	0.08	0.03	0.00	0.08	0.01	0.02	0.09	0.03	0.01	0.07	0.01	0.02	0.09	0.03	0.01	0.08	0.01
Annual Min/Max/Avg	0.01	0.09	0.02	0.01	0.09	0.03	0.00	0.08	0.01	0.01	0.09	0.03	0.00	0.08	0.01	0.02	0.09	0.03	0.01	0.09	0.01	0.01	0.09	0.03	0.01	0.09	0.01

NOTES: ' -- ' indicates filter offline

3.8 E.L. Smith Filters 10 - 18 Turbidity (NTU)

2024

Filter	10			11			12			13			14			15			16			17			18		
Month	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	0.02	0.09	0.04	0.01	0.09	0.01	0.00	0.09	0.02	0.02	0.08	0.03	0.03	0.09	0.04	0.03	0.09	0.04	0.03	0.09	0.04	0.03	0.09	0.04	0.02	0.09	0.04
February	0.02	0.07	0.03	0.01	0.08	0.01	0.01	0.06	0.01	0.03	0.07	0.03	0.04	0.09	0.05	0.03	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.04	0.08	0.04
March	0.02	0.08	0.03	0.01	0.08	0.01	0.00	0.07	0.01	0.02	0.08	0.03	0.02	0.09	0.05	0.03	0.09	0.04	0.03	0.09	0.04	0.03	0.09	0.04	0.04	0.09	0.05
April	0.02	0.08	0.03	0.01	0.08	0.01	0.00	0.08	0.01	0.03	0.07	0.03	0.04	0.08	0.05	0.03	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.04	0.08	0.05
May	0.02	0.08	0.03	0.01	0.08	0.01	0.00	0.08	0.01	0.03	0.08	0.03	0.03	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.02	0.08	0.03
June	0.02	0.08	0.03	0.01	0.07	0.01	0.01	0.07	0.02	0.03	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.05	0.03	0.08	0.04	0.04	0.08	0.04	0.02	0.07	0.03
July	0.02	0.08	0.03	0.01	0.08	0.01	0.01	0.07	0.02	0.03	0.08	0.04	0.03	0.08	0.04	0.02	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.02	0.08	0.03
August	0.02	0.08	0.03	0.01	0.08	0.01	0.01	0.08	0.02	0.03	0.08	0.04	0.03	0.08	0.04	0.04	0.08	0.05	0.03	0.08	0.04	0.03	0.08	0.04	0.02	0.07	0.03
September	0.02	0.07	0.03	0.01	0.06	0.01	0.00	0.06	0.01	0.03	0.07	0.04	0.03	0.08	0.04	0.04	0.08	0.04	0.03	0.08	0.04	0.03	0.08	0.04	0.02	0.07	0.03
October	0.02	0.09	0.03	0.01	0.09	0.01	0.00	0.09	0.02	0.03	0.09	0.04	0.03	0.09	0.04	0.04	0.09	0.04	0.03	0.09	0.04	0.03	0.09	0.04	0.02	0.08	0.03
November	0.02	0.10	0.04	0.01	0.09	0.01	0.00	0.09	0.02	0.03	0.09	0.04	0.03	0.09	0.04	0.04	0.09	0.05	0.03	0.09	0.04	0.03	0.09	0.04	0.02	0.08	0.03
December	0.02	0.09	0.03	0.01	0.09	0.01	0.00	0.08	0.01	0.03	0.08	0.03	0.03	0.08	0.04	0.04	0.09	0.04	0.03	0.09	0.04	0.02	0.10	0.04	0.02	0.08	0.03
Annual Min/Max/Avg	0.02	0.10	0.03	0.01	0.09	0.01	0.00	0.09	0.02	0.02	0.09	0.03	0.02	0.09	0.04	0.02	0.09	0.04	0.03	0.09	0.04	0.02	0.10	0.04	0.02	0.09	0.04

NOTES: ' -- ' indicates filter offline

3.9 Combined Filter Effluent Water Quality

2024

Month	Rossdale						E.L. Smith					
	Particle Counts (no./mL,>2um)			Turbidity (NTU)			Particle Counts (no./mL,>2um)			Turbidity (NTU)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	1	20	4	0.01	0.10	0.05	1	42	5	0.01	0.10	0.03
February	1	19	2	0.04	0.10	0.05	1	26	5	0.01	0.04	0.03
March	1	17	2	0.02	0.08	0.04	1	12	4	0.02	0.05	0.03
April	1	15	4	0.01	0.09	0.04	1	28	5	0.02	0.05	0.03
May	1	20	5	0.03	0.10	0.06	1	21	6	0.02	0.04	0.03
June	1	22	3	0.03	0.10	0.06	1	41	7	0.01	0.04	0.03
July	1	18	3	0.01	0.10	0.06	1	16	6	0.01	0.05	0.03
August	1	23	6	0.04	0.08	0.05	5	23	10	0.02	0.03	0.03
September	1	25	3	0.04	0.06	0.04	1	19	8	0.01	0.04	0.02
October	1	19	4	0.04	0.08	0.04	1	23	6	0.01	0.05	0.03
November	1	19	7	0.01	0.09	0.05	1	14	7	0.02	0.07	0.03
December	1	20	5	0.04	0.08	0.05	1	33	5	0.02	0.03	0.02
Annual Min/Max/Avg	1	25	4	0.01	0.10	0.05	1	42	6	0.01	0.10	0.03

NOTES: ' -- ' indicates plant offline

3.10 Rossdale UV Disinfection - Filters 1 - 3

2024

Filter	1						2						3						Transmittance (%)		
Month	Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)					
	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg
January	34.0	51.6	37.6	10.4	27.8	481.1	34.5	52.2	37.1	10.2	28.7	504.1	34.2	70.4	36.9	11.2	30.2	468.0	91.1	94.8	93.4
February	33.8	54.5	38.8	12.6	30.2	442.7	34.3	83.7	38.3	11.9	31.3	447.2	33.0	88.5	38.1	11.6	30.2	410.4	93.4	95.8	94.6
March	34.2	59.5	41.3	14.7	27.8	489.0	35.1	104.5	40.6	14.0	28.5	506.0	34.7	64.3	40.9	14.0	27.0	480.0	93.0	97.1	95.0
April	33.5	65.2	40.7	12.0	33.5	547.7	34.5	152.8	45.2	15.8	33.1	469.8	34.5	60.6	39.2	13.8	30.0	504.8	93.4	97.6	95.4
May	33.9	49.5	35.6	15.4	32.9	545.8	34.4	73.3	36.3	10.9	36.7	572.8	34.2	63.6	35.6	10.4	31.3	501.4	87.7	95.2	92.0
June	34.3	51.4	35.6	12.1	33.6	502.9	34.6	56.5	36.1	14.5	33.7	556.6	34.3	59.2	35.6	11.2	32.2	557.8	87.8	94.6	92.8
July	34.2	36.7	35.6	21.0	37.6	642.1	34.2	51.6	35.9	15.2	38.0	782.1	33.6	51.0	35.5	11.7	35.0	723.6	91.8	95.4	94.0
August	34.2	51.1	35.8	13.1	35.3	654.3	34.7	82.2	38.6	12.4	37.0	574.0	33.8	68.5	35.6	12.4	36.2	593.6	92.0	96.0	94.3
September	33.1	110.8	38.2	11.9	34.4	490.8	34.6	124.7	38.8	12.2	37.0	590.6	33.7	101.2	36.8	12.5	32.6	494.6	90.5	96.5	94.7
October	32.0	88.6	45.3	10.7	32.8	398.8	35.0	128.4	46.9	10.8	34.7	386.3	33.7	80.9	45.1	10.2	30.3	397.5	93.4	96.9	92.7
November	34.0	99.0	43.5	10.1	32.2	409.5	34.8	122.0	44.7	9.8	34.5	461.6	34.0	101.4	42.0	10.1	32.9	406.2	91.0	96.8	91.9
December	33.7	70.2	43.1	10.3	32.1	487.9	33.7	80.9	44.9	11.5	31.7	468.8	33.9	95.1	42.2	9.5	31.4	455.5	91.7	97.6	92.3
Annual Total						6093						6320						5994			
Annual Min/Max/ Avg	32.0	110.8	39.2	10.1	37.6		33.7	152.8	40.1	9.8	38.0		33.0	101.4	38.6	9.5	36.2		87.7	97.6	93.6

NOTES: - Each filter has a UV reactor

- Transmittance (%) is a grab sample of the filter effluent prior to the UV reactor of a random online filter

' -- ' indicates filter and UV reactor offline

3.11 Rossdale UV Disinfection - Filters 4 - 6

2024

Filter	4						5						6						Transmittance (%)		
Month	Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)					
	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg
January	34.3	94.3	40.4	11.3	27.9	469.8	33.9	59.5	38.0	11.1	28.1	483.1	34.1	59.0	36.3	10.7	30.5	507.6	91.1	94.8	93.4
February	35.1	88.0	44.0	11.6	30.4	435.1	33.6	58.4	40.4	11.5	27.6	386.3	33.9	56.2	37.6	11.9	31.1	418.8	93.4	95.8	94.6
March	34.8	75.9	46.9	12.8	26.4	494.1	34.9	103.2	42.3	12.7	27.7	453.4	33.9	59.0	38.7	12.0	32.7	523.1	93.0	97.1	95.0
April	35.0	69.2	45.6	11.0	32.4	479.9	34.8	69.1	41.7	10.9	29.5	521.5	34.6	60.4	38.2	10.8	33.7	513.7	93.4	97.6	95.4
May	34.3	51.6	35.9	14.4	34.6	544.9	32.0	40.9	35.7	14.5	32.9	325.0	34.6	55.2	35.5	10.7	35.1	561.8	87.7	95.2	92.0
June	34.3	51.9	35.8	13.9	32.2	538.6	34.8	46.9	35.6	13.4	31.5	523.6	34.0	42.6	35.6	14.2	35.8	590.6	87.8	94.6	92.8
July	34.0	44.9	35.7	11.1	36.7	707.9	34.1	55.1	35.6	12.6	34.4	698.9	33.8	55.8	35.6	13.6	36.9	751.5	91.8	95.4	94.0
August	34.2	56.8	36.9	15.8	35.3	582.3	33.5	49.7	36.0	13.2	34.8	614.3	33.8	45.3	35.7	14.0	37.3	631.5	92.0	96.0	94.3
September	34.4	123.4	39.4	10.6	34.0	502.8	34.5	57.4	38.4	14.0	33.4	469.1	34.7	73.9	36.5	10.1	36.7	559.3	90.5	96.5	94.7
October	35.0	100.1	47.1	10.2	33.5	645.7	34.9	90.2	45.7	10.2	32.9	392.1	33.7	87.7	42.5	10.9	34.2	480.2	93.4	96.9	92.7
November	33.5	129.9	45.5	10.1	30.4	574.4	32.5	100.4	43.8	10.0	29.0	388.3	33.6	118.7	41.5	10.6	33.7	486.1	91.0	96.8	91.9
December	34.0	84.1	46.8	10.4	31.9	501.2	31.3	97.4	46.7	10.4	30.8	373.0	34.5	87.7	45.3	10.6	35.2	489.0	91.7	97.6	92.3
Annual Total						6477						5629						6513			
Annual Min/Max/ Avg	33.5	129.9	41.7	10.1	36.7		31.3	103.2	40.1	10.0	34.8		33.6	118.7	38.3	10.1	37.3		87.7	97.6	93.6

NOTES: - Each filter has a UV reactor
- Transmittance (%) is a grab sample of the filter effluent prior to the UV reactor of a random online filter
' -- ' indicates filter and UV reactor offline

3.12 Rossdale UV Disinfection - Filters 7 - 9

2024

Filter	7						8						9						Transmittance (%)		
Month	Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)			Dosage (mJ/cm²)			Flow (MLD)					
	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg
January	33.7	55.6	36.2	10.1	32.7	532.3	33.9	61.5	35.7	12.7	33.0	495.9	34.4	71.1	35.9	11.4	31.7	557.0	91.1	94.8	93.4
February	33.3	62.3	37.3	11.1	30.1	465.8	34.1	48.2	36.6	12.0	30.2	497.2	34.1	51.4	36.6	11.7	31.4	482.7	93.4	95.8	94.6
March	32.9	57.3	37.9	13.5	30.3	518.5	34.4	51.1	38.4	13.7	33.6	543.6	33.9	53.2	38.6	12.6	30.3	472.9	93.0	97.1	95.0
April	33.7	57.1	36.9	11.8	36.3	591.3	31.6	89.9	37.0	11.0	33.8	579.4	34.6	58.8	37.3	15.1	36.3	577.7	93.4	97.6	95.4
May	32.1	44.4	35.6	10.6	36.0	482.7	34.8	45.1	35.6	12.5	36.7	603.0	33.8	81.9	35.6	12.0	35.6	608.9	87.7	95.2	92.0
June	33.5	40.5	35.6	17.9	36.0	629.4	33.8	42.5	35.6	14.7	35.4	621.0	33.7	50.2	35.6	14.7	36.5	678.9	87.8	94.6	92.8
July	33.5	37.4	35.6	20.4	41.6	797.4	34.4	54.0	35.6	12.9	40.3	775.6	34.2	43.5	35.6	16.5	38.1	758.6	91.8	95.4	94.0
August	34.0	43.1	35.6	13.6	38.1	619.4	32.7	53.6	35.6	13.8	38.0	707.2	34.0	50.5	35.6	11.6	37.5	673.5	92.0	96.0	94.3
September	33.0	113.7	36.2	13.3	37.1	626.5	33.5	55.0	35.7	11.2	37.2	628.6	33.8	68.1	35.8	12.4	39.7	639.2	90.5	96.5	94.7
October	33.4	86.4	40.8	10.9	37.5	507.4	34.4	82.0	38.1	10.4	39.0	515.5	33.0	77.8	38.6	10.5	39.2	728.7	93.4	96.9	92.7
November	33.0	73.0	39.5	10.2	33.1	486.0	33.5	110.9	41.4	10.8	34.6	495.6	33.9	91.5	39.1	10.1	35.5	637.1	91.0	96.8	91.9
December	33.2	60.4	38.5	10.2	33.2	489.1	34.9	81.1	43.7	10.1	35.9	521.2	33.5	103.2	40.9	9.3	35.6	536.7	91.7	97.6	92.3
Annual Total						6746						6984						7352			
Annual Min/Max/ Avg	32.1	113.7	37.1	10.1	41.6		31.6	110.9	37.5	10.1	40.3		33.0	103.2	37.1	9.3	39.7		87.7	97.6	93.6

NOTES: - Each filter has a UV reactor
- Transmittance (%) is a grab sample of the filter effluent prior to the UV reactor of a random online filter
' -- ' indicates filter and UV reactor offline

3.13 E.L. Smith UV Disinfection - UV Reactors 1 - 4

2024

Filter	1						2						3						4						Transmittance (%)		
Month	Dosage (mJ/cm^2)			Flow (MLD)			Dosage (mJ/cm^2)			Flow (MLD)			Dosage (mJ/cm^2)			Flow (MLD)			Dosage (mJ/cm^2)			Flow (MLD)					
	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg	Min	Max	Total	Min	Max	Avg
January	44.6	241.1	69.4	39.1	117.5	2,512.7	44.5	202.7	67.8	36.0	132.6	2,452.6	45.6	252.3	62.9	31.5	134.1	2,361.8	--	--	--	--	--	0.0	90.4	95.1	93.6
February	45.4	178.9	58.6	45.0	108.2	2,424.9	45.5	176.3	58.8	48.0	106.8	2,332.6	45.6	165.9	58.7	48.0	107.8	2,420.6	--	--	--	--	--	0.0	93.6	95.7	94.6
March	46.0	91.2	67.2	59.1	106.3	2,515.9	45.7	102.8	72.9	55.9	103.8	2,420.1	45.1	93.0	68.8	59.4	105.0	2,509.4	--	--	--	--	--	0.0	92.7	97.7	95.6
April	44.4	129.0	64.0	53.7	125.5	2,288.3	45.2	219.6	66.4	22.6	119.3	2,210.5	44.8	93.3	64.8	55.7	118.8	2,366.7	--	--	--	--	--	0.0	91.9	97.8	95.5
May	44.9	98.8	59.4	41.2	100.2	2,512.3	45.1	91.4	61.4	40.1	97.8	2,438.9	45.1	96.9	61.6	45.9	106.2	2,680.7	--	--	--	--	--	0.0	90.1	95.2	92.2
June	45.2	272.4	60.7	61.5	102.7	2,547.5	45.3	252.0	60.6	58.2	101.3	2,482.7	44.9	256.6	63.4	61.4	103.7	2,607.3	--	--	--	--	--	0.0	90.1	94.1	92.1
July	44.4	197.5	65.1	63.0	123.4	2,884.5	45.3	195.0	62.2	60.6	122.8	2,821.8	45.0	205.3	63.3	63.7	125.8	2,961.9	--	--	--	--	--	0.0	91.4	95.0	93.3
August	43.3	105.8	63.8	43.5	106.3	2,576.6	45.9	112.9	67.2	45.5	104.9	2,484.7	45.3	108.5	69.9	46.9	108.5	2,600.0	41.1	107.2	46.4	36.2	72.7	307.7	91.4	95.8	93.9
September	45.9	100.2	61.0	58.5	150.0	2,596.0	44.1	183.7	65.3	55.2	120.2	2,521.3	44.7	126.5	65.8	59.5	107.6	2,599.0	41.3	166.6	76.3	25.6	63.2	6.1	90.1	96.4	94.3
October	44.1	132.8	60.5	33.0	103.5	2,469.7	44.2	127.7	59.1	33.1	98.1	2,356.6	44.2	137.6	60.4	40.9	97.5	2,410.5	46.2	119.9	48.3	53.3	87.6	592.8	93.7	96.9	95.7
November	44.2	138.5	62.7	49.0	108.2	2,507.3	45.5	141.4	72.1	49.1	104.8	2,412.7	45.5	144.5	63.7	57.0	120.6	2,511.8	--	--	--	--	--	0.0	93.1	96.5	95.3
December	45.8	127.7	61.8	53.6	106.9	2,558.7	45.5	110.7	68.6	49.4	103.8	2,464.7	46.4	139.6	59.5	48.9	103.4	2,521.4	--	--	--	--	--	0.0	92.5	96.6	95.6
Annual Total						30,394						29,399						30,551						907			
Annual Min/Max/ Avg	43.3	272.4	62.9	33.0	150.0		44.1	252.0	65.2	22.6	132.6		44.2	256.6	63.6	31.5	134.1		41.1	166.6	50.5	25.6	87.6		90.1	97.8	94.3

NOTES: ' -- ' indicates UV reactor offline

- Transmittance (%) is a grab sample of the combined filter effluent prior to the UV reactor

3.14 Log Removal

2024

Month	Rossdale									E.L. Smith								
	Log Removal									Log Removal								
	Giardia			Virus			*Cryptosporidium*			*Giardia*			Virus			*Cryptosporidium*		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	7.6	8.7	8.1	12	18	14	6.5	7.0	6.8	6.7	7.4	7.0	5.9	15	7.6	6.5	7.0	6.8
February	7.8	9.2	8.3	12	16	14	7.0	7.0	7.0	7.1	7.3	7.2	6.4	9.1	7.8	7.0	7.0	7.0
March	7.8	8.7	8.2	13	17	14	7.0	7.0	7.0	7.1	7.3	7.2	6.6	9.9	7.9	7.0	7.0	7.0
April	7.8	8.7	8.0	12	21	15	7.0	7.0	7.0	7.1	7.3	7.2	6.8	14	8.4	7.0	7.0	7.0
May	8.4	11.0	9.5	17	29	22	7.0	7.0	7.0	7.0	7.5	7.3	9.1	19	13	6.8	7.0	7.0
June	9.5	11.3	10.4	23	39	31	6.3	7.0	7.0	7.1	7.7	7.5	13	29	19	6.5	7.0	7.0
July	8.0	12.3	11.0	10	51	39	6.9	7.0	7.0	7.4	8.0	7.7	17	40	27	7.0	7.0	7.0
August	8.4	11.9	10.6	16	44	36	6.3	7.0	7.0	7.4	7.8	7.6	16	34	24	6.9	7.0	7.0
September	9.0	11.7	10.2	21	37	29	6.9	7.0	7.0	7.3	7.7	7.5	13	27	19	7.0	7.0	7.0
October	7.4	10.2	8.5	14	26	19	6.5	7.0	6.8	6.6	7.4	7.0	6.6	18	11	6.5	7.0	6.7
November	6.9	8.2	7.6	5.5	17	14	6.3	6.5	6.5	6.6	6.8	6.7	4.9	10	7.4	6.5	6.5	6.5
December	7.2	9.1	7.7	11	16	13	6.4	6.5	6.5	6.3	6.8	6.7	5.3	10	7.5	6.1	6.5	6.5
Annual Min/Max/Avg	6.9	12.3	9.0	5.5	51	22	6.3	7.0	6.9	6.3	8.0	7.2	4.9	40	13	6.1	7.0	6.9

NOTES: ' -- ' indicates plant offline

4.1 Liquid Alum Chemical Consumption

2024

Month	Dosage (mg/L)			Consumption (kg)			
	Rossdale		E.L. Smith	Rossdale			E.L. Smith
	Plant 1	Plant 2		Plant 1	Plant 2	Plant Total	
January	20.0	23.2	28.1	6,222	230,059	236,281	492,032
February	25.1	25.8	29.0	22,922	198,802	221,724	472,974
March	49.8	39.7	41.8	60,032	344,238	404,270	721,801
April	34.8	34.8	38.7	125,164	241,963	367,128	626,351
May	57.2	57.7	71.9	168,692	443,809	612,501	1,284,250
June	42.0	42.0	42.0	172,716	290,536	463,251	741,134
July	33.1	33.1	34.6	168,129	289,780	457,909	686,095
August	33.3	33.3	33.1	149,624	247,052	396,676	610,762
September	31.2	31.3	29.8	145,811	191,106	336,917	527,881
October	18.7	15.2	13.9	42,264	105,546	147,810	248,387
November	--	6.50	6.54	--	60,901	60,901	115,429
December	5.12	5.40	5.70	22,030	28,264	50,294	101,294
Annual Total				1,083,606	2,672,055	3,755,662	6,628,391
Annual Avg	32.6	29.3	31.3				

NOTES : ' -- ' indicates plant offline
- Liquid alum consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 48.5%)

4.2 Primary Polymer (Praestol DW27AG) Chemical Consumption 2024

Month	Dosage (mg/L)			Consumption (kg)			
	Rossdale		E.L. Smith	Rossdale			E.L. Smith
	Plant 1	Plant 2		Plant 1	Plant 2	Plant Total	
January	0.24	0.21	0.19	37	1,010	1,046	936.12
February	0.38	0.39	0.17	166	1,477	1,643	1,325.55
March	0.36	0.38	0.20	211	1,638	1,848	1,729.59
April	0.27	0.27	0.17	473	919	1,392	1,305.68
May	0.33	0.34	0.19	483	1,261	1,744	1,638.01
June	0.31	0.31	0.16	632	1,048	1,680	1,348.60
July	0.24	0.24	0.16	595	1,038	1,633	1,532.75
August	0.25	0.25	0.15	540	895	1,436	1,355.70
September	0.26	0.26	0.14	588	781	1,370	1,202.26
October	0.21	0.18	0.11	233	613	846	511.14
November	--	0.10	--	--	455	455	--
December	0.10	0.10	--	211	250	461	--
Annual Total				4,169	11,385	15,554	12,885
Annual Avg	0.26	0.25	0.17				

NOTES: ' -- ' indicates plant offline
- Primary polymer consumption (kg) at 100% by weight mixed at the sites to required solution

4.3 Carbon Chemical Consumption

2024

Month	Dosage (mg/L)			Consumption (kg)			
	Rossdale		E.L. Smith	Rossdale			E.L. Smith
	Plant 1	Plant 2		Plant 1	Plant 2	Plant Total	
January	--	--	--	--	--	--	--
February	--	--	0.42	--	--	--	235
March	25.2	33.4	33.5	5,241	53,619	58,860	97,572
April	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--
June	--	--	1.20	--	--	--	334
July	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--
Annual Total				5,241	53,619	58,860	98,141
Annual Avg	25.2	33.4	26.5				

NOTES: ' -- ' indicates carbon not being used

4.4 Sodium Hypochlorite Chemical Consumption

2024

Month	Rossdale					E.L. Smith	
	Dosage (mg/L)		Consumption (kg)			Dosage (mg/L)	Consumption (kg)
	Plant 1	Plant 2	Plant 1	Plant 2	Plant Total		
January	1.80	3.02	35,325	1,744,952	1,780,277	3.22	3,544,250
February	3.00	2.94	165,807	1,401,673	1,567,480	3.19	3,318,927
March	2.73	3.11	214,897	1,657,721	1,872,618	3.43	3,825,376
April	2.65	2.63	579,197	1,115,815	1,695,012	3.16	3,298,042
May	2.58	2.73	493,068	1,302,391	1,795,459	3.51	3,989,260
June	3.34	3.27	858,219	1,362,747	2,220,966	3.95	4,451,674
July	3.02	2.98	939,671	1,629,756	2,569,428	4.11	5,246,464
August	2.90	2.84	792,524	1,288,534	2,081,059	3.80	4,426,658
September	2.93	2.79	816,210	1,032,136	1,848,345	3.67	4,130,703
October	2.73	2.71	364,835	1,232,496	1,597,332	3.08	3,588,670
November	--	2.73	--	1,550,119	1,550,119	2.96	3,336,724
December	2.57	2.61	659,150	833,494	1,492,644	3.07	3,466,256
Annual Total			5,918,904	16,151,834	22,070,739		46,623,005
Annual Avg	2.84	2.87				3.43	

NOTES: ' -- ' indicates plant offline

- Sodium hypochlorite consumption (kg) at 0.8% by weight (sodium hypochlorite generated onsite at a concentration of 0.8%)
- Plant 1 was converted to sodium hypochlorite from chlorine on Feb 2, 2015.
- Plant 2 was converted to sodium hypochlorite from chlorine on Feb 10, 2015.
- Plant Total Consumption is the combined addition of Plant 1, Plant 2 and Post Filter Trim.

4.5 Filter Polymer (Magnafloc LT 7981) Chemical Consumption
2024

Month	Dosage (mg/L)		Consumption (kg)	
	Rossdale	E.L. Smith	Rossdale	E.L. Smith
January	0.30	0.33	1,324	2,751
February	0.17	0.11	670	867
March	0.13	0.12	600	1,013
April	0.12	0.16	562	1,248
May	0.24	0.17	1,152	1,485
June	0.24	0.16	1,250	1,370
July	0.21	0.12	1,402	1,199
August	0.27	0.20	1,523	1,772
September	0.29	0.20	1,452	1,729
October	0.33	0.37	1,483	3,344
November	0.34	0.57	1,480	4,864
December	0.30	0.40	1,285	3,477
Annual Total			14,183	25,119
Annual Avg	0.25	0.24		

NOTES: ' -- ' indicates plant offline
- Filter polymer consumption (kg) at 100% by weight mixed at the sites to required solution

4.6 Aqua Ammonia Chemical Consumption
2024

Month	Dosage (mg/L)		Consumption (kg)	
	Rossdale	E.L. Smith	Rossdale	E.L. Smith
January	0.65	--	15,342	--
February	0.64	--	13,414	--
March	0.62	--	14,631	--
April	0.61	--	15,436	--
May	0.61	--	15,315	--
June	0.67	--	18,218	--
July	0.67	--	23,403	--
August	0.65	--	19,295	--
September	0.64	--	16,849	--
October	0.63	--	14,748	--
November	0.61	--	13,930	--
December	0.59	--	13,376	--
Annual Total			193,958	--
Annual Avg	0.63	--		

NOTES: ' -- ' indicates plant offline
- Aqua ammonia consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 19.0%)

4.6-1 LAS Ammonia Chemical Consumption
2024

Month	Dosage (mg/L)	Consumption (kg)
	E.L. Smith	E.L. Smith
January	0.65	48,296
February	0.65	47,032
March	0.61	46,172
April	0.58	40,856
May	0.59	45,749
June	0.64	50,087
July	0.66	58,468
August	0.67	54,641
September	0.67	52,879
October	0.65	51,510
November	0.59	45,063
December	0.57	43,876
Annual Total		584,629
Annual Avg	0.63	

NOTES: ' -- ' indicates plant offline
- LAS ammonia consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 19.0%)

4.7 Caustic Soda Chemical Consumption

2024

Month	Dosage (mg/L)		Consumption (kg)	
	Rossdale	E.L. Smith	Rossdale	E.L. Smith
January	6.06	10.8	27,734	86,856
February	2.94	6.61	20,644	93,781
March	7.88	10.3	65,264	149,608
April	5.69	8.33	48,905	113,058
May	8.69	15.7	77,415	241,920
June	6.10	6.00	29,052	91,776
July	2.55	4.32	11,264	74,358
August	4.27	3.93	11,206	64,068
September	3.57	3.68	14,381	42,915
October	--	--	--	--
November	--	--	--	--
December	--	--	--	--
Annual Total			305,864	958,342
Annual Avg	5.81	7.74		

NOTES: ' -- ' indicates plant offline
- Caustic soda consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 50.0%)

4.8 Fluoride Chemical Consumption
2024

Month	Dosage (mg/L)		Consumption (kg)	
	Rossdale	EL Smith	Rossdale	EL Smith
January	0.60	0.65	12,292	21,766
February	0.56	0.63	10,227	20,582
March	0.60	0.58	12,276	19,760
April	0.62	0.63	13,673	19,765
May	0.64	0.66	14,018	22,962
June	0.63	0.64	14,996	22,278
July	0.61	0.65	18,606	26,003
August	0.63	0.65	16,255	23,915
September	0.63	0.61	14,341	21,671
October	0.66	0.60	13,418	21,547
November	0.64	0.59	12,810	20,021
December	0.63	0.57	12,445	19,751
Annual Total			165,356	260,022
Annual Avg	0.62	0.62		

NOTES: ' -- ' indicates plant offline
- Fluoride consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 21.8%)

4.9 Sodium Bisulfite Chemical Consumption
2024

Month	Rossdale			E.L. Smith		
	Dosage (mg/L)	Consumption (kg)	De-chlorinated Waste Stream to Outfall (ML)	Dosage (mg/L)	Consumption (kg)	De-chlorinated Waste Stream to Outfall (ML)
January	20.6	26,440	505	14.7	64,775	1,683
February	19.2	20,647	421	20.2	59,966	1,157
March	13.6	19,146	548	11.5	44,276	1,473
April	14.4	20,050	516	14.5	53,339	1,422
May	15.7	20,735	516	16.1	58,434	1,411
June	20.9	20,945	388	16.5	56,302	1,294
July	28.2	29,517	415	19.6	75,354	1,444
August	33.2	33,559	374	22.3	71,940	1,255
September	45.6	27,255	356	19.2	58,794	1,176
October	31.5	41,437	535	15.5	61,292	1,533
November	31.7	43,876	534	14.9	65,108	1,668
December	34.5	34,290	478	15.3	57,284	1,448
Annual Total		337,898	5,585		726,865	16,963
Annual Avg	25.8			16.7		

NOTES: ' -- ' indicates Plant Offline
- Sodium bisulfite consumption (kg) at 38% by weight (solution delivered to sites at a concentration of 38.0%)

4.10 Phosphoric Acid Chemical Consumption
2024

Month	Dosage (mg/L)		Consumption (kg)	
	Rossdale	EL Smith	Rossdale	EL Smith
January	0.90	0.89	16,136	25,488
February	0.90	0.90	14,174	25,892
March	0.90	0.90	16,284	26,888
April	0.90	0.90	17,560	24,740
May	0.90	0.89	17,140	27,415
June	0.90	0.90	18,989	27,674
July	0.90	0.90	24,428	31,374
August	0.90	0.90	20,769	29,082
September	0.90	0.90	18,302	28,270
October	0.90	0.89	15,555	28,026
November	0.90	0.90	15,223	26,528
December	0.90	0.90	15,492	27,532
Annual Total			210,051	328,907
Annual Avg	0.90	0.90		

NOTES: ' -- ' indicates plant offline
- Phosphoric acid consumption (kg) at 100% by weight (solution delivered to sites at a concentration of 75%)

5.1 Waste Stream Volumes (ML)

2024

Month	Rossdale						E.L. Smith								
	Clarifier Blowdown	Clarifier Washdown	Backwash Water	Filter to Waste	Bypass	Plant Total	Clarifier Blowdown	Clarifier Washdown	Backwash Water	Filter to Waste	Bypass	LLP Flush	HLP Cooling	Plant Total	De-chlorinated Waste Flow to Outfall
January	213	--	202	51	0.4	467	597	--	504	319	157	0.6	24	1,602	1,683
February	193	20	140	34	7.6	395	566	--	292	154	46	0.6	26	1,085	1,157
March	335	--	135	44	0.0	514	657	--	380	303	50	0.6	27	1,418	1,473
April	369	--	118	30	5.4	523	652	10	353	298	34	0.7	23	1,371	1,422
May	344	--	108	35	21	508	686	13	369	217	37	0.6	29	1,350	1,411
June	264	--	104	27	0.0	395	676	13	339	161	28	0.6	29	1,246	1,294
July	247	--	127	40	7.9	422	739	--	397	152	49	0.6	37	1,375	1,444
August	196	--	114	37	25	372	623	--	328	136	52	1.8	30	1,171	1,255
September	--	--	99	36	12	148	595	--	308	116	45	8.8	29	1,103	1,176
October	248	24	151	51	58	533	690	--	448	218	46	1.0	30	1,432	1,533
November	65	--	209	55	10	339	702	--	490	265	52	3.0	29	1,541	1,668
December	33	20	168	52	21	295	700	--	391	178	17	0.6	28	1,314	1,448
Annual Total	2,508	65	1,674	492	170	4,909	7,883	35	4,602	2,517	613	20	340	16,009	16,963

NOTES:
- Clarifier washdown volume(s) estimated for clarifier cleaning
- LLP flush, HLP cooling and chlorinated waste flow to outfall are not applicable to the Rossdale WTP
- De-chlorinated waste flow to outfall is the estimated chlorinated waste flow to outfall for dechlorination

5.2 Rossdale Clarifier Blowdown Clarifier Washdown and Backwash Water Waste Stream Data

2024

Month	Clarifier Blowdown		Clarifier Washdown		Backwash Water	
	TSS (kg)	Aluminum (kg)	TSS (kg)	Aluminum (kg)	TSS (kg)	Aluminum (kg)
January	14,932	10,264	0	0	15,432	5,342
February	13,619	9,702	160	36	6,402	2,216
March	133,653	17,621	0	0	6,343	2,196
April	331,668	16,098	0	0	4,258	1,474
May	639,908	26,603	0	0	4,101	1,420
June	119,638	20,372	0	0	3,909	1,353
July	465,844	20,043	0	0	5,060	1,752
August	144,229	17,125	0	0	4,328	1,498
September	69,747	14,760	0	0	3,255	1,127
October	18,952	6,541	128	23	10,648	3,686
November	29,135	2,673	0	0	21,032	7,280
December	25,898	2,204	137	9	27,969	9,682
Annual Total	2,007,222	164,006	425	67	112,738	39,025

NOTES: '--' indicates that clarifier washdown did not occur
- Clarifier washdown waste stream solids, TSS and aluminum are calculated values

5.3 Rossdale Waste Stream Data

2024

Month	De-Chlorinated Waste Flow to Waste Stream 3						De-Chlorinated Waste Flow to Waste Stream 7					
	Total Chlorine (mg/L)			Sulfite (mg/L)			Total Chlorine (mg/L)			Sulfite (mg/L)		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	0.00	0.00	0.00	1.96	20.0	12.2	0.00	0.00	0.00	1.84	20.0	10.00
February	0.00	0.00	0.00	1.06	20.0	9.55	0.00	0.00	0.00	1.30	20.0	6.45
March	0.00	0.00	0.00	0.42	20.0	8.43	0.00	0.00	0.00	1.97	8.89	5.10
April	0.00	1.92	0.00	0.00	20.0	8.70	0.00	0.00	0.00	0.31	20.0	5.66
May	0.00	0.00	0.00	1.20	20.0	10.1	0.00	0.00	0.00	0.63	20.0	9.04
June	0.00	0.00	0.00	0.89	20.0	9.15	0.00	0.00	0.00	1.64	20.0	5.97
July	0.00	0.00	0.00	1.23	20.0	7.71	0.00	0.00	0.00	1.40	20.0	5.43
August	0.00	0.00	0.00	0.73	20.0	8.04	0.00	0.00	0.00	1.26	20.0	6.50
September	0.00	0.00	0.00	1.00	20.0	11.0	0.00	0.00	0.00	0.85	20.0	6.51
October	0.00	0.00	0.00	1.03	20.0	12.5	0.00	0.00	0.00	2.50	20.0	9.94
November	0.00	0.00	0.00	1.18	29.1	12.5	0.00	0.00	0.00	1.35	20.0	10.9
December	0.00	0.00	0.00	1.06	20.0	9.61	0.00	0.00	0.00	1.91	20.0	13.5
Annual Min/Max/Avg	0.00	1.92	0.00	0.00	20.0	9.96	0.00	0.00	0.00	0.31	20.0	7.93

5.4 E.L. Smith Clarifier Blowdown Clarifier Washdown and Backwash Water Waste Stream Data

2024

Month	Clarifier Blowdown		Clarifier Washdown		Backwash Water	
	TSS (kg)	Aluminum (kg)	TSS (kg)	Aluminum (kg)	TSS (kg)	Aluminum (kg)
January	113,335	21,292	0	0	37,104	12,844
February	106,010	20,644	0	0	15,371	5,321
March	251,572	31,314	0	0	25,551	8,845
April	395,290	27,016	427	28	33,492	11,593
May	729,580	55,290	284	28	34,358	11,893
June	293,332	31,565	516	57	22,556	7,808
July	563,537	28,901	0	0	23,593	8,167
August	285,017	25,650	0	0	14,681	5,082
September	184,309	22,211	0	0	11,831	4,095
October	78,656	10,050	0	0	32,350	11,198
November	111,645	4,282	0	0	68,354	23,661
December	68,342	4,313	0	0	48,449	16,771
Annual Total	3,180,623	282,527	1,228	113	367,690	127,277

NOTES: '--' indicates that clarifier wash did not occur
- Clarifier washdown waste stream solids, TSS and aluminum are calculated values

5.5 E.L. Smith Waste Stream Data

2024

Month	De-chlorinated Waste Flow to Outfall								
	Sulphite (mg/L)			Total Chlorine (mg/L)			pH		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
January	0.08	20.0	5.55	0.00	0.00	0.00	7.16	7.80	7.48
February	0.13	20.0	5.99	0.00	0.00	0.00	6.65	7.61	7.02
March	0.13	20.0	5.17	0.00	0.00	0.00	6.46	7.56	7.30
April	0.11	20.0	6.62	0.00	0.00	0.00	6.83	7.58	7.28
May	0.02	20.0	7.73	0.00	0.00	0.00	6.30	7.53	7.09
June	0.09	20.0	6.14	0.00	0.00	0.00	6.58	7.61	7.37
July	0.21	20.0	5.25	0.00	0.00	0.00	6.62	7.67	7.42
August	0.16	20.0	5.46	0.00	0.00	0.00	6.51	7.63	7.46
September	0.15	20.0	6.05	0.00	0.00	0.00	6.44	7.88	7.56
October	0.17	20.0	7.26	0.00	0.00	0.00	7.55	8.30	8.00
November	0.35	20.0	6.53	0.00	0.00	0.00	6.60	8.34	8.00
December	0.21	20.0	6.94	0.00	0.00	0.00	7.49	7.89	7.74
Annual Min/Max/Avg	0.02	20.0	6.22	0.00	0.00	0.00	6.3	8.3	7.5

6.0 Reservoir Chlorine Residual (mg/L) - Part 1

2024

Reservoir	Papaschase 1			Ormsby			Clareview Discharge			Millwoods Discharge			Kaskitayo			Discovery Park		
Day	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Jan	1.55	2.00	1.72	1.85	2.07	1.95	1.57	1.88	1.75	1.86	2.09	1.96	1.69	2.08	1.87	1.12	1.63	1.49
Feb	1.51	1.94	1.68	1.80	2.07	1.94	1.55	1.84	1.71	1.89	2.09	1.96	1.66	2.07	1.86	1.22	1.57	1.41
Mar	1.51	1.91	1.64	1.65	2.06	1.87	1.47	1.80	1.66	1.64	2.14	1.88	1.55	2.05	1.78	1.31	1.64	1.48
Apr	1.45	1.91	1.63	1.65	2.03	1.84	1.48	1.80	1.66	1.81	2.01	1.87	1.60	2.03	1.80	1.01	1.51	1.39
May	1.34	1.90	1.49	1.50	1.96	1.73	1.31	1.78	1.57	1.66	1.95	1.79	1.48	2.00	1.73	0.90	1.49	1.29
Jun	1.14	2.02	1.46	1.57	1.99	1.79	1.47	1.81	1.61	1.76	2.17	1.89	1.65	2.17	1.97	1.01	1.59	1.30
Jul	0.98	1.94	1.23	1.53	1.96	1.81	1.30	1.80	1.58	1.81	2.12	1.89	1.72	2.14	1.98	1.02	1.34	1.17
Aug	1.17	2.01	1.37	1.59	1.98	1.78	1.36	1.77	1.59	1.79	2.17	1.90	1.75	2.25	2.01	1.02	1.41	1.20
Sep	1.05	2.07	1.36	1.68	2.18	1.88	1.25	1.80	1.56	1.84	2.11	1.96	0.95	2.22	1.91	1.00	1.68	1.28
Oct	1.34	2.01	1.52	1.74	2.64	1.95	1.35	1.80	1.59	1.87	2.14	2.00	1.02	2.15	1.84	1.08	1.77	1.42
Nov	1.46	2.04	1.66	1.81	2.16	1.99	1.40	1.82	1.67	1.77	2.11	1.97	1.77	2.17	2.04	1.34	1.68	1.51
Dec	1.54	1.98	1.67	1.63	2.04	1.83	1.23	1.83	1.65	1.80	2.05	1.93	1.66	2.14	1.92	1.04	2.68	1.54
Monthly Min/Max/ Avg	0.98	2.07	1.55	1.50	2.64	1.86	1.23	1.88	1.63	1.64	2.17	1.92	0.95	2.25	1.89	0.90	1.88	1.63

NOTES: '--' Indication Analyzer Offline

6.1 Reservoir Chlorine Residual (mg/L) - Part 2

2024

Reservoir	Rosslyn 1			Londonderry			N. Jasper Place			Rosslyn 2			Thorncliffe			Blackmud Creek		
Day	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Jan	1.61	2.31	2.00	1.58	2.12	1.88	1.47	1.93	1.61	1.74	2.32	1.94	1.57	2.05	1.75	1.61	1.93	1.76
Feb	1.70	1.83	1.77	1.61	2.00	1.82	1.45	1.95	1.64	1.70	2.17	1.84	1.57	2.04	1.74	1.28	1.74	1.65
Mar	1.66	1.82	1.74	1.45	1.94	1.76	1.38	1.94	1.62	1.61	2.21	1.85	1.43	2.00	1.69	1.38	1.71	1.53
Apr	1.68	1.73	1.71	1.49	1.87	1.69	1.41	1.89	1.57	1.59	2.18	1.73	1.51	2.03	1.64	1.40	1.80	1.59
May	1.48	1.73	1.61	1.35	1.88	1.58	1.25	1.88	1.44	1.42	2.16	1.61	1.35	2.08	1.50	1.34	1.60	1.48
Jun	1.51	1.69	1.64	1.36	1.94	1.60	1.24	2.00	1.41	1.38	2.15	1.58	1.29	2.28	1.50	1.38	1.58	1.48
Jul	1.59	1.59	1.59	1.16	1.76	1.55	1.21	2.00	1.34	1.28	2.33	1.51	1.13	2.12	1.35	1.37	1.56	1.45
Aug	1.49	1.62	1.59	1.17	1.79	1.53	1.14	2.02	1.32	1.20	2.33	1.51	1.12	2.20	1.39	1.34	1.62	1.43
Sep	1.50	1.65	1.56	1.20	1.81	1.58	1.21	2.04	1.40	1.11	2.28	1.42	1.37	2.23	1.55	1.32	1.68	1.50
Oct	1.47	1.81	1.63	1.40	2.20	1.70	1.32	2.06	1.51	1.19	2.08	1.48	1.39	2.20	1.64	1.44	1.98	1.65
Nov	1.66	1.76	1.72	1.60	1.94	1.81	1.40	2.02	1.59	1.45	1.98	1.65	1.51	2.13	1.71	1.38	1.94	1.65
Dec	1.66	1.78	1.71	1.56	1.92	1.76	1.26	1.94	1.57	1.52	1.98	1.66	1.06	2.03	1.68	1.69	1.86	1.77
Monthly Min/Max/ Avg	1.47	2.31	1.70	1.16	2.20	1.69	1.14	2.06	1.50	1.11	2.33	1.65	1.06	2.28	1.59	1.28	1.98	1.58

NOTES: '--' Indication Analyzer Offline

Water Quality 2024

7.1 Water Quality Objectives for EPCOR

Parameter	**Approval Requirement**	**EPCOR Internal Limit**	**EPCOR Target**
Turbidity (NTU)			
Individual Filters	<0.3	<0.1 (2)	<0.08
Distribution System	N/A	< 1 (1)	< 1
Distribution System (Maintenance)	N/A	< 3 (1)	< 1
Colour (TCU)	<15 (3)	<10 (1)	<3
pH (25°C)	6.5 - 8.5	7.3 - 8.3 (1)	7.4 - 8.0
Taste and Odour	Inoffensive (3)	Inoffensive (1)	Inoffensive
E.coli (PA/100 mL)	absent	absent (1)	absent
Total Coliforms (PA/100 mL)	absent	absent (1)	absent
Total Chlorine Residual (mg/L)			
Water Treatment Plant Effluent	>1.0	1.3 - 2.4 (2)	1.9 - 2.2
Reservoirs	>0.5	1.0 - 2.4 (1)	1.2 - 2.2
Distribution	>0.5 (4)	1.0 - 2.4 (1)	1.0 - 2.2
Fluoride: (mg/L)			
Reservoir Effluent	0.5 - 0.9	0.6 - 0.8 (1)	0.6 - 0.8
Trihalomethanes (mg/L)			
Reservoir Effluent	<0.100	<0.050 (1)	<0.040
Distribution System	<0.100	<0.050 (1)	<0.040
UV254 % Transmittance			
E.L. Smith		>89% (2)	>90%
Rossdale		>87% (2)	>88%
HAA (mg/L)			
Reservoir Effluent	< 0.080	< 0.040 (1)	<0.035
Distribution System	< 0.080	< 0.040 (1)	<0.035
NDMA (mg/L):			
Reservoir Effluent	< 0.000040	< 0.000010 (1)	<0.000005
Distribution System	< 0.000040	< 0.000010 (1)	
Microoganism Log Removal at Water Treatment Plants			
Giardia	≥5.5	≥6.0 (2)	>6.5
Cryptosporidium	≥5.5	≥5.3 (2)	>6.0
Virus	≥4.0	≥4.5 (2)	>5.0

(1) Limit based on City of Edmonton Performance Based Rate (PBR) agreement
(2) Limit based on EPCOR Action Level
(3) Aesthetic Objective
(4) in 75% of samples collected in a day
All values are expressed in units of mg/L unless otherwise stated.
Based on March 2024 Summary of Epcor Edmonton Water Quality Standards.

7.2 SUMMARY OF MAJOR CHEMICALS, MICROBIOLOGICAL, AND PHYSICAL PARAMETERS OF EDMONTON DRINKING WATER PRODUCED AT WATER TREATMENT PLANTS

2024

Parameter	Unit	MAC*	Average	Median	Min	Max	Count
Alkalinity Total	mg CaCO3/L		118	119	8	143	725
Aluminum	mg/L	2.9 (0.1)	0.068	0.071	0.023	0.125	24
Arsenic	mg/L	0.01	0.0002	<0.0002	<0.0002	0.0003	24
Bromate Dissolved	mg/L	0.01	<0.005	<0.005	<0.005	<0.005	106
Bromodichloromethane	µg/L		1.0	1.0	<0.5	2.6	718
Cadmium	mg/L	0.007	<0.0002	<0.0002	<0.0002	<0.0002	24
Calcium Hardness	mg/L CaCO3		117	116	96	141	711
Chlorate Dissolved	mg/L	1	0.161	0.183	<0.100	0.332	106
Chloride Dissolved	mg/L	(250)	6.36	5.91	3.89	12.10	106
Chlorite Dissolved	mg/L	1	<0.03	<0.20	<0.20	<0.20	106
Chromium	mg/L	0.05	<0.0002	<0.0002	<0.0002	<0.0002	24
Colour	TCU	(15)	0.9	0.9	<0.5	1.9	725
Conductivity	µS/cm		396	393	342	453	105
Copper	mg/L	2 (1)	<0.0028	<0.0050	<0.0050	<0.0050	24
Cryptosporidium	oocysts/100L		<0.1	<0.1	<0.1	<0.1	32
Fluoride	mg/L	1.5	0.69	0.68	0.61	0.79	725
Giardia	cysts/100L		<0.1	<0.1	<0.1	<0.1	32
Haloacetic Acids, total (HAA5)	µg/L	80	21.4	20.2	9.7	47.1	24
Iron	mg/L	(0.3)	<0.0050	<0.0050	<0.0050	<0.0050	24
Manganese	mg/L	0.12 (0.02)	<0.0020	<0.0020	<0.0020	<0.0020	24
Mercury	mg/L	0.001	<0.0002	<0.0002	<0.0002	<0.0002	24
Nitrate (as N) Dissolved	mg/L	10	0.049	0.040	<0.010	0.170	98
Nitrite (as N) Dissolved	mg/L	1	<0.01	<0.01	<0.01	0.02	98
pH	N/A	(7.0 - 10.5)	7.9	7.9	7.5	8.3	726
Potassium	mg/L		0.82	0.80	0.60	1.10	24
Sodium	mg/L	(200)	11.03	9.90	6.70	18.90	24
Sulphate Dissolved	mg/L	(500)	71.5	71.1	59.3	95.1	106
Total Chlorine	mg/L	>1.0	2.15	2.15	1.84	2.40	725
Total Dissolved Solids	mg/L	(500)	229	229	195	252	24
Total Hardness	mg/L CaCO3		177	177	145	218	711
Total Organic Carbon	mg/L C		1.5	1.4	<0.6	2.8	106
Trihalomethanes	µg/L	100	18	15	5	40	718
Turbidity	NTU		0.05	0.05	<0.04	0.22	725
Uranium	mg/L	0.02	0.0005	<0.0005	<0.0005	0.0006	24
Zinc	mg/L	(5.0)	<0.0050	<0.0050	<0.0050	<0.0050	24
Bacteriological Data							
Coliforms, total	PA/100mL	None/100mL	Absent	Absent	Absent	Absent	725
E. coli	PA/100mL	None/100mL	Absent	Absent	Absent	Absent	725

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits.

7.3 SUMMARY OF LABORATORY ANALYSIS - 2024

DISTRIBUTION OF TESTING

Drinking Water Testing

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
Water Treatment Plant	# Tests	10,442	9,566	10,736	10,143	9,855	10,053	10,306	10,156	6,169	10,169	9,697	6,693	113,985
	# Samples	261	248	326	269	264	260	268	273	257	268	253	256	3,203
Field Reservoirs	# Tests	1,936	1,721	1,695	1,883	1,734	2,006	2,225	1,917	1,779	2,035	1,596	1,918	22,445
	# Samples	63	52	52	65	49	53	66	54	52	65	52	64	687
Routine Distribution System	# Tests	2,740	2,879	2,734	2,845	2,901	2,692	2,424	2,401	2,142	3,187	2,728	2,634	32,307
	# Samples	146	153	146	153	144	124	99	106	103	165	148	143	1,630
System Depressurization/Repair	# Tests	1,050	720	555	675	660	630	628	480	723	735	825	540	8,221
	# Samples	70	48	37	45	44	42	42	32	48	49	55	36	548
Customer Complaints	# Tests	1,395	651	1,209	1,488	1,023	1,209	1,009	1,731	952	910	724	332	12,633
	# Samples	15	7	13	16	11	13	11	19	13	10	8	4	140
Subtotal	# Tests	17,563	15,537	16,929	17,034	16,173	16,590	16,592	16,685	11,765	17,036	15,570	12,117	189,591
	# Samples	555	508	574	548	512	492	486	484	473	557	516	503	6,208

Additional Testing

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
New Watermain Testing	# Tests	80	30	0	10	135	160	495	275	305	330	580	494	2,894
	# Samples	17	6	0	2	27	32	99	55	61	66	116	95	576
Water Treatment Plant Waste Discharge	# Tests	168	43	173	117	300	327	284	595	68	73	271	64	2,483
	# Samples	56	33	36	45	55	51	50	52	34	35	45	25	517
Quality Control	# Tests	5,961	6,042	6,091	5,937	6,055	6,793	8,719	8,020	5,721	7,034	6,061	5,576	78,010
	# Samples	1,187	1,056	1,193	1,186	1,244	1,418	1,629	1,747	1,581	1,776	1,611	1,878	17,506
Distribution Water Enhanced Surveillance	# Tests	0	0	0	0	0	540	1,337	1,091	960	0	0	0	3,928
	# Samples	0	0	0	0	0	20	53	45	40	0	0	0	158
Externally Contracted Analyses	# Tests	405	672	316	307	949	798	832	595	7,210	817	745	6,064	19,710
	# Samples	134	120	157	136	140	122	139	130	240	174	147	238	1,877
Subtotal	# Tests	6,614	6,787	6,580	6,371	7,439	8,618	11,667	10,576	14,264	8,254	7,657	12,198	107,025
	# Samples	1,394	1,215	1,386	1,369	1,466	1,643	1,970	2,029	1,956	2,051	1,918	2,236	20,633

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
Grand Total	# Tests	24,177	22,324	23,509	23,405	23,612	25,208	28,259	27,261	26,029	25,290	23,227	24,315	**296,616**
	# Samples	1,825	1,611	1,848	1,793	1,842	2,022	2,327	2,399	2,198	2,452	2,301	2,506	**25,124**

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
January															
Rossdale Raw (MPN/100mL)	32			133	1	517			13	1	40	1	44.7	44.7	44.7
E.L. Smith Raw (MPN/100mL)	5			41	28	53			2	1	3	1	14.2	14.2	14.2
Raw River Water Entering the Treatment Plants	37			121	1	517			11	1	40	2	29.4	14.2	44.7
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.44	0.10	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.50	0.12	1.00
Water Entering the Plant Reservoir	61	0	0.0				0	0.0				61	0.47	0.10	1.00
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.45	0.10	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.52	0.10	1.00
Treated Water Entering the Distribution System	61	0	0.0				0	0.0				61	0.49	0.10	1.00
February															
Rossdale Raw (MPN/100mL)	29			144	1	816			12	1	44	1	17.0	17.0	17.0
E.L. Smith Raw (MPN/100mL)	4			18	12	28			1	1	2	1	11.8	11.8	11.8
Raw River Water Entering the Treatment Plants	33			129	1	816			10	1	44	2	14.4	11.8	17.0
Rossdale Treated (PA/100mL)	28	0	0.0				0	0.0				28	0.73	0.11	1.00
E.L. Smith Treated (PA/100mL)	29	0	0.0				0	0.0				29	0.64	0.11	1.48
Water Entering the Plant Reservoir	57	0	0.0				0	0.0				57	0.69	0.11	1.48
Rossdale Reservoir (PA/100mL)	28	0	0.0				0	0.0				28	0.74	0.11	1.00
E.L. Smith Reservoir (PA/100mL)	29	0	0.0				0	0.0				29	0.68	0.11	1.00
Treated Water Entering the Distribution System	57	0	0.0				0	0.0				57	0.71	0.11	1.00

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
March															
Rossdale Raw (MPN/100mL)	32			1,469	1	13,700			87	1	1,760	1	293	293	293
E.L. Smith Raw (MPN/100mL)	4			2,505	8	9,770			16	1	62	1	60.7	60.7	60.7
Raw River Water Entering the Treatment Plants	36			1,584	1	13,700			79	1	1,760	2	177	60.7	293
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.70	0.12	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.77	0.13	1.00
Water Entering the Plant Reservoir	62	0	0.0				0	0.0				62	0.74	0.12	1.00
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.71	0.10	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.67	0.11	1.00
Treated Water Entering the Distribution System	62	0	0.0				0	0.0				62	0.69	0.10	1.00
April															
Rossdale Raw (MPN/100mL)	31			208	1	1,120			9	1	58	1	92.2	92.2	92.2
E.L. Smith Raw (MPN/100mL)	4			353	91	980			2	1	5	1	126	126	126
Raw River Water Entering the Treatment Plants	35			225	1	1,120			8	1	58	2	109	92.2	126
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.66	0.14	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.57	0.10	1.00
Water Entering the Plant Reservoir	60	0	0.0				0	0.0				60	0.61	0.10	1.00
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.58	0.11	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.56	0.10	1.00
Treated Water Entering the Distribution System	60	0	0.0				0	0.0				60	0.57	0.10	1.00

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
May															
Rossdale Raw (MPN/100mL)	30			174	1	517			16	1	63	1	121	121	121
E.L. Smith Raw (MPN/100mL)	5			194	43	276			9	2	22	1	99.6	99.6	99.6
Raw River Water Entering the Treatment Plants	35			177	1	517			15	1	63	2	110	99.6	121
Rossdale Treated (PA/100mL)	29	0	0.0				0	0.0				29	0.49	0.10	1.02
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.44	0.11	1.00
Water Entering the Plant Reservoir	60	0	0.0				0	0.0				60	0.46	0.10	1.02
Rossdale Reservoir (PA/100mL)	29	0	0.0				0	0.0				29	0.50	0.10	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.42	0.11	1.00
Treated Water Entering the Distribution System	60	0	0.0				0	0.0				60	0.46	0.10	1.00
June															
Rossdale Raw (MPN/100mL)	31			158	1	1,410			8	1	45	1	77.0	77.0	77.0
E.L. Smith Raw (MPN/100mL)	4			131	48	249			7	2	15	1	66.5	66.5	66.5
Raw River Water Entering the Treatment Plants	35			155	1	1,410			8	1	45	2	71.8	66.5	77.0
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.66	0.14	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.61	0.10	1.00
Water Entering the Plant Reservoir	60	0	0.0				0	0.0				60	0.64	0.10	1.00
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.73	0.12	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.71	0.10	1.03
Treated Water Entering the Distribution System	60	0	0.0				0	0.0				60	0.72	0.10	1.03

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
July															
Rossdale Raw (MPN/100mL)	31			1,838	179	22,400			51	1	538	1	80.6	80.6	80.6
E.L. Smith Raw (MPN/100mL)	5			912	162	1,990			38	1	115	1	50.6	50.6	50.6
Raw River Water Entering the Treatment Plants	36			1,709	162	22,400			50	1	538	2	65.6	50.6	80.6
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.89	0.12	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.89	0.12	1.00
Water Entering the Plant Reservoir	62	0	0.0				0	0.0				62	0.89	0.12	1.00
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.91	0.10	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.86	0.11	1.00
Treated Water Entering the Distribution System	62	0	0.0				0	0.0				62	0.89	0.10	1.00
August															
Rossdale Raw (MPN/100mL)	32			1,548	1	11,600			156	1	1,450	1	56.3	56.3	56.3
E.L. Smith Raw (MPN/100mL)	9			504	218	1,300			25	11	77	1	59.6	59.6	59.6
Raw River Water Entering the Treatment Plants	41			1,319	1	11,600			128	1	1,450	2	57.9	56.3	59.6
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.97	0.11	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.94	0.12	1.00
Water Entering the Plant Reservoir	62	0	0.0				0	0.0				62	0.96	0.11	1.00
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.97	0.13	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.97	0.10	1.00
Treated Water Entering the Distribution System	62	0	0.0				0	0.0				62	0.97	0.10	1.00

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
September															
Rossdale Raw (MPN/100mL)	30			373	1	1,414			25	1	124	1	29.3	29.3	29.3
E.L. Smith Raw (MPN/100mL)	4			215	53	579			17	6	34	0			
Raw River Water Entering the Treatment Plants	34			354	1	1,414			24	1	124	1	29.3	29.3	29.3
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	1.47	0.11	18.5
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.71	0.10	1.00
Water Entering the Plant Reservoir	60	0	0.0				0	0.0				60	1.09	0.10	18.5
Rossdale Reservoir (PA/100mL)	29	0	0.0				0	0.0				29	0.94	0.12	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.86	0.12	1.00
Treated Water Entering the Distribution System	59	0	0.0				0	0.0				59	0.90	0.12	1.00
October															
Rossdale Raw (MPN/100mL)	32			375	1	6,152			11	1	126	1	13.5	13.5	13.5
E.L. Smith Raw (MPN/100mL)	5			127	91	161			5	3	9	2	27.5	19.6	35.4
Raw River Water Entering the Treatment Plants	37			341	1	6,152			11	1	126	3	22.8	13.5	35.4
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.77	0.11	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.78	0.13	1.00
Water Entering the Plant Reservoir	62	0	0.0				0	0.0				62	0.78	0.11	1.00
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.81	0.12	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.73	0.10	1.00
Treated Water Entering the Distribution System	62	0	0.0				0	0.0				62	0.77	0.10	1.00

7.4 Bacteriological Data: Water Treatment Plants
2024

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
November															
Rossdale Raw (MPN/100mL)	30			82	1	148			4	1	23	1	15.7	15.7	15.7
E.L. Smith Raw (MPN/100mL)	4			88	70	121			3	1	4	0			
Raw River Water Entering the Treatment Plants	34			83	1	148			4	1	23	1	15.7	15.7	15.7
Rossdale Treated (PA/100mL)	29	0	0.0				0	0.0				29	0.77	0.10	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.51	0.10	1.00
Water Entering the Plant Reservoir	59	0	0.0				0	0.0				59	0.63	0.10	1.00
Rossdale Reservoir (PA/100mL)	29	0	0.0				0	0.0				29	0.94	0.13	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.60	0.10	1.00
Treated Water Entering the Distribution System	59	0	0.0				0	0.0				59	0.77	0.10	1.00
December															
Rossdale Raw (MPN/100mL)	31			199	1	1,203			21	1	157	1	40.3	40.3	40.3
E.L. Smith Raw (MPN/100mL)	5			76	41	88			1	1	1	1	44.2	44.2	44.2
Raw River Water Entering the Treatment Plants	36			182	1	1,203			18	1	157	2	42.2	40.3	44.2
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.55	0.11	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.47	0.10	1.00
Water Entering the Plant Reservoir	61	0	0.0				0	0.0				61	0.51	0.10	1.00
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.52	0.10	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.49	0.10	1.00
Treated Water Entering the Distribution System	61	0	0.0				0	0.0				61	0.50	0.10	1.00

PA = present or absent, MPN = most probable number, cATP = cellular adenosine triphosphate

7.5 Bacteriological Data: Distribution System

2024

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
January									
FIELD DISTRIBUTION	104	0	0.0	0	0.0	15	0.36	0.14	1.50
FIELD DISTRIBUTION - PLPH	55	1	1.8	0	0.0				
FIELD RESERVOIR	22	0	0.0	0	0.0	22	0.46	0.15	1.20
FIELD RESERVOIR - PLPH (duplicate-not counted)	22	0	0.0	0	0.0				
Monthly	181	1	0.6	0	0.0	37	0.42	0.14	1.50
February									
FIELD DISTRIBUTION	106	0	0.0	0	0.0	7	0.17	0.12	0.32
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	160	0	0.0	0	0.0	7	0.17	0.12	0.32
March									
FIELD DISTRIBUTION	105	0	0.0	0	0.0	13	0.18	0.11	0.42
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	159	0	0.0	0	0.0	13	0.18	0.11	0.42
April									
FIELD DISTRIBUTION	112	1	0.9	0	0.0	16	0.35	0.12	0.75
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	166	1	0.6	0	0.0	16	0.35	0.12	0.75
May									
FIELD DISTRIBUTION	74	0	0.0	0	0.0	11	0.27	0.10	0.49
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	128	0	0.0	0	0.0	11	0.27	0.10	0.49
June									
FIELD DISTRIBUTION	53	0	0.0	0	0.0	17	0.42	0.11	0.91
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	107	0	0.0	0	0.0	17	0.42	0.11	0.91

7.5 Bacteriological Data: Distribution System

2024

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
July									
FIELD DISTRIBUTION	37	1	2.7	0	0.0	13	0.55	0.18	1.66
FIELD DISTRIBUTION - PLPH	58	0	0.0	0	0.0				
Monthly	95	1	1.1	0	0.0	13	0.55	0.18	1.66
August									
FIELD DISTRIBUTION	48	0	0.0	0	0.0	24	3.12	0.10	42.04
FIELD DISTRIBUTION - PLPH	56	0	0.0	0	0.0				
Monthly	104	0	0.0	0	0.0	24	3.12	0.10	42.04
September									
FIELD DISTRIBUTION	43	0	0.0	0	0.0	19	0.50	0.14	1.12
FIELD DISTRIBUTION - PLPH	58	0	0.0	0	0.0				
Monthly	101	0	0.0	0	0.0	19	0.50	0.14	1.12
October									
FIELD DISTRIBUTION	45	0	0.0	0	0.0	18	0.25	0.11	0.47
FIELD DISTRIBUTION - PLPH	73	0	0.0	0	0.0				
Monthly	118	0	0.0	0	0.0	18	0.25	0.11	0.47
November									
FIELD DISTRIBUTION	35	0	0.0	0	0.0	15	0.19	0.10	0.62
FIELD DISTRIBUTION - PLPH	57	0	0.0	0	0.0				
Monthly	92	0	0.0	0	0.0	15	0.19	0.10	0.62
December									
FIELD DISTRIBUTION	66	0	0.0	0	0.0	12	0.17	0.10	0.28
FIELD DISTRIBUTION - PLPH	54	0	0.0	0	0.0				
Monthly	120	0	0.0	0	0.0	12	0.17	0.10	0.28
Year to Date	1,531	3	0.2	0	0.0	202	0.63	0.10	42.04

7.5 Bacteriological Data: Distribution System

2024

Guidelines for Canadian Drinking Water Quality recommend 195 bacteriological samples for a city the size of Edmonton. Total Coliform and E.coli testing is required in the AEPA Approval (638-04-01). At least 95 of the 195 samples must be tested at ProvLab each month according to our Operations Program.

Testing conducted by Laboratory for Provincial Laboratory for Public Health (ProvLAB) are labelled with PLPH.

7.5 Bacteriological Data: Distribution System
2024

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
Samples from Complaints									
January	15	0	0.0	0	0.0	15	0.36	0.14	1.50
February	7	0	0.0	0	0.0	7	0.17	0.12	0.32
March	13	0	0.0	0	0.0	13	0.18	0.11	0.42
April	16	0	0.0	0	0.0	16	0.35	0.12	0.75
May	11	0	0.0	0	0.0	11	0.27	0.10	0.49
June	13	0	0.0	0	0.0	13	0.39	0.11	0.91
July	11	0	0.0	0	0.0	11	0.64	0.24	1.66
August	19	0	0.0	0	0.0	19	4.04	0.10	42.04
September	13	0	0.0	0	0.0	13	0.48	0.14	1.12
October	10	0	0.0	0	0.0	10	0.25	0.11	0.39
November	8	0	0.0	0	0.0	7	0.29	0.11	0.62
December	4	0	0.0	0	0.0	4	0.15	0.10	0.22
Year to Date	140	0	0.0	0	0.0	139	0.79	0.10	42.04
Samples from Depressurizations									
January	70	0	0.0	0	0.0				
February	48	0	0.0	0	0.0				
March	37	0	0.0	0	0.0				
April	45	0	0.0	0	0.0				
May	44	0	0.0	0	0.0				
June	42	0	0.0	0	0.0				
July	42	0	0.0	0	0.0				
August	32	0	0.0	0	0.0				
September	48	0	0.0	0	0.0				
October	49	0	0.0	0	0.0				
November	55	0	0.0	0	0.0				
December	36	0	0.0	0	0.0				
Year to Date	548	0	0.0	0	0.0				

7.6 Giardia and Cryptosporidium

2024

Treated Water entering the distribution system

	Cryptosporidium oocysts/100L		Giardia cysts/100L	
	E.L. Smith	Rossdale	E.L. Smith	Rossdale
23 - Jan		<0.1		<0.1
	<0.09		<0.09	
12 - Feb		<0.1		<0.1
	<0.09		<0.09	
21 - Mar		<0.1		<0.1
	<0.1		<0.1	
15 - Apr	<0.1		<0.1	
16 - Apr		<0.1		<0.1
13 - May	<0.1		<0.1	
14 - May		<0.1		<0.1
11 - Jun	<0.1		<0.1	
12 - Jun		<0.1		<0.1
11 - Jul		<0.1		<0.1
	<0.1		<0.1	
1 - Aug		<0.1		<0.1
	<0.1		<0.1	
9 - Sep		<0.1		<0.1
10 - Sep	<0.09		<0.09	
16 - Sep		<0.1		<0.1
17 - Sep	<0.1		<0.1	
23 - Sep		<0.09		<0.09
24 - Sep	<0.09		<0.09	
15 - Oct		<0.1		<0.1
	<0.09		<0.09	
22 - Oct	<0.1		<0.1	
23 - Oct		<0.1		<0.1
28 - Oct		<0.1		<0.1
	<0.1		<0.1	
5 - Nov		<0.1		<0.1
	<0.09		<0.09	
11 - Dec		<0.1		<0.1
	<0.09		<0.09	

Water entering plant reservoir

	Cryptosporidium oocysts/100L	Giardia cysts/100L
	Rossdale	Rossdale
29 - Oct	<0.1	<0.1

7.6 Giardia and Cryptosporidium

2024

Raw Water

	Cryptosporidium oocysts/100L		Giardia cysts/100L	
	E.L. Smith	Rossdale	E.L. Smith	Rossdale
23 - Jan		<6.93		<6.93
	<1.28		<1.28	
12 - Feb		<39.6		158.4
	<1		9	
21 - Mar		5.5		39.0
	<4.2		8.3	
15 - Apr	13.0		13.0	
16 - Apr		<23.0		23.0
13 - May	<13.0		26.0	
14 - May		<14.0		14.0
11 - Jun	<3.7		<3.7	
12 - Jun		<2.6		7.8
11 - Jul		<9.5		9.5
	19.0		19.0	
1 - Aug		2.4		23.0
	<2.5		5.0	
9 - Sep		<3.89		<3.89
10 - Sep	<6.62		6.6	
16 - Sep		9.0		86.0
17 - Sep	<6.5		6.5	
23 - Sep		<0.99		3
24 - Sep	<1		7	
2 - Oct		<0.99		7.9
7 - Oct		<0.99		197.6
15 - Oct		3.4		215.5
	<1.13		56.6	
22 - Oct	<1.07		7.5	
		<25.22		<25.22
28 - Oct		<1.15		17.3
	<1.44		43.2	
5 - Nov		<1.06		6.4
	<1.33		2.7	
11 - Dec		<1.34		1.3
	<1.38		2.8	

7.7 ROSSDALE AND E.L. SMITH TREATED WATER ENTERING PLANT RESERVOIR

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical										
Turbidity (NTU)	0.09	<0.04	12.90	362	0.05	<0.04	0.39	365		0.3
UV 254 %T ****	<94.6	<90.1	<96.9	359	<94.6	<90.7	<98.9	365		
Primary Inorganics (mg/L)										
Bromate, dissolved	<0.005	<0.003	<0.005	53	<0.005	<0.003	<0.005	53	0.01	
Chlorate Dissolved	0.23	0.10	0.34	53	0.11	<0.05	0.20	53	1	
Chlorite Dissolved	<0.034	<0.005	<0.200	53	<0.034	<0.005	<0.200	53	1	
Nitrate (as N) Dissolved	0.05	<0.01	0.17	49	0.05	<0.01	0.16	49	10	
Nitrite (as N) Dissolved	<0.010	<0.005	0.020	49	<0.010	<0.005	0.020	49	1	
Primary Organics (µg/L)										
Benzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	5	
Carbon tetrachloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365	2	
Chlorobenzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	359	<0.5	<0.5	<0.5	364	5	
Dichloroethylene (1,1)	<0.5	<0.5	<3.0	360	<0.5	<0.5	<3.0	365	14	
Ethylbenzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Tetrachloroethylene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	10	
Toluene	<0.5	<0.5	4.1	360	<0.5	<0.5	1.8	365	60 (24)	
Total Xylenes	<1.0	<0.5	<2.5	360	<1.0	<0.5	<2.5	365	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	360	<0.5	<0.5	0.5	365	5	
Trihalomethanes	15.9	5.3	38.4	360	14.1	3.7	33.7	365	100	50 (single result)
Vinyl chloride	<1.0	<1.0	<1.0	359	<1.0	<1.0	<1.0	364	2	
Secondary Inorganics (mg/L)										
Ammonia as NH3	0.12	0.08	0.18	128	0.12	0.06	0.17	130		
Bromide Dissolved	<0.03	<0.01	<0.05	53	<0.03	<0.01	<0.05	53		
Chloride Dissolved	6.05	3.91	19.90	53	6.7	4.5	12.9	53	(250)	
Sulphate Dissolved	70.5	59.0	95.8	53	72.4	59.4	95.3	53	(500)	

7.7 ROSSDALE AND E.L. SMITH TREATED WATER ENTERING PLANT RESERVOIR

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Secondary Organics (µg/L)										
1,1,2-Trichloroethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
1,2,3-Trichloropropane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
Bromodichloromethane	0.9	<0.5	2.3	360	0.8	<0.5	2.1	365		16
Bromoform	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Bromomethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
Chloroethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
Chloroform	14.7	4.60	37.4	360	13.1	3.00	33.2	365		
Chloromethane	<5	<5	<5	33	<5	<5	<5	35		
Dibromochloromethane	<0.5	<0.5	0.5	360	<0.5	<0.5	<0.5	365		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichloroethylene, cis (1,2)	<0.5	<0.5	0.5	360	<0.5	<0.5	<0.5	365		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Methyl Isobutyl Ketone (MIBK)	<3	<1	<20	360	<3	<1	<20	365		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	354	<0.5	<0.5	<0.5	357	(15)	
Styrene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Total Volatile Organics (NonTHM)	2.2	<1.0	6.5	327	2.2	<1.0	6.7	330		
Total Volatile Organics (Unknown)	1.1	<0.5	2.4	38	1.1	<0.5	2.8	42		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Xylene (1,2)	<0.5	<0.3	<0.5	360	<0.5	<0.3	<0.5	365		
Xylene (1,4)	<0.5	<0.4	1.3	360	<0.5	<0.4	0.6	365		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval Limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

**** UV 254 %T for Rossdale based on a sample collected daily from one of the nine filters selected randomly. For E.L. Smith it is based on a daily sample of Combined Filter Effluent.

7.8 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Microbiologicals										
Microcystin	<0.2	<0.2	<0.2	4	<0.2	<0.2	<0.2	4	1.5	
Physical										
Colour (TCU)	0.9	<0.5	1.9	360	0.9	<0.5	1.8	365	(15)	10
Conductivity (µS/cm)	393	342	439	52	399	351	453	53		
FPA-Intensity (N/A)	1.07	0.31	1.88	61	0.97	0.50	2.12	61		
pH (N/A)	8.0	7.7	8.3	361	7.9	7.5	8.3	365	(7.0 - 10.5)	7.3-8.3
Total Dissolved Solids (mg/L)	227	195	252	12	230	213	250	12	(500)	
Turbidity (NTU)	<0.05	<0.04	0.09	360	0.06	<0.04	0.22	365		0.3
Primary Inorganics (mg/L)										
Antimony	<0.0004	<0.0002	<0.0005	12	<0.0004	<0.0002	<0.0005	12	0.006	
Arsenic	<0.0002	<0.0002	0.0003	12	<0.0002	<0.0002	0.0003	12	0.01	
Barium	0.06	0.05	0.08	12	0.062	0.049	0.077	12	2	
Boron	0.010	0.008	0.012	12	0.010	0.007	0.012	12	2	
Bromate, dissolved	<0.005	<0.003	<0.005	53	<0.005	<0.003	<0.005	53	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.007	
Chlorate Dissolved	0.23	0.18	0.33	53	0.11	<0.05	0.23	53	1	
Chlorite Dissolved	<0.034	<0.005	<0.200	53	<0.034	<0.005	<0.200	53	1	
Chromium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.05	
Copper	<0.003	<0.002	<0.005	12	<0.003	<0.002	<0.005	12	2 (1)	
Fluoride	0.69	0.61	0.76	360	0.69	0.62	0.79	365	1.5	0.6–0.8
Lead	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.005	
Manganese	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12	0.12 (0.02)	
Mercury	<0.0002	<0.00005	<0.0002	13	<0.0002	<0.00005	<0.0002	13	0.001	
Mercury (ext µg/L)	<0.005	<0.005	<0.005	3	<0.005	<0.005	<0.005	3	0.001	
Nitrate (as N) Dissolved	0.05	<0.01	0.17	49	0.05	<0.01	0.17	49	10	
Nitrite (as N) Dissolved	<0.010	<0.005	0.020	49	<0.010	<0.005	0.020	49	1	
Selenium	0.0003	0.0002	0.0004	12	0.0003	0.0002	0.0004	12	0.05	
Total Chlorine	2.18	1.88	2.40	360	2.13	1.84	2.35	365	>1.0	>1.0 and <2.4
Total Cyanide	<0.031	<0.002	<0.100	4	<0.002	<0.002	<0.002	4	0.2	
Uranium	<0.0005	<0.0005	0.0006	12	<0.0005	<0.0005	0.0006	12	0.02	

7.8 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Primary Organics (µg/L)										
2,4-D	<0.11	<0.05	<0.25	4	<0.15	<0.05	<0.25	4	100	
2-methyl-4-chlorophenoxyacetic acid	<0.11	<0.05	<0.25	4	<0.15	<0.05	<0.25	4	100	
Atrazine	<0.05	<0.05	<0.05	4	<0.05	<0.05	<0.05	4	5	
Benzene	<0.5	<0.5	0.6	360	<0.5	<0.5	<0.5	365	5	
Benzo(a)pyrene	<0.005	<0.005	<0.005	4	<0.005	<0.005	<0.005	4	0.04	
Bromoxynil	<0.11	<0.05	<0.25	4	<0.15	<0.05	<0.25	4	5	
Carbon tetrachloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365	2	
Chlorobenzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Chlorpyrifos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	90	
Cyanazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Diazinon	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4		
Dicamba	<0.2	<0.1	<0.5	4	<0.3	<0.1	<0.5	4	110	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	359	<0.5	<0.5	<0.5	364	5	
Dichloroethylene (1,1)	<0.5	<0.5	<3.0	360	<0.5	<0.5	<3.0	365	14	
Dichlorophenol (2,4)	<0.2	<0.2	<0.3	4	<0.2	<0.2	<0.3	4		
Diclofop-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Dimethoate	<0.05	<0.05	<0.05	5	<0.05	<0.05	<0.05	5	20	
Dimethoate&Omethoate (Dimethoate)	<0.16	<0.16	<0.16	4	<0.16	<0.16	<0.16	4	20	
Diuron	<0.05	<0.05	<0.05	4	<0.05	<0.05	<0.05	4		
Ethylbenzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	140 (1.6)	
Glyphosate	<0.3	<0.2	<0.5	4	<0.3	<0.2	<0.5	4	280	
Haloacetic Acids (HAA5)	22.1	10.8	47.1	12	20.96	9.71	42.30	12	80	40 (single result)
Malathion	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4	190	
Methylene Chloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Metolachlor	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4		
Metribuzin	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	80	
Nitrilotriacetic Acid (NTA mg/L)	<0.4	<0.4	<0.4	4	<0.4	<0.4	<0.4	4	0.4	
N-Nitrosodimethylamine (NDMA)	<0.006	<0.006	<0.006	12	<0.006	<0.006	<0.006	12	0.040	0.01
Paraquat	<1	<1	<1	1	<1	<1	<1	1		
Paraquat (as dichloride)	<1	<1	<1	3	<1	<1	<1	3		
Pentachlorophenol	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4	60 (30)	
Perfluorooctane sulfonic acid (PFOS)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4	0.6	
Perfluorooctanoic acid (PFOA)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4	0.2	
Phorate	<3.31	<0.25	<12.50	4	<0.25	<0.25	<0.25	4		
Picloram	<0.2	<0.1	<0.5	4	<0.3	<0.1	<0.5	4		
Simazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Terbufos	<6.6	<0.5	<25.0	4	<0.5	<0.5	<0.5	4		
Tetrachloroethylene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	10	
Toluene	<0.5	<0.5	1.6	360	<0.5	<0.5	3.3	365	60 (24)	
Total Xylenes	<1.0	<0.5	<2.5	360	<1.0	<0.5	<2.5	365	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365	5	
Trifluralin	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Trihalomethanes	18.7	6.6	39.9	360	17.5	5.1	39.5	365	100	50 (single result)
Vinyl chloride	<1.0	<0.5	<1.0	359	<1.0	<0.5	<1.0	364	2	

7.8 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Radionuclides (Bq/L)										
Cesium-137	<0.2	<0.2	<0.2	2	<0.2	<0.2	<0.2	2	10	
Gross Alpha	<0.11	<0.10	<0.12	2	<0.13	<0.10	<0.15	2	(0.5)	
Gross Beta	<0.08	<0.07	0.09	2	<0.06	<0.05	<0.07	2	(1.0)	
Iodine-131	<0.4	<0.4	<0.4	2	<0.6	<0.4	<0.7	2	6	
Lead-210	<0.02	<0.02	<0.02	2	<0.02	<0.02	<0.02	2	0.2	
Radium-226	<0.005	<0.005	<0.005	2	<0.005	<0.005	<0.005	2	0.5	
Strontium-90	<0.05	<0.05	<0.05	2	<0.05	<0.05	<0.05	2	5	
Tritium	<40	<40	<40	2	<40	<40	<40	2	7000	
Secondary Inorganics (mg/L)										
Alkalinity Total (mg CaCO3/L)	118	99	143	360	118	8	140	365		
Aluminum	0.071	0.023	0.125	12	0.066	0.026	0.122	12	2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.12	0.08	0.18	128	0.12	0.08	0.18	130		
Beryllium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Bromide Dissolved	<0.03	<0.01	<0.05	53	<0.03	<0.01	<0.05	53		
Calcium	47.5	43.7	51.7	12	47.5	44.2	52.3	12		
Calcium Hardness Calculated	116	109	125	7	116	110	124	7		
Chloride Dissolved	5.90	3.89	11.40	53	6.67	4.61	12.10	53	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Free Chlorine	<0.07	<0.07	<0.07	12	<0.07	<0.07	<0.07	12		
Hardness, Ca (mg CaCO3/L)	117	98	141	353	116	96	138	358		
Iron	<0.005	<0.005	0.005	12	<0.005	<0.005	<0.005	12	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	12		
Lithium	0.0038	0.0031	0.0043	12	0.003	0.003	0.004	12		
Magnesium	13.9	12.6	15.1	12	13.9	12.6	15.1	12		
Molybdenum	0.0008	0.0006	0.0010	12	0.0008	0.0006	0.0009	12		
Nickel	<0.0005	<0.0005	0.0006	12	<0.0005	<0.0005	0.0006	12		
Ortho Phosphate (as P)	<0.02	<0.02	<0.02	24	<0.02	<0.02	<0.02	22		
Phosphorus	<0.02	<0.02	<0.02	12	<0.02	<0.02	<0.02	12		
Potassium	0.8	0.7	1.1	12	0.8	0.6	1.0	12		
Silicon	1.95	1.44	2.27	12	1.94	1.44	2.27	12		
Silver	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Sodium	9.7	6.8	16.1	12	11.9	6.7	18.9	12	(200)	
Strontium	0.445	0.385	0.488	12	0.441	0.408	0.478	12	7.0	
Sulphate Dissolved	70.2	59.3	86.8	53	72.5	59.7	95.1	53	(500)	
Thallium	<0.0003	<0.0002	<0.0005	12	<0.0003	<0.0002	<0.0005	12		
Tin	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Titanium	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Total Hardness (mg/L CaCO3)	178	149	218	353	177	145	211	358		
Total Hardness Calculated	173	162	182	7	172	162	180	7		
Total Sulphide (as S)	<0.0015	<0.0015	<0.0015	4	<0.0015	<0.0015	<0.0015	4	(0.05)	
Vanadium	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Zinc	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	(5.0)	
Zirconium	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	12		

7.8 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2024

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Secondary Organics (µg/L)										
1,1,2-Trichloroethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
1,2,3-Trichloropropane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
6:2 Fluorotelomer sulfonic acid(6:2 FTS)	<0.007	<0.002	<0.020	4	<0.007	<0.002	<0.020	4		
8:2 Fluorotelomer sulfonic acid(8:2 FTS)	<0.007	<0.002	<0.020	4	<0.007	<0.002	<0.020	4		
Aldicarb	<0.3	<0.1	<1.0	4	<0.1	<0.1	<0.1	4		
Aldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4		
Azinphos-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Bromochloroacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Bromodichloromethane	1.1	<0.5	2.6	360	1.0	<0.5	2.4	365		16
Bromoform	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Bromomethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35		
Carbaryl	<0.05	<0.05	<0.05	4	<0.05	<0.05	<0.05	4		
Carbofuran	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4		
Chloroethane	<0.5	<0.5	<0.5	33	<0.51	<0.50	0.84	35		
Chloroform	17.4	5.70	38.7	360	16.4	4.30	37.7	365		
Chloromethane	<5	<5	<5	33	<5	<5	<5	35		
Dibromoacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Dibromochloromethane	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichloroacetic acid	10.7	4.7	21.1	12	10.48	4.69	19.80	12		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	0.6	365		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Dieldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4		
Methyl Isobutyl Ketone (MIBK)	<3	<1	<20	360	<3	<1	<20	365		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	0.5	354	<0.5	<0.5	<0.5	358	(15)	
Monobromoacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Monochloroacetic acid	<1.06	<1.00	1.58	12	<1.08	<1.00	1.68	12		
Parathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Perfluorobutane sulfonic acid (PFBS)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4		
Perfluorobutanoic acid [PFBA]	<0.04	<0.02	<0.10	4	<0.04	<0.02	<0.10	4		
Perfluoroheptanoic acid [PFHpA]	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4		
Perfluorohexanesulfonic acid [PFHxS]	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4		
Perfluorohexanoic acid [PFHxA]	<0.007	<0.002	<0.02	4	<0.02	<0.02	<0.02	4		
Perfluorononanoic acid [PFNA]	<0.007	<0.002	<0.02	4	<0.02	<0.02	<0.02	4		
Perfluoropentanoic acid (PFPeA)	<0.007	<0.002	<0.02	4	<0.02	<0.02	<0.02	4		
Prometryn	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4		
Styrene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365		
Total Organic Carbon	1.2	<0.5	1.9	12	1.1	0.7	1.7	12		
Total Volatile Organics (NonTHM)	2.3	<1.0	6.1	327	2	<1	6	330		
Total Volatile Organics (Unknown)	1.3	<0.5	7.7	41	1.3	<0.5	3.6	43		
Triallate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Trichloroacetic acid	11.08	6.06	24.40	12	10.24	5.02	20.80	12		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365		
Xylene (1,2)	<0.5	<0.3	<0.5	360	<0.5	<0.3	<0.5	365		
Xylene (1,4)	<0.5	<0.4	0.6	360	<0.5	<0.4	0.9	365		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval Limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

	Mean	Min	Max	Count	Limits: *Approval or GCDWQ MAC, (AO or OG)	Limits: EPCOR
Microbiological						
Microcystin	<0.2	<0.2	<0.2	6	1.5	
Physical						
Colour (TCU)	0.8	0.6	1.1	4	(15)	10
pH (N/A)	7.8	7.6	8.1	316	(7.0 - 10.5)	7.3 - 8.3
Total Dissolved Solids (mg/L)	234	213	261	4	(500)	
Turbidity (NTU)	0.25	<0.04	5.03	1625		1.0
UV 254 %T	<92.8	<90.1	<94.7	4		
Primary Inorganics (mg/L) **						
Antimony	<0.0004	<0.0002	<0.0005	5	0.006	
Arsenic	<0.0002	<0.0002	<0.0002	5	0.01	
Barium	0.062	0.057	0.074	5	2	
Boron	0.010	0.009	0.011	5	2	
Bromate Dissolved	<0.005	<0.003	<0.005	21	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	5	0.007	
Chlorate Dissolved	0.18	<0.08	0.30	21	1	
Chlorite Dissolved	<0.033	<0.005	<0.200	21	1	
Chromium	0.0002	<0.0002	0.0003	5	0.05	
Copper	<0.003	<0.002	<0.005	5	2 (1)	
Fluoride	0.68	0.65	0.74	4	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	5	0.005	
Manganese	<0.002	<0.002	<0.002	5	0.12 (0.02)	
Mercury	<0.00010	<0.00005	<0.00020	2	0.001	
Mercury (ext µg/L)	<0.005	<0.005	<0.005	3	0.001	
Nitrate (as N) Dissolved	0.04	<0.01	0.18	337	10	
Nitrite (as N) Dissolved	<0.009	<0.005	0.040	337	1	
Selenium	0.0003	<0.0002	0.0003	5	0.05	
Strontium	0.451	0.438	0.466	5	7.0	
Total Chlorine	1.88	0.09	2.44	1624	>0.5 and <3.0	>1.0 and <2.4
Total Cyanide	<0.02	<0.02	<0.02	4	0.2	
Uranium	<0.0005	<0.0005	<0.0005	5	0.02	

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Primary Organics (µg/L) **						
2,4-D	<0.15	<0.05	<0.25	4	100	
2-methyl-4-chlorophenoxyacetic acid	<0.15	<0.05	<0.25	4	100	
Atrazine	<0.05	<0.05	<0.05	4	5	
Atrazine + N-dealkylated metabolites	<0.1	<0.1	<0.1	4	0.005	
Azinphos-methyl	<0.1	<0.1	<0.1	4	0.02	
Benzene	<0.5	<0.5	<0.5	74	5	
Benzo(a)pyrene	<0.005	<0.005	<0.005	4	0.04	
Bromoxynil	<0.15	<0.05	<0.25	4	5	
Carbon Tetrachloride	<0.5	<0.5	<0.5	74	2	
Chlorobenzene	<0.5	<0.5	<0.5	74	80 (30)	
Chlorpyrifos	<0.1	<0.1	<0.1	4	90	
Cyanazine	<0.1	<0.1	<0.1	4		
Diazinon	<0.025	<0.025	<0.025	4		
Dicamba	<0.3	<0.1	<0.5	4	110	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	74		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	74	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	74	5	
Dichloroethylene (1,1)	<0.5	<0.5	<0.5	74	14	
Dichlorophenol (2,4)	<0.2	<0.2	<0.3	4		
Diclofop-methyl	<0.1	<0.1	<0.1	4		
Dimethoate	<0.05	<0.05	<0.05	4	20	
Diquat	<1	<1	<1	4	0.05	
Diuron	<0.05	<0.05	<0.05	4		
Ethylbenzene	<0.5	<0.5	<0.5	74	140 (1.6)	
Glyphosate	<0.3	<0.2	<0.5	4	280	
Haloacetic Acids, total (HAA5)	20.8	10.3	49.6	72	80	40 (single result)
Malathion	<0.025	<0.025	<0.025	4	190	
Methylene Chloride	<0.5	<0.5	<1.0	74	50	
Metolachlor	<0.025	<0.025	<0.025	4		
Metribuzin	<0.1	<0.1	<0.1	4	80	
Nitrilotriacetic Acid (NTA mg/L)	<0.4	<0.4	<0.4	4	0.4	
N-Nitrosodimethylamine (NDMA)	<0.00310	<0.00100	0.00690	36	0.040	0.01
Paraquat	<1	<1	<1	1		
Paraquat (as dichloride)	<1	<1	<1	3		
Pentachlorophenol	<0.6	<0.5	<1.0	4	60 (30)	
Perfluorooctane sulfonic acid (PFOS)	<0.02	<0.02	<0.02	4	0.6	
Perfluorooctanoic acid (PFOA)	<0.02	<0.02	<0.02	4	0.2	
Phorate	<0.25	<0.25	<0.25	4		
Picloram	<0.3	<0.1	<0.5	4		

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

	Mean	Min	Max	Count	Limits: *Approval or GCDWQ MAC, (AO or OG)	Limits: EPCOR
**Primary Organics (µg/L) ** **						
Simazine	<0.1	<0.1	<0.1	4		
Terbufos	<0.5	<0.5	<0.5	4		
Tetrachloroethylene	<0.5	<0.5	<0.5	74	10	
Tetrachlorophenol (2,3,4,6)	<0.5	<0.5	<0.5	4	100 (1)	
Toluene	<0.5	<0.5	<0.5	74	60 (24)	
Total Xylenes	<1.0	<0.5	<1.0	74	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	74	5	
Trichlorophenol (2,4,6)	<0.3	<0.2	<0.5	4	5 (2)	
Trifluralin	<0.1	<0.1	<0.1	4		
Trihalomethanes	21.3	8.6	40.7	74	100	50 (single result)
Vinyl Chloride	<1.0	<0.5	<1.0	74	2	

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

	Mean	Min	Max	Count	Limits: *Approval or GCDWQ MAC, (AO or OG)	Limits: EPCOR
Secondary Inorganics (mg/L) ***						
Alkalinity Total	117	112	121	4		
Alkalinity, PHP (mg CaCO3/L)	<3	<3	<3	4		
Aluminum	0.047	0.014	0.093	5	2.9 (0.1)	0.1/0.2
Ammonia as N	0.15	0.09	0.24	28		
Beryllium	<0.0002	<0.0002	<0.0002	5		
Bromide Dissolved	<0.03	<0.01	<0.05	21		
Calcium	48.3	46.5	51.8	5		
Chloride Dissolved	6.56	4.87	8.73	21	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	5		
Free Chlorine	<0.07	<0.07	<0.07	4		
Iron	0.008	<0.005	0.013	5	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	5		
Lithium	0.0038	0.0034	0.0042	5		
Magnesium	14.1	13.4	15.3	5		
Molybdenum	0.0008	0.0006	0.0010	5		
Nickel	0.0006	<0.0005	0.0010	5		
Ortho Phosphate (as P)	0.88	0.24	1.32	455		
Phosphorus	0.98	0.91	1.05	5		
Potassium	0.8	0.7	0.9	5		
Silicon	2.03	1.68	2.59	5		
Silver	<0.0002	<0.0002	<0.0002	5		
Sodium	10.3	6.9	13.5	5	(200)	
Sulphate Dissolved	71.1	59.0	82.4	21	(500)	
Thallium	<0.0003	<0.0002	<0.0005	5		
Tin	<0.0005	<0.0005	<0.0005	5		
Titanium	<0.0005	<0.0005	<0.0005	5		
Total Hardness (mg/L CaCO3)	178	171	183	4		
Total Kjeldahl Nitrogen	0.4	0.4	0.5	4		
Total Sulphide (as S)	<0.0015	<0.0015	<0.0015	4	(0.05)	
Vanadium	<0.0005	<0.0005	<0.0005	5		
Zinc	0.011	<0.005	0.037	5	(5.0)	
Zirconium	<0.001	<0.001	<0.001	5		

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

	Mean	Min	Max	Count	Limits: *Approval or GCDWQ MAC, (AO or OG)	Limits: EPCOR
Secondary Organics (µg/L) ***						
1,1,1-Trichloroethane	<0.5	<0.5	<0.5	7		
1,1,2,2-Tetrachloroethane	<0.5	<0.5	<0.5	7		
1,2-Dichloroethylene, cis	<0.5	<0.5	<0.5	7		
1,2-Dichloroethylene, trans	<0.5	<0.5	<0.5	7		
1,2-Dichloropropane	<0.5	<0.5	<0.5	7		
1,3-Dichlorobenzene	<0.5	<0.5	<0.5	7		
2,4,5-T	<0.15	<0.05	<0.25	4		
6:2 Fluorotelomer sulfonic acid(6:2 FTS)	<0.02	<0.02	<0.02	4		
8:2 Fluorotelomer sulfonic acid(8:2 FTS)	<0.02	<0.02	<0.02	4		
a-chlordane	<0.008	<0.008	<0.008	4		
Alachlor	<0.05	<0.05	<0.05	4		
Aldicarb	<0.1	<0.1	<0.1	4		
Aldrin	<0.008	<0.008	<0.008	4		
Ametryn	<0.025	<0.025	<0.025	4		
Atrazine Desethyl	<0.025	<0.025	<0.025	4		
Bendiocarb	<0.025	<0.025	<0.025	4		
Bromochloroacetic acid	<1	<1	<1	72		
Bromodichloromethane	1.1	<0.5	2.1	74		16
Bromoform	<0.5	<0.5	<0.5	74		
Carbaryl	<0.05	<0.05	<0.05	4		
Carbofuran	<0.025	<0.025	<0.025	4		
Chloroform	20.0	7.6	39.1	74		
Dibromoacetic acid	<1	<1	<1	72		
Dibromochloromethane	<0.5	<0.5	<0.5	74		
Dichloroacetic acid	10.45	4.89	23.50	72		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	67		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	67		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	67		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	67		
Dieldrin	<0.008	<0.008	<0.008	4		
Dinoseb	<0.15	<0.05	<0.25	4		
gamma-hexachlorocyclohexane	<0.008	<0.008	<0.008	4		
g-chlordane	<0.008	<0.008	<0.008	4		
Heptachlor	<0.008	<0.008	<0.008	4		
Heptachlor Epoxide	<0.008	<0.008	<0.008	4		
Methoxychlor	<0.008	<0.008	<0.008	4		
Methyl Isobutyl Ketone (MIBK)	<3	<1	<20	74		
Methyl Parathion	<0.1	<0.1	<0.1	4		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	68	(15)	

7.9.a Routine Distribution System (does not include Field Reservoirs)

2024

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Secondary Organics (µg/L) * **						
Monobromoacetic acid	<1	<1	<1	72		
Monochloroacetic acid	1	<1	2	72		
op-DDT	<0.004	<0.004	<0.004	4		
Oxychlordane	<0.008	<0.008	<0.008	4		
Parathion	<0.1	<0.1	<0.1	4		
Perfluorobutane sulfonic acid (PFBS)	<0.02	<0.02	<0.02	4		
Perfluorobutanoic acid (PFBA)	<0.04	<0.02	<0.10	4		
Perfluoroheptanoic acid (PFHpA)	<0.02	<0.02	<0.02	4		
Perfluorohexane sulfonic acid (PFHxS)	<0.02	<0.02	<0.02	4		
Perfluorohexanoic acid (PFHxA)	<0.02	<0.02	<0.02	4		
Perfluorononanoic acid (PFNA)	<0.02	<0.02	<0.02	4		
Perfluoropentanoic acid (PFPeA)	<0.02	<0.02	<0.02	4		
pp-DDD	<0.004	<0.004	<0.004	4		
pp-DDE	<0.004	<0.004	<0.004	4		
pp-DDT	<0.004	<0.004	<0.004	4		
Prometon	<0.025	<0.025	<0.025	4		
Prometryn	<0.025	<0.025	<0.025	4		
Propazine	<0.025	<0.025	<0.025	4		
Styrene	<0.5	<0.5	<0.5	74		
Temephos	<0.25	<0.25	<0.25	4		
Terbutryn	<0.025	<0.025	<0.025	4		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<0.5	67		
Total Organic Carbon	1.8	1.0	2.7	220		
Total Volatile Organics (NonTHM)	2	<1	5	67		
Total Volatile Organics (Unknown)	1.0	<0.5	1.9	11		
Triallate	<0.1	<0.1	<0.1	4		
Trichloroacetic acid	10.1	5.4	24.3	72		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	74		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	67		
Trichloroethane (1,1,2)	<0.5	<0.5	<0.5	7		
Trichloropropane (1,2,3)	<0.5	<0.5	<0.5	7		
Xylene (1,2)	<0.5	<0.3	<0.5	74		
Xylene (1,4)	<0.5	<0.4	<0.5	74		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

Schedule 4 Testing:

- As per AEPA Approval 638-04-01 requirements 2 grab samples per annum and these were collected from two locations in the distribution system during December and February (sampled February 5, 2024) and June to August (sampled July 8, 2024) and tested for all Schedule 4 parameters. Two additional samples were collected from two locations in the distribution system (on May 6, 2024 and October 7, 2024) and tested for all Schedule 4 parameters.

Microcystin Testing:

- As per AEPA Approval 638-04-01, one sample was collected from the distribution system between August 1 and 16 (sampled August 12, 2024) and between September 1 and September 16 (sampled Sept 9, 2024) and tested for total microcystin.

7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations

2024

	Mean	Min	Max	Count	Limits: *Approval or GCDWQ MAC, (AO or OG)	Limits: EPCOR
Physical						
Colour (TCU)	0.9	<0.5	1.9	140	(15)	10
pH (N/A)	7.8	7.6	8.1	140	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.44	<0.04	2.89	140		1.0
**Primary Inorganics (mg/L) ** **						
Antimony	<0.0005	<0.0002	<0.0005	140	0.006	
Arsenic	<0.0002	<0.0002	<0.0002	140	0.01	
Barium	0.062	<0.002	0.093	140	2	
Boron	0.011	0.007	0.036	140	2	
Cadmium	<0.0002	<0.0002	<0.0002	140	0.007	
Chromium	<0.0002	<0.0002	<0.0002	140	0.05	
Copper	0.005	<0.002	0.192	140	2 (1)	
Lead	0.0002	<0.0002	0.0025	140	0.005	
Manganese	0.002	<0.002	0.008	140	0.12 (0.02)	
Nitrate (as N) Dissolved	0.03	0.03	0.03	1	10	
Nitrite (as N) Dissolved	<0.01	<0.01	<0.01	1	1	
Selenium	0.0003	<0.0002	0.0004	140	0.05	
Strontium	0.445	<0.002	0.501	140	7.0	
Total Chlorine	1.82	0.75	2.27	140	>0.5 and <3.0	>1.0 and <2.4
Uranium	0.0005	<0.0005	0.0006	140	0.02	
**Primary Organics (µg/L) ** **						
Benzene	<0.5	<0.5	<0.5	140	5	
Carbon tetrachloride	<0.5	<0.5	<0.5	140	2	
Chlorobenzene	<0.5	<0.5	<0.5	140	80 (30)	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	140		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	140	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	140	5	
Dichloroethylene (1,1)	<0.5	<0.5	<0.5	140	14	
Ethylbenzene	<0.5	<0.5	<0.5	140	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<1.0	140		
Tetrachloroethylene	<0.5	<0.5	<0.5	140	10	
Toluene	0.6	<0.5	3.4	140	60 (24)	
Total Xylenes	<1.0	<0.5	1.2	140	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	140	5	
Trihalomethanes	21.1	6.8	38.6	140	100	50 (single result)
Vinyl chloride	<1.0	<0.5	<1.0	140	2	

7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations

2024

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Secondary Inorganics (mg/L) * **						
Aluminum	0.089	0.012	0.955	140	2.9 (0.1)	0.1/0.2
Beryllium	<0.0002	<0.0002	<0.0002	140		
Calcium	48.1	<0.1	54.3	140		
Cobalt	0.0002	<0.0002	0.0006	140		
Iron	0.059	<0.005	0.497	140	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	140		
Lithium	0.0038	<0.0002	0.0076	140		
Magnesium	13.7	<0.1	16.4	140		
Molybdenum	0.0008	0.0006	0.0011	140		
Nickel	0.0006	<0.0005	0.0028	140		
Phosphorus	0.99	0.33	1.62	140		
Potassium	0.9	0.3	2.8	140		
Silicon	2.05	1.63	2.69	140		
Silver	<0.0002	<0.0002	<0.0002	140		
Sodium	11.4	6.6	98.7	140	(200)	
Thallium	<0.0002	<0.0002	<0.0005	140		
Tin	<0.0005	<0.0005	<0.0005	140		
Titanium	<0.0005	<0.0005	<0.0005	140		
Total Hardness (mg/L CaCO3)	177	<2	201	140		
Vanadium	<0.0005	<0.0005	<0.0005	140		
Zinc	0.005	<0.005	0.023	140	(5.0)	
Zirconium	<0.001	<0.001	<0.001	140		

7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations

2024

Secondary Organics (µg/L) ***						
Bromodichloromethane	1.2	<0.5	2.1	140		16
Bromoform	<0.5	<0.5	<0.5	140		
Chloroform	19.7	5.6	37.6	140		
Dibromochloromethane	<0.5	<0.5	<0.5	140		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	140		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	140		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	140		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	140		
Methyl Isobutyl Ketone (MIBK)	<2	<1	<20	140		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	138	(15)	
Styrene	<0.5	<0.5	<0.5	140		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<0.5	140		
Total Volatile Organics (NonTHM)	2.5	<1.0	6.9	132		
Total Volatile Organics (Unknown)	3.2	<0.5	13.8	17		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	140		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	140		
Trichloroethane (1,1,2)	<0.5	<0.5	<0.5	8		
Trichloropropane (1,2,3)	<0.5	<0.5	<0.5	8		
Xylene (1,2)	<0.5	<0.3	<0.5	140		
Xylene (1,4)	0.5	<0.4	1.1	140		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval Limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.10 Castledowns, Clareview and Discovery Park Reservoirs
2024

Parameter	Castledowns				Clareview				Discovery Park				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical														
Colour (TCU)	1.2	0.6	2.0	5	0.8	0.7	1.0	7	0.7	<0.5	1.0	8	(15)	10
Conductivity (µS/cm)	401	369	423	5	396	368	421	7	395	367	420	8		
Odour	Inoff	Inoff	Inoff	5	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	8		
pH (N/A)	7.8	7.6	8.1	22	7.8	7.7	8.1	25	7.9	7.8	8.1	26	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.13	0.06	0.46	49	0.15	0.10	0.43	53	0.15	0.06	1.09	55		1
**Primary Inorganics (mg/L) ** **														
Antimony	<0.0004	<0.0002	<0.0005	5	<0.0005	<0.0002	<0.0005	7	<0.0005	<0.0002	<0.0005	8	0.006	
Arsenic	<0.0002	<0.0002	0.0002	5	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	0.0003	8	0.01	
Barium	0.060	0.051	0.069	5	0.062	0.056	0.068	7	0.062	0.054	0.069	8	2	
Boron	0.009	0.007	0.011	5	0.010	0.008	0.013	7	0.010	0.008	0.012	8	2	
Bromate Dissolved	<0.005	<0.005	<0.005	12	<0.005	<0.003	<0.005	16	<0.005	<0.003	<0.005	16	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8	0.007	
Chlorate Dissolved	0.119	0.050	0.143	12	0.203	0.172	0.229	16	0.120	<0.090	0.163	16	1	
Chlorite Dissolved	<0.005	<0.005	<0.005	12	<0.029	<0.005	<0.200	16	<0.029	<0.005	<0.200	16	1	
Chromium	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8	0.05	
Copper	<0.003	<0.002	<0.005	5	<0.002	<0.002	<0.005	7	<0.002	<0.002	<0.005	8	2 (1)	
Fluoride	0.70	0.66	0.75	5	0.69	0.65	0.74	7	0.69	0.65	0.77	8	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8	0.005	
Manganese	<0.002	<0.002	0.003	5	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	8	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8	0.001	
Nitrate (as N) Dissolved	0.036	0.010	0.170	44	0.040	0.010	0.180	47	0.045	0.020	0.190	49	10	
Nitrite (as N) Dissolved	<0.010	<0.005	0.010	44	<0.009	<0.005	0.010	47	<0.009	<0.005	0.010	49	1	
Selenium	0.0003	0.0002	0.0004	5	0.0003	0.0002	0.0003	7	0.0003	0.0002	0.0003	8	0.05	
Strontium	0.438	0.423	0.453	5	0.453	0.405	0.488	7	0.446	0.410	0.479	8	7.0	
Total Chlorine	1.80	1.27	2.06	49	1.84	1.60	2.09	53	1.42	1.03	1.87	55	>0.5 and <3.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	0.0006	8	0.02	
**Primary Organics (µg/L) ** **														
Benzene	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	5	
Carbon Tetrachloride	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	2	
Chlorobenzene	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,4)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	5 (1)	
Dichloroethane (1,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	5	
Dichloroethylene (1,1)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	14	
Ethylbenzene	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	140 (1.6)	
Methylene Chloride	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	50	
Tetrachloroethylene	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	10	

7.10 Castledowns, Clareview and Discovery Park Reservoirs
2024

Parameter	Castledowns				Clareview				Discovery Park				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Toluene	<0.60	<0.50	1.00	5	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	8	60 (24)	
Total Xylenes	<1	<1	<1	5	<1	<1	<1	7	<1	<1	<1	8	90	
Trichloroethylene	<0.60	<0.50	1.00	5	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	8	5	
Trihalomethanes	22.2	7.8	36.2	5	23.5	15.4	36.9	7	23.4	13.1	39.7	8	100	50 (single result)
Vinyl Chloride	<1.2	<1.0	2.0	5	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	8	2	
Secondary Inorganics (mg/L) ***														
Alkalinity Total	117	112	122	5	119	109	130	7	118	111	126	8		
Aluminum	0.060	0.022	0.100	5	0.073	0.023	0.173	7	0.086	0.021	0.200	8	2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.18	0.14	0.28	21	0.19	0.15	0.22	23	0.22	<0.05	0.31	25		
Beryllium	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8		
Bromide Dissolved	<0.023	<0.010	<0.030	12	<0.028	<0.010	<0.050	16	<0.028	<0.010	<0.050	16		
Calcium	47.3	45.5	49.5	5	47.7	43.7	51.3	7	46.5	43.9	50.3	8		
Calcium Hardness	121	121	121	1	124	118	130	2	119	113	124	2		
Calcium Hardness Calculated	118	114	124	4	117	109	126	5	117	110	126	6		
Chloride Dissolved	7.1	5.6	8.0	12	5.9	5.1	7.0	16	6.8	5.5	8.4	16	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8		
Iron	0.020	<0.005	0.078	5	0.015	0.012	0.019	7	<0.006	<0.005	0.008	8	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	5	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	8		
Lithium	0.0035	0.0030	0.0040	5	0.0037	0.0032	0.0043	7	0.0034	0.0030	0.0041	8		
Magnesium	13.6	13.3	14.0	5	14.0	12.2	14.9	7	13.7	12.7	14.5	8		
Molybdenum	0.0008	0.0006	0.0009	5	0.0008	0.0006	0.0010	7	0.0008	0.0006	0.0009	8		
Nickel	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	0.0006	8		
Ortho Phosphate (as P)	0.90	0.84	1.00	37	0.89	0.74	0.95	40	0.91	0.76	1.04	41		
Phosphorus	0.97	0.87	1.02	5	0.95	0.91	0.97	7	0.99	0.91	1.02	8		
Potassium	0.88	0.70	1.20	5	0.83	0.70	1.10	7	0.84	0.70	1.00	8		
Silicon	2.03	1.59	2.36	5	1.90	1.61	2.13	7	1.89	1.57	2.21	8		
Silver	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	8		
Sodium	12.3	7.3	17.1	5	10.2	7.1	16.2	7	11.9	7.4	19.4	8	(200)	
Sulphate Dissolved	73	62	80	12	70	60	76	16	72	59	81	16	(500)	
Thallium	<0.0003	<0.0002	<0.0005	5	<0.0002	<0.0002	<0.0005	7	<0.0002	<0.0002	<0.0005	8		
Tin	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	8		
Titanium	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	8		
Total Hardness (mg/L CaCO3)	184	184	184	1	188	177	198	2	178	174	182	2		
Total Hardness Calculated	174	168	181	4	174	160	188	5	173	162	185	6		
Vanadium	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	8		
Zinc	<0.005	<0.005	<0.005	5	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	8	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	5	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	8		
Secondary Organics (µg/L) ***														

7.10 Castledowns, Clareview and Discovery Park Reservoirs
2024

Parameter	Castledowns				Clareview				Discovery Park				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Bromodichloromethane	0.9	0.6	1.2	5	1.5	0.9	2.2	7	1.2	0.7	1.8	8		16
Bromoform	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Chloroform	21.3	6.9	35.6	5	21.9	13.9	34.8	7	21.9	11.7	37.8	8		
Dibromochloromethane	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,3)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichloroethylene, cis (1,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichloroethylene, trans (1,2)	<0.6	<0.5	< 1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Dichloropropane (1,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Methyl Isobutyl Ketone (MIBK)	<1.2	<1.0	2.0	5	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	8		
Methyl t-Butyl Ether (MTBE)	<0.6	<0.5	1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8	(15)	
Styrene	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Tetrachloroethane (1,1,2,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Total Organic Carbon	1.7	0.9	2.3	17	1.7	1.1	2.5	20	1.7	0.7	2.4	21		
Total Volatile Organics (NonTHM)	1.3	<1.0	1.9	5	2.4	<1.0	4.4	7	2.5	<1.0	4.2	8		
Total Volatile Organics (Unknown)	0.7	0.7	0.7	1	1.0	1.0	1.0	1	1.2	1.2	1.2	1		
Trichlorobenzene (1,2,4)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Trichloroethane (1,1,1)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Xylene (1,2)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		
Xylene (1,4)	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	8		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.11 Kaskitayo, Londonderry, Millwoods Reservoirs
2024

Parameter	Kaskitayo				Londonderry				Millwoods				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical														
Colour (TCU)	1.1	0.5	1.6	6	1.0	0.7	1.2	5	0.9	<0.5	1.2	6	(15)	10
Conductivity (µS/cm)	401	370	426	6	390	369	405	5	397	370	421	6		
Odour	Inoff	Inoff	Inoff	6	Inoff	Inoff	Inoff	5	Inoff	Inoff	Inoff	6		
pH (N/A)	7.7	7.6	7.9	26	7.8	7.7	8.1	24	7.8	7.7	8.0	24	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.11	0.04	0.39	53	0.13	0.06	0.52	53	0.11	0.06	0.23	53		1
**Primary Inorganics (mg/L) ** **														
Antimony	<0.0005	<0.0002	<0.0005	6	<0.0004	<0.0002	<0.0005	5	<0.0005	<0.0002	<0.0005	6	0.006	
Arsenic	<0.0002	<0.0002	0.0003	6	<0.0002	<0.0002	0.0002	5	<0.0002	<0.0002	0.0003	6	0.01	
Barium	0.063	0.056	0.071	6	0.059	0.052	0.068	5	0.061	0.051	0.071	6	2	
Boron	0.009	0.008	0.010	6	0.010	0.007	0.012	5	0.010	0.007	0.013	6	2	
Bromate Dissolved	<0.005	<0.003	<0.005	12	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.000	<0.0002	5	<0.0002	<0.0002	<0.0002	6	0.007	
Chlorate Dissolved	<0.101	<0.080	0.126	12	0.216	0.188	0.238	12	0.134	0.090	0.171	12	1	
Chlorite Dissolved	<0.038	<0.005	<0.200	12	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	1	
Chromium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6	0.05	
Copper	<0.003	<0.002	<0.005	6	<0.003	<0.002	<0.005	5	<0.003	<0.002	<0.005	6	2 (1)	
Fluoride	0.70	0.65	0.74	6	0.69	0.66	0.73	5	0.68	0.65	0.72	6	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6	0.005	
Manganese	<0.002	<0.002	<0.002	6	<0.002	<0.002	<0.002	5	<0.002	<0.002	<0.002	6	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6	0.001	
Nitrate (as N) Dissolved	0.035	<0.010	0.170	49	0.038	0.010	0.180	46	0.033	0.010	0.160	46	10	
Nitrite (as N) Dissolved	<0.009	<0.005	0.010	49	<0.009	<0.005	0.010	46	<0.009	<0.005	0.010	46	1	
Selenium	0.0003	0.0002	0.0003	6	0.0002	0.0002	0.0003	5	0.0003	0.0002	0.0004	6	0.05	
Strontium	0.450	0.385	0.483	6	0.437	0.412	0.459	5	0.448	0.422	0.481	6	7.0	
Total Chlorine	1.96	1.18	2.23	53	1.92	1.63	2.25	53	2.01	1.79	2.21	53	>0.5 and <3.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	0.0006	6	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	6	0.02	
**Primary Organics (µg/L) ** **														
Benzene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	5	
Carbon Tetrachloride	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	2	
Chlorobenzene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	80 (30)	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	5	
Dichloroethylene (1,1)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	14	
Ethylbenzene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	10	

7.11 Kaskitayo, Londonderry, Millwoods Reservoirs
2024

Parameter	Kaskitayo				Londonderry				Millwoods				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Toluene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	60 (24)	
Total Xylenes	<1	<1	<1	6	<1	<1	<1	5	<1	<1	<1	7	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	5	
Trihalomethanes	20.3	10.8	33.4	6	22.4	9.8	35.8	5	19.8	7.8	38.3	7	100	50 (single result)
Vinyl Chloride	<1.0	<1.0	<1.0	6	<1.2	<1.0	2.0	5	<1.1	<1.0	2.0	7	2	
Secondary Inorganics (mg/L) ***														
Alkalinity Total	122	112	129	6	115	110	121	5	116	112	123	6		
Aluminum	0.060	0.022	0.097	6	0.063	0.018	0.120	5	0.086	0.022	0.168	6	2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.17	0.11	0.20	25	0.18	0.14	0.22	23	0.17	0.11	0.19	24		
Beryllium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6		
Bromide Dissolved	<0.027	<0.010	<0.050	12	<0.023	<0.010	<0.030	12	<0.023	<0.010	<0.030	12		
Calcium	47.8	43.3	51.2	6	47.1	44.6	49.5	5	47.2	45.2	49.6	6		
Calcium Hardness	124	118	129	2	122	122	122	1	122	122	122	1		
Calcium Hardness Calculated	117	108	127	4	116	111	124	4	117	113	124	5		
Chloride Dissolved	6.8	5.6	8.2	12	6.1	4.9	7.2	12	6.5	5.5	7.4	12	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6		
Iron	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	5	<0.005	<0.005	<0.005	6	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.01	6	<0.001	<0.001	<0.001	5	<0.001	<0.0001	<0.0001	6		
Lithium	0.0033	0.0029	0.0037	6	0.0038	0.0031	0.0043	5	0.0037	0.0031	0.0045	6		
Magnesium	13.9	11.8	15.1	6	13.8	13.3	14.3	5	13.9	13.3	14.5	6		
Molybdenum	0.0007	0.0006	0.0009	6	0.0008	0.0006	0.0010	5	0.0008	0.0006	0.0011	6		
Nickel	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	0.0005	6		
Ortho Phosphate (as P)	0.90	0.76	1.02	40	0.90	0.84	0.95	40	0.90	0.80	1.00	40		
Phosphorus	0.95	0.87	1.00	6	0.97	0.89	1.03	5	0.97	0.90	1.01	6		
Potassium	0.83	0.70	1.10	6	0.88	0.60	1.40	5	0.85	0.70	1.10	6		
Silicon	1.95	1.53	2.16	6	2.05	1.56	2.35	5	1.98	1.55	2.43	6		
Silver	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	6		
Sodium	12.1	7.3	22.0	6	10.3	7.0	13.0	5	11.9	7.3	16.4	6	(200)	
Sulphate Dissolved	72	61	80	12	71	60	75	12	73	61	80	12	(500)	
Thallium	<0.0003	<0.0002	<0.0005	6	<0.0003	<0.0002	<0.0005	5	<0.0003	<0.0002	<0.0005	6		
Tin	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	6		
Titanium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	6		
Total Hardness (mg/L CaCO3)	184	178	190	2	184	184	184	1	185	185	185	1		
Total Hardness Calculated	173	157	189	4	172	166	182	4	175	168	184	5		
Vanadium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	6		
Zinc	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	5	<0.005	<0.005	<0.005	6	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	6	<0.0010	<0.0010	<0.0010	5	<0.0010	<0.0010	<0.0010	6		
Secondary Organics (µg/L) ***														

7.11 Kaskitayo, Londonderry, Millwoods Reservoirs
2024

Parameter	Kaskitayo				Londonderry				Millwoods				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Bromodichloromethane	1.2	0.7	1.8	6	1.1	0.7	1.4	5	1.1	0.6	2.2	7		16
Bromoform	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Chloroform	18.8	9.8	31.6	6	21.3	8.53	4.35	1	8.6	6.8	37.4	7		
Dibromochloromethane	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	< 1.0	5	<0.6	<0.5	<1.0	7		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Methyl Isobutyl Ketone (MIBK)	<1.0	<1.0	<1.0	6	<1.2	<1.0	2.0	5	<1.1	<1.0	2.0	7		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7	(15)	
Styrene	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Total Organic Carbon	1.8	1.2	2.6	20	1.7	1.0	2.5	19	1.7	0.9	2.6	19		
Total Volatile Organics (NonTHM)	2.3	<1.0	4.3	6	1.5	<1.0	2.4	5	1.7	<1.0	3.6	7		
Total Volatile Organics (Unknown)	1.1	1.1	1.1	1				0	1.3	1.3	1.3	1		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Xylene (1,2)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		
Xylene (1,4)	<0.5	<0.5	<0.5	6	<0.6	<0.5	<1.0	5	<0.6	<0.5	<1.0	7		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs
2024

Parameter	North Jasper Place				Ormsby				Papaschase 1				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical														
Colour (TCU)	0.9	0.6	1.3	7	0.9	0.6	1.1	5	0.9	0.7	1.0	5	(15)	10
Conductivity (µS/cm)	399	367	421	7	403	371	424	5	388	367	408	5		
Odour	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	5	Inoff	Inoff	Inoff	5		
pH (N/A)	7.8	7.7	8.0	25	7.8	7.6	8.0	24	7.8	7.6	8.0	24	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.12	0.05	0.37	53	0.11	0.05	0.28	53	0.14	0.06	0.26	53		1
Primary Inorganics (mg/L) **														
Antimony	<0.0005	<0.0002	<0.0005	7	<0.0004	<0.0002	<0.0005	5	<0.0004	<0.0002	<0.0005	5	0.006	
Arsenic	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	0.0002	5	<0.0002	<0.0002	0.0003	5	0.01	
Barium	0.061	0.054	0.068	7	0.060	0.051	0.071	5	0.059	0.050	0.071	5	2	
Boron	0.010	0.008	0.014	7	0.010	0.007	0.011	5	0.009	0.007	0.011	5	2	
Bromate Dissolved	<0.005	<0.003	<0.005	16	<0.005	<0.005	<0.005	10	<0.005	<0.005	<0.005	10	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5	0.007	
Chlorate Dissolved	0.112	<0.080	0.147	16	0.102	0.060	0.139	10	0.232	0.190	0.261	10	1	
Chlorite Dissolved	<0.029	<0.005	<0.200	16	<0.005	<0.005	<0.005	10	<0.005	<0.005	<0.005	10	1	
Chromium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5	0.05	
Copper	<0.002	<0.002	<0.005	7	<0.003	<0.002	<0.005	5	<0.003	<0.002	<0.005	5	2 (1)	
Fluoride	0.70	0.64	0.74	7	0.68	0.66	0.71	5	0.69	0.64	0.75	5	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5	0.005	
Manganese	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	5	<0.002	<0.002	<0.002	5	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5	0.001	
Nitrate (as N) Dissolved	0.042	0.020	0.190	49	0.034	0.010	0.170	46	0.037	0.010	0.160	46	10	
Nitrite (as N) Dissolved	<0.009	<0.005	0.010	49	<0.009	<0.005	0.010	46	<0.009	<0.005	0.010	46	1	
Selenium	0.0003	0.0002	0.0003	7	0.0003	0.0002	0.0003	5	0.0002	0.0002	0.0003	5	0.05	
Strontium	0.451	0.416	0.487	7	0.439	0.424	0.458	5	0.437	0.423	0.455	5	7.0	
Total Chlorine	1.66	1.25	2.07	53	1.94	1.62	2.15	53	1.87	1.35	2.17	53	>0.5 and <3.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	5	0.02	
Primary Organics (µg/L) **														
Benzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	5	
Carbon Tetrachloride	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	2	
Chlorobenzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	5	
Dichloroethylene (1,1)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	14	
Ethylbenzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	10	

7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs
2024

Parameter	North Jasper Place				Ormsby				Papaschase 1				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Toluene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	60 (24)	
Total Xylenes	<1	<1	<1	7	<1	<1	<1	6	<1	<1	<1	6	90(20)	
Trichloroethylene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.6	<1.0	6	5	
Trihalomethanes	22.7	14.0	37.9	7	19.0	7.7	39.0	6	19.4	8.8	35.4	6	100	50 (single result)
Vinyl Chloride	<1.0	<1.0	<1.0	7	<1.2	<1.0	2.0	6	<1.2	<1.0	2.0	6	2	
Secondary Inorganics (mg/L) ***														
Alkalinity Total	118	110	128	7	117	112	123	5	115	110	120	5		
Aluminum	0.071	0.024	0.125	7	0.078	0.023	0.138	5	0.066	0.019	0.104	5	2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.21	0.14	0.25	23	0.17	0.11	0.20	24	0.19	0.11	0.28	24		
Beryllium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5		
Bromide Dissolved	<0.028	<0.010	<0.050	16	<0.022	<0.010	<0.030	10	<0.022	<0.010	<0.030	10		
Calcium	47.0	43.9	51.0	7	46.8	43.9	49.6	5	47.3	45.1	50.1	5		
Calcium Hardness	122	116	128	2	122	122	122	1	123	123	123	1		
Calcium Hardness Calculated	116	110	125	5	117	110	124	4	117	113	123	4		
Chloride Dissolved	6.8	5.9	8.0	16	7.0	5.7	7.9	10	6.1	4.9	7.5	10	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5		
Iron	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	5	0.012	0.007	0.016	5	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	5	<0.001	<0.001	<0.001	5		
Lithium	0.0034	0.0030	0.0041	7	0.0034	0.0030	0.0040	5	0.0037	0.0032	0.0045	5		
Magnesium	13.8	12.2	14.7	7	13.7	13.1	14.2	5	13.8	13.1	14.5	5		
Molybdenum	0.0007	0.0005	0.0009	7	0.0008	0.0006	0.0011	5	0.0008	0.0006	0.0011	5		
Nickel	<0.0005	<0.0005	0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	5		
Ortho Phosphate (as P)	0.91	0.74	1.08	40	0.90	0.68	0.98	40	0.87	0.74	0.95	40		
Phosphorus	0.98	0.92	1.00	7	0.98	0.88	1.04	5	0.94	0.88	0.97	5		
Potassium	0.81	0.70	1.00	7	0.86	0.60	1.30	5	0.84	0.70	1.10	5		
Silicon	1.91	1.64	2.09	7	2.04	1.53	2.39	5	2.00	1.58	2.39	5		
Silver	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	5		
Sodium	11.7	7.2	19.0	7	13.0	7.3	16.2	5	9.6	6.8	11.4	5	(200)	
Sulphate Dissolved	72	60	80	16	73	61	78	10	70	61	75	10	(500)	
Thallium	<0.0002	<0.0002	<0.0005	7	<0.0003	<0.0002	<0.0005	5	<0.0003	<0.0002	<0.0005	5		
Tin	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	5		
Titanium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	5		
Total Hardness (mg/L CaCO3)	184	173	194	2	185	185	185	1	185	185	185	1		
Total Hardness Calculated	172	160	186	5	173	164	182	4	173	167	182	4		
Vanadium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	5		
Zinc	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	5	<0.005	<0.005	<0.005	5	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	5	<0.0010	<0.0010	<0.0010	5		
Secondary Organics (µg/L) ***														

7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs
2024

Parameter	North Jasper Place				Ormsby				Papaschase 1				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Bromodichloromethane	1.3	0.9	1.8	7	0.9	0.5	1.1	6	0.9	0.6	1.6	6		16
Bromoform	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Chloroform	21.2	12.7	36.0	7	17.9	6.6	38.1	6	18.5	7.8	35.1	6		
Dibromochloromethane	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Methyl Isobutyl Ketone (MIBK)	<1.0	<1.0	<1.0	7	<1.2	<1.0	2.0	6	<1.2	<1.0	2.0	6		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6	(15)	
Styrene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Total Organic Carbon	1.7	1.0	2.4	19	1.7	0.9	2.5	19	1.7	0.9	2.5	19		
Total Volatile Organics (NonTHM)	2.2	<1.0	3.5	7	1.4	<1.0	2.3	6	1.3	<1.0	1.8	6		
Total Volatile Organics (Unknown)	1.7	1.7	1.7	1	0.9	0.6	1.2	2	<0.5	<0.5	<0.5	1		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Xylene (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		
Xylene (1,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	6	<0.6	<0.5	<1.0	6		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs
2024

Parameter	Papaschase 2				Rosslyn 1				Rosslyn 2				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical														
Colour (TCU)	1.0	0.7	1.4	7	1.0	0.6	1.4	5	0.8	0.6	0.9	7	(15)	10
Conductivity (µS/cm)	394	368	430	7	395	368	408	5	394	369	419	7		
Odour	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	5	Inoff	Inoff	Inoff	6		
pH (N/A)	7.8	7.6	8.0	25	7.8	7.7	8.1	23	7.8	7.7	8.1	25	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.11	0.05	0.26	53	0.15	0.08	0.53	50	0.11	0.07	0.18	53		1
Primary Inorganics (mg/L) **														
Antimony	<0.0005	<0.0002	<0.0005	7	<0.0004	<0.0002	<0.0005	5	<0.0005	<0.0002	<0.0005	7	0.006	
Arsenic	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	0.0002	5	<0.0002	<0.0002	0.0003	7	0.01	
Barium	0.063	0.055	0.070	7	0.060	0.053	0.069	5	0.062	0.054	0.067	7	2	
Boron	0.010	0.008	0.013	7	0.011	0.007	0.014	5	0.009	0.008	0.012	7	2	
Bromate Dissolved	<0.005	<0.003	<0.005	14	<0.005	<0.005	<0.005	12	<0.005	<0.003	<0.005	16	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	0.007	
Chlorate Dissolved	0.204	0.108	0.300	14	0.181	0.152	0.204	12	0.187	0.147	0.206	16	1	
Chlorite Dissolved	<0.033	<0.005	<0.200	14	<0.005	<0.005	<0.005	12	<0.029	<0.005	<0.200	16	1	
Chromium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	0.05	
Copper	<0.002	<0.002	<0.005	7	<0.003	<0.002	<0.005	5	<0.002	<0.002	<0.005	7	2 (1)	
Fluoride	0.71	0.66	0.75	7	0.69	0.66	0.73	5	0.70	0.67	0.74	7	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	0.005	
Manganese	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	5	<0.002	<0.002	<0.002	7	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7	0.001	
Nitrate (as N) Dissolved	0.038	<0.010	0.170	46	0.036	0.020	0.190	44	0.039	0.020	0.170	46	10	
Nitrite (as N) Dissolved	<0.009	<0.005	0.010	46	<0.010	<0.005	0.010	44	<0.010	<0.005	0.010	46	1	
Selenium	0.0003	<0.0002	0.0003	7	0.0003	0.0002	0.0003	5	0.0003	<0.0002	0.0003	7	0.05	
Strontium	0.453	0.400	0.487	7	0.438	0.426	0.459	5	0.456	0.419	0.483	7	7.0	
Total Chlorine	1.96	1.73	2.17	53	1.82	1.55	2.07	50	1.70	1.30	2.08	53	>0.5 and <3.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	0.0006	7	0.02	
Primary Organics (µg/L) **														
Benzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	5	
Carbon Tetrachloride	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	2	
Chlorobenzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	5	
Dichloroethylene (1,1)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	14	
Ethylbenzene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	10	

7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs
2024

Parameter	Papaschase 2				Rosslyn 1				Rosslyn 2				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Toluene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	60 (24)	
Total Xylenes	<1	<1	<1	7	<1	<1	<1	5	<1	<1	<1	8	90 (20)	
Trichloroethylene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	5	
Trihalomethanes	19.7	11.0	28.8	7	22.1	10.0	35.7	5	23.6	16.1	37.5	8	100	50 (single result)
Vinyl Chloride	<1.0	<1.0	<1.0	7	<1.2	<1.0	2.0	5	<1.0	<1.0	<1.0	8	2	
Secondary Inorganics (mg/L) ***														
Alkalinity Total	119	109	130	7	116	112	122	5	119	111	127	7		
Aluminum	0.077	0.023	0.157	7	0.069	0.020	0.122	5	0.074	0.025	0.170	7	2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.18	0.12	0.27	24	0.19	0.14	0.23	21	0.22	0.15	0.27	23		
Beryllium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7		
Bromide Dissolved	<0.027	<0.010	<0.050	14	<0.023	<0.010	<0.030	12	<0.028	<0.010	<0.050	16		
Calcium	47.8	43.0	52.2	7	47.4	45.2	49.8	5	47.4	44.5	51.0	7		
Calcium Hardness	123	116	130	2	122	122	122	1	122	116	128	2		
Calcium Hardness Calculated	117	107	126	5	117	113	123	4	117	111	124	5		
Chloride Dissolved	6.2	4.8	7.2	14	6.5	5.2	7.6	12	6.2	5.3	7.4	16	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7		
Iron	<0.005	<0.005	<0.005	7	0.008	<0.005	0.011	5	<0.005	<0.005	0.007	7	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	7	<0.001	<0.001	<0.001	5	<0.001	<0.001	<0.001	7		
Lithium	0.0038	0.0030	0.0044	7	0.0036	0.0031	0.0042	5	0.0036	0.0031	0.0042	7		
Magnesium	13.9	12.2	14.8	7	13.8	13.3	14.6	5	14.0	12.7	14.9	7		
Molybdenum	0.0008	0.0006	0.0010	7	0.0008	0.0006	0.0010	5	0.0008	0.0006	0.0009	7		
Nickel	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	0.0005	7		
Ortho Phosphate (as P)	0.88	0.80	0.95	40	0.90	0.80	1.00	37	0.90	0.84	1.05	40		
Phosphorus	0.96	0.89	0.98	7	0.97	0.91	1.00	5	0.96	0.90	0.99	7		
Potassium	0.81	0.70	1.10	7	0.92	0.60	1.50	5	0.81	0.70	1.00	7		
Silicon	1.90	1.55	2.14	7	2.05	1.55	2.35	5	1.88	1.62	2.14	7		
Silver	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	5	<0.0002	<0.0002	<0.0002	7		
Sodium	9.9	6.9	17.1	7	11.3	7.1	14.4	5	10.2	7.1	16.5	7	(200)	
Sulphate Dissolved	70	60	79	14	72	61	77	12	70	59	79	16	(500)	
Thallium	<0.0002	<0.0002	<0.0005	7	<0.0003	<0.0002	<0.0005	5	<0.0002	<0.0002	<0.0005	7		
Tin	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7		
Titanium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7		
Total Hardness (mg/L CaCO3)	186	177	194	2	183	183	183	1	186	178	194	2		
Total Hardness Calculated	174	158	186	5	173	168	181	4	173	163	184	5		
Vanadium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	5	<0.0005	<0.0005	<0.0005	7		
Zinc	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	5	<0.005	<0.005	<0.005	7	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	5	<0.0010	<0.0010	<0.0010	7		
Secondary Organics (µg/L) ***														

7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs
2024

Parameter	Papaschase 2				Rosslyn 1				Rosslyn 2				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Bromodichloromethane	1.3	0.8	2.2	7	1.1	0.8	1.5	5	1.3	0.9	1.9	8		16
Bromoform	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Chloroform	18.2	9.9	26.9	7	21.0	8.9	34.2	5	22.0	14.6	35.3	8		
Dibromochloromethane	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Dichloropropane (1,2)	<0.5	<0.5	<0.6	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Methyl Isobutyl Ketone (MIBK)	<1.0	<1.0	<1.0	7	<1.2	<1.0	2.0	5	<1.0	<1.0	<1.0	8		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8	(15)	
Styrene	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Tetrachloroethane (1,1,2,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	1.0	5	<0.5	<0.5	<0.5	8		
Total Organic Carbon	1.7	0.9	2.6	20	1.7	1.0	2.5	18	1.7	1.0	2.4	20		
Total Volatile Organics (NonTHM)	2.8	<1.0	5.9	7	1.4	<1.0	2.1	5	2.3	<1.0	3.8	8		
Total Volatile Organics (Unknown)	0.6	0.6	0.6	1	1.0	1.0	1.0	1	1.9	1.9	1.9	1		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Xylene (1,2)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		
Xylene (1,4)	<0.5	<0.5	<0.5	7	<0.6	<0.5	<1.0	5	<0.5	<0.5	<0.5	8		

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.14 Thorncliff Reservoir
2024

Parameter	Thorncliff						Limits	
	Mean	Min	Max	Count			*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Physical								
Colour (TCU)	0.9	<0.5	1.4	7			(15)	10
Conductivity (µS/cm)	399	368	420	7				
Odour	Inoff	Inoff	Inoff	7				
pH (N/A)	7.8	7.6	8.0	25			(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.12	0.05	0.33	54				1
Primary Inorganics (mg/L) **								
Antimony	<0.0005	<0.0002	<0.0005	7			0.006	
Arsenic	<0.0002	<0.0002	0.0003	7			0.01	
Barium	0.062	0.055	0.067	7			2	
Boron	0.009	0.008	0.012	7			2	
Bromate Dissolved	<0.005	<0.003	<0.005	14			0.01	
Cadmium	<0.0002	<0.0002	<0.0002	7			0.007	
Chlorate Dissolved	0.108	<0.080	0.143	14			1	
Chlorite Dissolved	<0.033	<0.005	<0.200	14			1	
Chromium	<0.0002	<0.0002	<0.0002	7			0.05	
Copper	<0.002	<0.002	<0.005	7			2 (1)	
Fluoride	0.70	0.64	0.77	7			1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	7			0.005	
Manganese	<0.002	<0.002	<0.002	7			0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	7			0.001	
Nitrate (as N) Dissolved	0.040	<0.010	0.180	47			10	
Nitrite (as N) Dissolved	<0.009	<0.005	0.010	47			1	
Selenium	0.0003	0.0002	0.0003	7			0.05	
Strontium	0.453	0.413	0.493	7			7.0	
Total Chlorine	1.73	1.26	2.23	54			>0.5 and <3.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	0.0006	7			0.02	
Primary Organics (µg/L) **								
Benzene	<0.6	<0.5	<1.0	7			5	
Carbon Tetrachloride	<0.6	<0.5	<1.0	7			2	
Chlorobenzene	<0.6	<0.5	<1.0	7				
Dichlorobenzene (1,2)	<0.6	<0.5	<1.0	7				
Dichlorobenzene (1,4)	<0.6	<0.5	<1.0	7			5 (1)	
Dichloroethane (1,2)	<0.6	<0.5	<1.0	7			5	
Dichloroethylene (1,1)	<0.6	<0.5	<1.0	7			14	
Ethylbenzene	<0.6	<0.5	<1.0	7			140 (1.6)	
Methylene Chloride	<0.6	<0.5	<1.0	7			50	
Tetrachloroethylene	<0.6	<0.5	<1.0	7			10	

7.14 Thorncliff Reservoir
2024

Parameter	Thorncliff						Limits	
	Mean	Min	Max	Count			*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Toluene	<0.6	<0.5	<1.0	7			60 (24)	
Total Xylenes	<1	<1	<1	7			90(20)	
Trichloroethylene	<0.6	<0.5	<1.0	7			5	
Trihalomethanes	21.3	12.2	32.9	7			100	50 (single result)
Vinyl Chloride	<1.1	<1.0	2.0	7			2	
Secondary Inorganics (mg/L) ***								
Alkalinity Total	118	110	129	7				
Aluminum	0.091	0.027	0.194	7			2.9 (0.1)	0.1/0.2
Ammonia as NH3	0.20	0.12	0.26	24				
Beryllium	<0.0002	<0.0002	<0.0002	7				
Bromide Dissolved	<0.027	<0.010	<0.050	14				
Calcium	47.3	43.7	50.9	7				
Calcium Hardness	122	116	128	2				
Calcium Hardness Calculated	117	109	127	5				
Chloride Dissolved	6.7	6.0	8.1	14			(250)	
Cobalt	<0.0002	<0.0002	<0.0002	7				
Iron	<0.005	<0.005	<0.005	7			(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	7				
Lithium	0.0034	0.0030	0.0040	7				
Magnesium	14.0	12.4	14.9	7				
Molybdenum	0.0008	0.0006	0.0009	7				
Nickel	<0.0005	<0.0005	0.0005	7				
Ortho Phosphate (as P)	0.89	0.66	1.00	43				
Phosphorus	0.99	0.93	1.01	7				
Potassium	0.81	0.70	1.00	7				
Silicon	1.90	1.60	2.11	7				
Silver	<0.0002	<0.0002	<0.0002	7				
Sodium	11.6	7.3	18.3	7			(200)	
Sulphate Dissolved	71	60	80	14			(500)	
Thallium	<0.0002	<0.0002	<0.0005	7				
Tin	<0.0005	<0.0005	<0.0005	7				
Titanium	<0.0005	<0.0005	<0.0005	7				
Total Hardness (mg/L CaCO3)	182	174	189	2				
Total Hardness Calculated	173	160	189	5				
Vanadium	<0.0005	<0.0005	<0.0005	7				
Zinc	<0.005	<0.005	<0.005	7			(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	7				
Secondary Organics (µg/L) ***								

7.14 Thorncliff Reservoir
2024

Parameter	Thorncliff						Limits	
	Mean	Min	Max	Count			*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Bromodichloromethane	1.3	0.8	2.1	7				16
Bromoform	<0.6	<0.5	<1.0	7				
Chloroform	19.8	10.9	31.1	7				
Dibromochloromethane	<0.6	<0.5	<1.0	7				
Dichlorobenzene (1,3)	<0.6	<0.5	<1.0	7				
Dichloroethylene, cis (1,2)	<0.6	<0.5	<1.0	7				
Dichloroethylene, trans (1,2)	<0.6	<0.5	<1.0	7				
Dichloropropane (1,2)	<0.6	<0.5	<1.0	7				
Methyl Isobutyl Ketone (MIBK)	<1.1	<1.0	2.0	7				
Methyl t-Butyl Ether (MTBE)	<0.6	<0.5	<1.0	7			(15)	
Styrene	<0.6	<0.5	<1.0	7				
Tetrachloroethane (1,1,2,2)	<0.6	<0.5	<1.0	7				
Total Organic Carbon	1.7	0.8	2.3	20				
Total Volatile Organics (NonTHM)	2.4	<1.0	4.1	7				
Total Volatile Organics (Unknown)	1.2	1.2	1.2	1				
Trichlorobenzene (1,2,4)	<0.6	<0.5	<1.0	7				
Trichloroethane (1,1,1)	<0.6	<0.5	<1.0	7				
Xylene (1,2)	<0.6	<0.5	<1.0	7				
Xylene (1,4)	<0.6	<0.5	<1.0	7				

TABLE EXPLANATIONS:

* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Protected Areas (AEPA) Operating Approval 638-04-01. Limits in brackets indicate Aesthetic Objectives (AO) or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.

** Primary parameters are those that have health-based limits (MACs) according the AEPA Operating Approval 638-04-01.

*** Secondary parameters do not have health-based limits but may have aesthetic or operational objectives.

7.15 Distribution System Disinfection By-products

2024

Parameter	Mean	Min	Max	Count	Limits: GCDWQ or Approval or MAC* or (AO or OG)	Limits: EPCOR single result
HAA (µg/L)					80	40
Far End of Distribution System						
Dead End	19.4	10.6	29.3	9		
Water Transfer to Regional Customers	20.3	13.7	34.8	9		
Middle of Distribution System						
EDMONTON S4	26.0	12.6	49.6	3		
Staff Residence	20.9	10.3	49.3	50		
	20.9	10.3	49.6	71		
N-Nitrosodimethylamine (NDMA) (µg/L)					0.040	0.01
Far End of Distribution System						
Dead End	0.004	0.003	0.006	6		
Water Transfer to Regional Customers	0.004	0.001	0.007	6		
Middle of Distribution System						
EDMONTON S4	0.002	0.001	0.002	3		
Staff Residence	0.003	0.001	0.006	21		
	0.003	0.001	0.007	36		
Trihalomethanes (µg/L)					100	50
Far End of Distribution System						
Dead End	20.7	13.0	37.1	8		
Water Transfer to Regional Customers	21.0	9.7	34.0	9		
Middle of Distribution System						
EDMONTON S4	21.9	13.0	35.1	3		
Field Reservoirs	21.6	7.7	39.7	84		
Staff Residence	20.2	8.6	40.7	46		
	21.1	7.7	40.7	150		

7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2024

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
Microbiologicals								
Microcystin	<0.20	<0.20	<0.20	4	<0.20	<0.20	<0.20	4
Physical								
Colour (TCU)	8.3	2.7	43.8	360	8.5	2.6	43.6	365
Conductivity (uS/cm)	362	311	415	52	356	311	416	53
FPA-Intensity (N/A)	0.74	0.25	2.38	61	0.78	0.31	2.25	61
pH (N/A)	8.2	8.1	8.4	12	8.3	8.1	8.4	12
Total Dissolved Solids (mg/L)	217	186	292	12	210	184	240	12
Total Suspended Solids	13	<1	54	12	24	<2	154	12
Turbidity (NTU)	8	1	367	360	11	1	257	365
Primary Inorganics (mg/L) **								
Antimony	<0.0004	<0.0002	0.0005	12	<0.0004	<0.0002	<0.0005	12
Arsenic	0.0004	<0.0002	0.0011	12	0.0005	<0.0002	0.0022	12
Barium	0.075	0.058	0.125	12	0.080	0.057	0.180	12
Boron	0.011	0.008	0.018	12	0.012	0.008	0.022	12
Cadmium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12
Chromium	0.0010	<0.0002	0.0053	12	0.0015	<0.0002	0.0099	12
Copper	<0.003	<0.002	0.005	12	<0.003	<0.002	0.006	12
Fluoride	0.11	0.08	0.15	52	0.11	0.08	0.13	53
Lead	0.0004	<0.0002	0.0013	12	0.0005	<0.0002	0.0027	12
Manganese	0.012	<0.002	0.050	12	0.017	0.003	0.080	12
Mercury	<0.0002	<0.00005	<0.0002	13	<0.0002	<0.00005	<0.0002	13
Mercury (ext µg/L)	<0.0050	<0.0050	<0.0050	3	<0.0050	<0.0050	<0.0050	3
Nitrate (as N) Dissolved	0.053	<0.010	0.190	49	0.045	<0.010	0.180	49
Nitrite (as N) Dissolved	<0.010	<0.005	<0.010	49	<0.010	<0.005	<0.010	49
Selenium	0.0003	0.0002	0.0004	12	0.0003	<0.0002	0.0005	12
Total Chlorine	<0.03	<0.03	<0.03	12	<0.03	<0.03	<0.03	12
Total Cyanide	<0.002	<0.002	<0.002	4	<0.002	<0.002	<0.002	4
Uranium	<0.0006	<0.0005	0.0007	12	<0.0006	<0.0005	0.0008	12

7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2024

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
Primary Organics (µg/L) **								
2,4-D	<0.25	<0.25	<0.25	4	<0.25	<0.25	<0.25	4
2-methyl-4-chlorophenoxyacetic acid	<0.25	<0.25	<0.25	4	<0.25	<0.25	<0.25	4
Atrazine	<0.05	<0.05	<0.05	4	<0.05	<0.05	<0.05	4
Benzene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Benzo(a)pyrene	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Bromoxynil	<0.25	<0.25	<0.25	4	<0.25	<0.25	<0.25	4
Carbon tetrachloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365
Chlorobenzene	<0.50	<0.50	<0.50	360	<0.50	<0.50	<0.50	365
Chlorpyrifos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Cyanazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Diazinon	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4
Dicamba	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dichloroethane (1,2)	<0.5	<0.5	<0.5	359	<0.5	<0.5	<0.5	364
Dichloroethylene (1,1)	<0.5	<0.5	<3.0	360	<0.5	<0.5	<3.0	365
Dichlorophenol (2,4)	<0.23	<0.20	<0.30	4	<0.23	<0.20	<0.30	4
Diclofop-methyl	<0.10	<0.10	<0.10	4	<0.10	<0.10	<0.10	4
Dimethoate	<0.05	<0.05	<0.05	5	<0.05	<0.05	<0.05	5
Diuron	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Ethylbenzene	<0.50	<0.50	<0.50	360	<0.50	<0.50	<0.50	365
Glyphosate	<0.28	<0.20	<0.50	4	<0.28	<0.20	<0.50	4
Malathion	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4
Methylene Chloride	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365
Metolachlor	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4
Metribuzin	<0.100	<0.100	<0.100	4	<0.100	<0.100	<0.100	4
Nitrilotriacetic acid	<0.40	<0.40	<0.40	4	<0.40	<0.40	<0.40	4
N-Nitrosodimethylamine (NDMA)	<0.006	<0.006	<0.006	1	<0.006	<0.006	<0.006	1
Paraquat	<1	<1	<1	1	<1	<1	<1	1
Paraquat (as dichloride)	<1	<1	<1	3	<1	<1	<1	3
Pentachlorophenol	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Perfluorooctane sulfonic acid (PFOS)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Perfluorooctanoic acid (PFOA)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Phorate	<0.250	<0.250	<0.250	4	<0.250	<0.250	<0.250	4
Picloram	<0.300	<0.100	<0.500	4	<0.300	<0.100	<0.500	4
Simazine	<0.100	<0.100	<0.100	4	<0.100	<0.100	<0.100	4
Terbufos	<0.50	<0.50	<0.50	4	<0.50	<0.50	<0.50	4
Tetrachloroethylene	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Toluene	<0.51	<0.50	1.70	360	<0.52	<0.50	2.90	365
Total Xylenes	<1	<1	<3	360	<1	<1	<3	365
Trichloroethylene	<0.50	<0.50	<0.50	360	<0.50	<0.50	<0.50	365
Trifluralin	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Trihalomethanes	<1	<1	6	360	<1	<1	1	365
Vinyl chloride	<1.0	<1.0	<1.0	359	<1.0	<1.0	<1.0	364

7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2024

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
Radionuclides (Bq/L)								
Cesium-137	<0.20	<0.20	<0.20	2	<0.15	<0.10	<0.20	2
Gross Alpha	<0.12	<0.10	<0.14	2	<0.13	<0.10	<0.15	2
Gross Beta	<0.06	<0.05	0.07	2	<0.07	<0.07	0.07	2
Iodine-131	<0.45	<0.30	<0.60	2	<0.40	<0.20	<0.60	2
Lead-210	<0.02	<0.02	<0.02	2	<0.02	<0.02	<0.02	2
Radium-226	0.01	<0.01	0.01	2	<0.01	<0.01	<0.01	2
Strontium-90	<0.1	<0.1	<0.1	2	<0.1	<0.1	<0.1	2
Tritium	<40	<40	<40	2	<40	<40	<40	2
Secondary Inorganics (mg/L) ***								
Alkalinity Total	128	117	149	52	128	112	152	53
Alkalinity, PHP (mg CaCO3/L)	<3	<3	<3	12	<3	<3	<3	12
Aluminum	0.745	0.104	4.200	12	1.058	0.078	7.370	12
Ammonia as NH3	<0.05	<0.05	0.09	77	<0.05	<0.05	0.14	81
Beryllium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	0.0002	12
Calcium Hardness	117	96	138	45	116	99	140	46
Calcium Hardness Calculated	118	113	127	7	121	114	147	7
Cobalt	0.0003	<0.0002	0.0008	12	0.0004	<0.0002	0.0018	12
Free Chlorine	<0	<0	<0	12	<0	<0	<0	12
Iron	0.498	0.048	2.110	12	0.768	0.075	4.850	12
Lanthanum	<0.001	<0.001	0.001	12	<0.001	<0.001	0.003	12
Lithium	0.0044	0.0033	0.0076	12	0.0045	0.0033	0.0104	12
Magnesium	14.1	13.3	15.4	12	14.4	13.2	16.6	12
Molybdenum	0.0008	0.0005	0.0010	12	0.0008	0.0006	0.0011	12
Nickel	0.0012	<0.0005	0.0034	12	0.0015	<0.0005	0.0066	12
Ortho Phosphate (as P)	<0.02	<0.02	0.04	13	<0.02	<0.02	0.04	13
Phosphorus	0.04	<0.02	0.09	12	0.04	<0.02	0.15	12
Potassium	1.03	0.70	2.20	12	1.10	0.70	3.20	12
Silicon	3.29	1.40	11.20	12	4.05	1.63	18.10	12
Silver	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12
Sodium	4.6	3.4	7.0	12	4.1	3.4	5.1	12
Strontium	0.452	0.419	0.499	12	0.454	0.418	0.504	12
Thallium	<0.0003	<0.0002	<0.0005	12	<0.0003	<0.0002	<0.0005	12
Tin	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12
Titanium	0.0195	0.0013	0.1140	12	0.0294	0.0017	0.2010	12
Total Hardness (mg/L CaCO3)	178	153	211	45	178	155	203	46
Total Hardness Calculated	175	170	187	7	180	169	216	7
Total Kjeldahl Nitrogen	0.28	<0.10	0.98	38	0.49	<0.10	9.35	39
TotalSulphide(asS)	<0.0015	<0.0015	<0.0015	4	<0.0015	<0.0015	<0.0015	4
Vanadium	0.0020	<0.0005	0.0106	12	0.0028	<0.0005	0.0198	12
Zinc	<0.006	<0.005	0.011	12	<0.007	<0.005	0.020	12
Zirconium	<0.001	<0.001	0.003	12	0.002	<0.001	0.005	12

Secondary Organics (µg/L) ***								
1,1,2-Trichloroethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35
1,2,3-Trichloropropane	<1	<1	<1	33	<1	<1	<1	35
Aldicarb	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Aldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4
Azinphos-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Bromodichloromethane	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Bromoform	<0.5	<0.5	<1.0	360	<0.5	<0.5	<1.0	365
Bromomethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35
Carbaryl	<0.050	<0.050	<0.050	4	<0.050	<0.050	<0.050	4
Carbofuran	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4
Chloroethane	<0.5	<0.5	<0.5	33	<0.5	<0.5	<0.5	35
Chloroform	<0.514	<0.500	5.700	360	<0.500	<0.500	<0.500	365
Chloromethane	<5.0	<5.0	<5.0	33	<5.0	<5.0	<5.0	35
Dibromochloromethane	<0.50	<0.50	<0.50	360	<0.50	<0.50	<0.50	365
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dichloropropane (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Dieldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4
Methyl Isobutyl Ketone (MIBK)	<2.7	<1.0	<20	360	<2.8	<1.0	<20	365
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	354	<0.5	<0.5	<0.5	358
Parathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Perfluorobutane sulfonic acid (PFBS)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Perfluorobutanoic acid (PFBA)	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Perfluoroheptanoic acid (PFHpA)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Perfluorohexane sulfonic acid (PFHxS)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Perfluorohexanoic acid (PFHxA)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Perfluorononanoic acid (PFNA)	<0.02	<0.02	<0.02	4	<0.02	<0.02	<0.02	4
Prometryn	<0.025	<0.025	<0.025	4	<0.025	<0.025	<0.025	4
Styrene	<0.50	<0.50	<0.50	360	<0.50	<0.50	<0.50	365
Tetrachloroethane (1,1,2,2)	<1	<1	<1	360	<1	<1	<1	365
Total Organic Carbon	2.3	0.7	5.4	53	2.2	0.9	5.9	53
Total Volatile Organics (NonTHM)	2.2	<1.0	6.2	327	2.2	<1.0	6.1	330
Total Volatile Organics (Unknown)	<0.8	<0.5	2.1	23	<0.8	<0.5	2.1	31
Triallate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Xylene (1,2)	<0.5	<0.5	<0.5	360	<0.5	<0.5	<0.5	365
Xylene (1,4)	<0.5	<0.5	1	360	<0.5	<0.5	1	365

7. 17 EPCOR Lead Management Program

EPCOR's proactive Lead Management Program has been in place since 2008 and aligns with Health Canada's Risk Management Strategy for Lead in drinking water, which seeks to reduce lead exposure to the greatest extent possible. There are approximately 4,000 homes with a lead service line in Edmonton—on either the EPCOR side or the homeowner side, or both. These are homes located in older neighborhoods that were typically built before 1950.

Exposure to lead from drinking water sources is a key risk identified within our Drinking Water Safety Plan. EPCOR mitigates the risks associated with lead exposure through several activities, including:

- Annual Notices
    - We send annual letters to notify customers that our records show the EPCOR portion of their service line is lead.
- Free water sampling
    - We offer complimentary water sampling, for those with lead service lines, by appointment between May and October. Alternatively, we can provide customers with a home sampling kit that provides step-by-step instructions on how to sample for lead at the tap.
- Free water filters
    - We provide, free water filters that will remove lead from tap water, if used properly.
- Advice on maintaining water quality
    - We provide recommendations on how to maintain good water quality with a lead service line.
- Addition of a lead inhibitor (orthophosphate) to drinking water
    - EPCOR began full-scale dosing of orthophosphate from our two water treatment plants in March 2023. Orthophosphate creates a protective coating inside lead pipes and plumbing fixtures that prevents lead from leaching into drinking water.

Through 2024, EPCOR's Lead Management Program continued its mission to monitor, manage, and reduce lead exposure in Edmonton's water system. Since the introduction of Orthophosphate (March 2023), the Lead Management Program has continued to monitor lead concentrations, at the tap, of approximately a dozen 'Sentinel' homes on a monthly basis. The average lead concentration in these Sentinel homes, which have lead service lines, has continued to trend downwards since the introduction of Orthophosphate, with the 2024 average concentration reaching a level of 5.6 ppb (down from 6.3 ppb in 2023).

Through the program's sampling activities, we have also seen a decrease in the number of lead service line homes testing above Health Canada's Maximum Acceptable Concentration of 5 ppb, with only 7% of homes sampled testing above this level, as compared to 22% in 2022. These reductions reflect the effectiveness of the combined strategies employed by the program over the last number of years—primarily the introduction of orthophosphate as well as proactive infrastructure replacements of lead service lines.

In 2024 the Lead Management Program shifted our field strategy approach for random sampling from sampling exclusively for customers who reach out to request sampling, to placing a focus on a specific community with a large concentration of lead service lines. This approach was highly successful with a 2024 focus in the community of Westmount. The Lead Management Program distributed over 1,000 water sampling kits to residents, achieving a return rate of 72%—the highest in the last 10 years. This targeted engagement not only resulted in better response rates but also facilitated deeper conversations with EPCOR customers about their water safety and lead concerns, fostering trust and awareness. This focus on a single community also helped identify more than 400 homes with lead service lines that EPCOR was previously unaware of. EPCOR's Lead Management program continues to position itself as a leader in public health and drinking water safety.

7.18 EXPLANATION OF NOTATIONS USED

Concentrations are reported as mg/L unless otherwise indicated.
Alkalinity and Hardness (Ca and Total) are reported as mg $CaCO_3$/L

%T	=	% Transmission
- ve	=	Absent
+ ve	=	Present
µg/L	=	Micrograms per litre (1 µg/L = 0.001 mg/L)
µS/cm	=	Microsiemens per centimeter (unit of conductivity)
2/Y	=	Twice per Year
AO	=	Aesthetic Objective
Bq/L	=	Becquerel(s) per litre (unit of radionuclide concentration)
CCPP	=	Calcium Carbonate Precipitation Potential
CFU	=	Colony Forming Units
Comm	=	Commercial Laboratories
D	=	Daily
EWSI	=	EPCOR Water Services Inc.
FPA	=	Flavour Profile Analysis
GCDWQ	=	Guidelines for Canadian Drinking Water Quality
GM	=	Geometric Mean
inoff	=	Inoffensive (no objectionable odour)
M	=	Monthly
MAC	=	Maximum Acceptable Concentration
MDL	=	Method Detection Limit
N/A	=	Not Available
ND	=	Not Detected
NTU	=	Nephelometric Turbidity Units
PA	=	Presence/Absence Testing
PBR	=	Performance Based Rates
PHP	=	Phenolphthalein
PLPH	=	Provincial Laboratory of Public Health
ppb	=	Parts Per Billion
ppm	=	Parts Per Million
Q	=	Quarterly
QA	=	Quality Assurance
QC	=	Quality Control
RDL	=	Reportable Detection Limit
TCU	=	True Colour Units
TDS	=	Total Dissolved Solids
TOC	=	Total Organic Carbon
WL	=	Water Laboratory
WTP	=	Water Treatment Plant

Appendix A – Residuals Management Program

Residuals Management Program

Edmonton Waterworks System

Annual Progress Report

Prepared for Alberta Environment and Protected Areas (AEPA)

EPEA Approval 638-04

EPCOR PROVIDING MORE

EPCOR WATER SERVICES INC.

February 2025

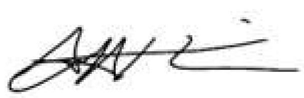
Approval

February 14, 2025

Sr Manager, Edmonton WTPs Operations

Jamie Gingrich, P.Eng.

Date



February 13, 2025

Sr Manager, Environment & Process Services

Geoffry Heise

Date

Executive Summary

EPCOR has committed to reduce the impact of Water Treatment Plant (WTP) residuals released to the North Saskatchewan River (NSR), a commitment now formalized in the system's Approval issued under the *Environmental Protection and Enhancement Act* (Approval 638-04, as amended). This report summarizes activities and progress made against those commitments and challenges faced in 2024. The Residuals Working Group (WG) under the Process Development and Optimization Committee (PDOC), includes a cross-section of water treatment subject matter experts who meet regularly, with the focus of promoting environmental excellence and stewardship by minimizing environmental impacts through the management of residuals.

EPCOR has essentially eliminated release of chlorinated water from all parts of the system (WTPs, storage, water distribution and transmission) where feasible and practical. Our focus now is monitoring and continuous improvements. The sodium bisulfite (SBS) dechlorination systems at the Edmonton WTPs continue to operate as intended.

In 2024, there were zero instances exceeding 15 minutes of chlorinated waste released at the outfall structures at the WTPs. On April 8 and April 19 at Rossdale WTP, sudden increases in flow to the waste stream resulted in short periods of detectable levels of chlorine, approximately 7 minutes and 12 minutes in duration, while the sodium bisulphite dose was increased to compensate.

Significant releases of chlorinated water directly to watercourses due to main breaks or other events within the distribution system are also reported to the AEPA emergency hotline and in monthly reports.

As stated in the Approval, EPCOR's main strategy for reducing solids discharges is to operate in Direct Filtration (DF) during the winter months. WTPs convert to DF during the fall and winter months to further reduce chemical addition and subsequent solids discharges to the NSR. In 2024, the WTPs were able to achieve an average of 91 days in DF (90 days at Rossdale and 92 days at E.L. Smith), not meeting the internal 120 day target for DF operation due to unfavourable raw water conditions. In 2024, in DF, the total solids reduction during the winter months (January and November throughDecember) was 42.9%. The solid reductions during extended DF operation were 28.7%. Overall, in 2024, total solids discharged to the NSR were reduced by 5.8%, as compared to baseline conventional operation due to dry weather and stable raw water conditions. The frequency of monitoring *Giardia* and *Cryptosporidium* in raw and treated water increased while transitions to DF operation took place. Full analytical details are provided in the EPCOR Edmonton Waterworks 2024 Annual Report.

As part of the alum dosing optimization strategy, the ratio of actual alum dosage to the in-house model's suggested dosage was assessed, showing annual average decreases at Rossdale Plant 1 (-1.6%), Rossdale Plant 2 (-2.7%), and E.L. Smith Plant (-3.1%) from 2018 to 2024. EPCOR will continue to enhance the alum dosing strategy, applying insights from E.L. Smith WTP to Rossdale WTP.

EPCOR continues to consider conversion to deep bed filters to further reduce residuals discharged to NSR by extending DF operation at the E.L. Smith WTP. Structural rehabilitation of the filters are underway which is necessary for deep bed filter implementation.

In 2024, EPCOR continued to collect water quality samples as part of the Wastestream Monitoring Program, which was approved by AEPA in December 2022. The goal of the program is to improve wastestream load quantification to better determine if acute and/or chronic guidelines and regional water quality triggers and limits are being met. A report summarizing the 2023 and 2024 results is included as an appendix to the Edmonton Waterworks Annual Report to AEPA.

Table of Contents

List of Tables

List of Figures

1 Introduction

In 2005, EPCOR initiated the Residuals Management Program (RMP) to address Alberta Environment and Protected Areas (AEPA) proposed limits for discharges to the North Saskatchewan River (NSR). This included discharges from the Water Treatment Plants (WTPs) and distribution system. In 2021, EPCOR's commitments in this area were formalized in the system's Approval issued under the *Environmental Protection and Enhancement Act* (Approval no. 638-04, as amended), here after referred to as Approval.

Section 4.5 of the Approval states EPCOR "…shall strive to reduce the impact of water treatment plant residual streams released to the North Saskatchewan River through a long-term residuals management program of continuous improvement..."

EPCOR's Residual Working Group (WG) under the Process Development and Optimization Committee (PDOC), includes a cross-section of water treatment subject matter experts who meet regularly with the focus of promoting environmental excellence and stewardship by minimizing environmental impacts through the management of residuals.

This document outlines the progress and status of the work done by EPCOR in managing residuals discharges for 2024.

2 Residuals Management Improvements

2.1 Dechlorination Update

Edmonton Water Treatment Plants:

Sodium bisulfite (SBS) based dechlorination systems have been in operation at E.L. Smith WTP and Rossdale WTP since 2009 and 2012, respectively.

In 2024, there were zero instances exceeding 15 minutes of chlorinated waste released at the outfall structures at the WTPs. On April 8 and April 19 at Rossdale WTP, sudden increases in flow to the waste stream resulted in short periods of detectable levels of chlorine, approximately 7 minutes and 12 minutes in duration, while the sodium bisulphite dose was increased to compensate.Reservoir and Distribution System Dechlorination Update:

Procedures are in place for dechlorinating all planned releases of chlorinated water from the field reservoirs (i.e. during draining) and the distribution system (i.e. during flushing). Procedures are also in place for dechlorinating water released during unplanned events (i.e. main breaks), although the priority is to investigate and stop the source of leaking water as soon as possible.

Significant releases of chlorinated water directly to watercourses due to main breaks or other events within the distribution system are reported to the AEPA emergency hotline and in monthly reports.

2.2 Direct Filtration Operations Update

Provided that the river water quality allows the conversion from conventional treatment, Rossdale and E.L. Smith WTPs operate in the direct filtration (DF) mode during the late fall and winter months. This operation mode aims to reduce solids (including aluminium) discharged to the NSR.

Table 1 summarizes the differences in chemical dosage between conventional and DF operation during low raw water Colour and Turbidity conditions (<8 TCU, <10 NTU). DF treatment uses less overall chemical compared to conventional treatment. DF operation has successfully reduced alum usage by approximately 75% compared to conventional mode. Thus, the total mass of solid treatment residuals discharged to the NSR is reduced by approximately 50% during the DF operation period.

Table 1: Chemical Dose Comparison in Conventional and DF during Fall/Winter Operation

Chemical	Conventional	Direct Filtration
Alum	25 – 30 mg/L	< 10 mg/L
Primary Polymer	0.2 – 0.3 mg/L	0 – 0.1 mg/L
Filter Polymer	0.2 – 0.5 mg/L	0.4 to 0.7 mg/L
Caustic Soda	0 – 2.8 mg/L	0

EPCOR has continuously made improvements to DF operation that would enable DF operation for longer periods during the year. Ongoing trials and investigations to reduce residuals are highlighted in Section 5 of this report.

As per the Approval, EPCOR's main strategy for reducing solids to the river is to operate in Direct Filtration between November and February. When the WTPs are operated in DF outside the months of November/December/January/February, this period is considered as Extended DF. Over the past several years, the year-to-year results have been variable and have depended highly on raw water conditions and other variables. EPCOR has now set a KPI target to operate in DF for a period of at least 120 days in a year. In 2024, the WTPs were able to achieve an average of 91 days in DF (90 days at Rossdale and 92 days at E.L. Smith).

<u>Conversion dates for 2024:</u>

The Rossdale WTP was in DF operation on January 1st, 2024 and converted back to conventional treatment on January 15th, 2024, due to high raw water color in the NSR. Later in the year, Rossdale was converted to DF on October 17th, 2024; and remained in DF for the rest of 2024.

The E.L. Smith WTP was in DF operation on January 1st, 2024 and converted back to conventional treatment on January 15th, 2024, due to high raw water color in the NSR. Later in the year, E.L. Smith was converted to DF on October 15th, 2024; and remained in DF for the rest of 2024.

2.3 Residuals Reduction

Optimization of alum dosing strategy has been a primary focus over the past few years at EPCOR since reduction in alum dosage results in a reduction of chemical residuals produced and discharged to the NSR.

Optimal alum dosages are applied in conventional treatment operation based on a dosing model that was developed in-house. The use of this model has resulted in lower alum dosages than historically used to treat raw water of similar quality. This model was optimized in 2017 to include a temperature correction factor. While the model provides a suggested alum dosage, actual dosages may vary. Table 2 and Figure 1 illustrate the annual average alum dosage ratio, comparing the actual dosage to the model's suggested dosage from 2018 to 2024 at Rossdale Plant 1 and Plant 2, and at E.L. Smith. From 2018 to 2024, Rossdale Plant 1 experienced an average annual decrease of 1.6%, Rossdale Plant 2 saw a decrease of 2.7%, and E.L. Smith Plant had an decrease of 3.1%. This data indicates a general decline in values across both WTPs over the specified period.

Table 2: Annual Average Alum Dosage Ratio (Actual to Model) from 2018 to 2024 during Conventional Treatment with No Carbon

Year	Rossdale Plant 1 Ratio	Year to Year Ratio Change (%)	Rossdale Plant 2 Ratio	Year to Year Ratio Change (%)	E.L. Smith Ratio	Year to Year Ratio Change (%)
2018	1.26	-	1.24	-	1.10	-
2019	1.23	-2.6%	1.14	-7.8%	1.25	13.3%
2020	1.20	-2.3%	1.15	0.3%	1.07	-14.7%
2021	1.16	-3.0%	1.12	-2.7%	0.95	-10.4%
2022	1.23	5.8%	1.20	7.8%	1.10	14.8%
2023	1.06	-13.7%	1.03	-14.8%	0.94	-14.1%
2024	1.12	5.9%	1.04	1.3%	0.87	-7.5%
Average		-1.6%		-2.7%		-3.1%

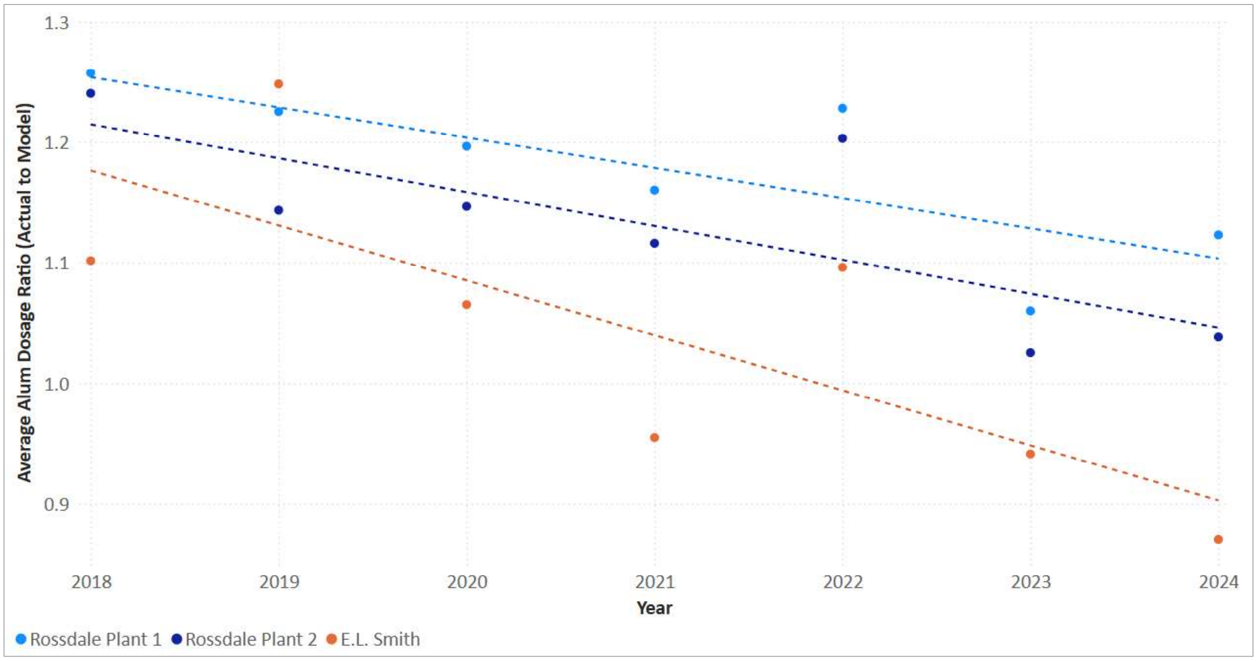


Figure 1: Annual Average Alum Dosage Ratio (Actual to Model) Trend

Alum dose is reduced through DF and extended DF operation as explained in Section 2.2. In 2024, DF operation resulted in a reduction of total solids discharged to the NSR by 42.9% during the months of January, November, and December compared to baseline conventional operation. In 2024, both WTPs plants operated several days in DF in October. During this Extended DF period, the total solids reduction was 28.7% compared to baseline conventional operation.

3 and 4 below summarize total suspended solids loading to the river in 2023 and 2024, respectively.

Table 3: Total Suspended Solids Discharged to the NSR in 2023

Mode of Operation	Months	Actual Total Solids Loading (tonne)	Chemical Loading (tonne)	Baseline Total Solids Loading [Conventional Model]* (tonne)	Total Solids Loading Reduction (tonne)	Total Solids Loading Reduction (%)
Direct Filtration (DF)	Jan-Feb, Nov-Dec	487	145	1046	559	53.5%
Extended DF	Mar, Oct	200	86	358	158	44.1%
Chemical Optimization	Mar-Oct	8836	2482	9220	384	4.2%
Total		9522	2713	10623	1101	10.4%

Table 4: Total Suspended Solids Discharged to the NSR in 2024

Mode of Operation	Months	Actual Total Solids Loading (tonne)	Chemical Loading (tonne)	Baseline Total Solids Loading [Conventional Model]* (tonne)	Total Solids Loading Reduction (tonne)	Total Solids Loading Reduction (%)
Direct Filtration (DF)	Jan, Nov-Dec	432	136	757	324	42.9%
Extended DF	Oct	61	30	86	25	28.7%
Chemical Optimization	Jan-Oct	5997	2564	6046	50	0.8%
Total		6490	2730	6889	399	5.8%

Note for Table 3 and 4: Total suspended solids discharges are calculated based on a predictive model that accounts for raw water turbidity and colour and chemical dosing. Both are continuously monitored. Reductions in loading are calculated compared to the historical conventional operating strategy and 2005-2010 baseline data*. For extended DF, only the days when the WTPs were in DF were used.

3 Impact of Residuals Management on Water Quality

3.1 Effects of Direct Filtration on Treated Water Quality

Treated water quality during DF operation in 2024 was compared with baseline quality observed during a ten-year period of conventional winter operation (2001 – 2010). Raw water quality conditions during 2024 allowed DF operation to proceed only in the first half of January for both WTPs. Adverse river water quality conditions did not allow for further DF operation before spring runoff. DF operation was resumed in mid-October for both WTPs, resulting in an average number of 91 DF days at the Edmonton WTPs. This value was lower than 2023 primarily due to plants exiting DF mode in January 2024. High river colour was cited as the main concern. It is interesting to note that the colour values below the Brazeau dam (measured by the AEPA) in September 2023 was 19.0 TCU, an elevated value that has been known previously to precede a difficult winter season with respect to maintaining DF operation at the water plants.

Filter effluent quality comparisons between historic conventional operation and 2024 DF operation are shown in Table 5. Average daily values and standard deviations are shown for seven parameters: turbidity, particle counts (PC>2 µm), total aluminum (Total Al), UV_{254} transmittance (UV%T), total organic carbon (TOC), and two groups of disinfection by-products (TTHM and HAA5). Turbidity, particle counts, and UV%T values were measured with on-line filter effluent analyzers, whereas Total Al, TOC, TTHM, and HAA5 values were lab-measured values for treated reservoir samples. Slight decreases in UV%T and small increases in Total Al, TTHM, and HAA5 were observed. These differences are expected as a result of reduced coagulant use and and parameters remained well within established target ranges.

Table 5: Treated Water Quality Comparison: Former Winter Conventional vs. 2024 DF Operation

Parameter	EPCOR Target	E.L.S Conv. 2001-2010		E.L.S DF 2024		Rossdale Conv. 2001-2010		Rossdale DF 2024	
		Mean	St Dev	Mean	St Dev	Mean	St Dev	Mean	St Dev
Turbidity*	< 0.10NTU	0.027	0.005	0.027	0.004	0.024	0.007	0.030	0.005
PC >2 µm*	< 20/mL	6.0	3.3	5.9	1.8	3.6	3.4	5.9	3.3
Total Al	< 0.20 mg/L	0.041	0.013	0.097	0.022	0.036	0.015	0.100	0.022
$UV_{254}T$ %*	> 90%	96.2	1.2	95.1	0.97	95.9	1.0	95.0	1.1
TOC (mg/L)	No target	1.19	0.33	1.15	0.30	1.23	0.34	1.26	0.33
TTHM	< 40 µg/L	6.30	2.56	11.97	2.42	8.35	3.04	13.73	3.09
HAA5	< 35 µg/L	11.1	5.3	17.3	3.8	13.5	5.7	19.1	1.9

*Parameters measured in filter effluent rather than the treated water reservoir

3.2 Risk Analysis of Cryptosporidium during DF

Biweekly assays for *Giardia* and *Cryptosporidium* were performed on samples of raw and treated water from both WTPs during periods of DF conversion in fall. Due to the shorter than typical DF operation duration in Q1, no assays were available for analysis for winter DF operation. The monitoring frequency was increased to weekly in early September while considering a suitable time to start DF.

The maximum reported *Giardia* concentration in raw water was 215.5 cysts/100 L, whereas the maximum for *Cryptosporidium* was only 3.4 oocysts/100 L. After DF was implemented in mid-October at both WTPs, the counts of *Giardia* in raw water samples declined gradually to low levels by the beginning of November, while *Cryptosporidium* concentrations remained near or below the level of detection in raw water samples. *Giardia* and *Cryptosporidium* were not measured above the detection limit for the entirety of 2024 in treated water samples. Full analytical details are provided in the EPCOR Edmonton Waterworks 2024 Annual Report.

4 Environmental Impacts of Residuals Discharges

4.1 Residuals Characterization and Effluent Toxicity Summary

Clarifier and filter waste streams were sampled quarterly from locations as close as practical to NSR discharge points. Samples were characterized by the Process Development and Support (PDS) team, and 96-hour trout assays were conducted by Bureau Veritas to evaluate acute toxicity. Initial DO concentrations were measured and checks were made to ensure that no residual chlorine was present. Results are shown in Table 6. All Samples were reported as non-toxic (LC50 > 100%).

Table 6: Residuals Characterization and Effluent Toxicity Summary

Date	Operating Mode	Sample Description	TSS (mg/L)	pH	TOC (mg/L)	LC50
22-Feb-24	Conventional	ELS Clarifier Waste	11990	7.46	10.7	>100%
22-Feb-24	Conventional	ELS Filter Waste	29	7.70	2.7	>100%
21-Feb-24	Conventional	ROS WS3 Filter Waste	8	7.59	2.0	>100%
21-Feb-24	Conventional	ROS WS5 Clarifier Waste*	NA	NA	NA	NA
21-Feb-24	Conventional	ROS WS6 Clarifier Waste	249	7.93	2.6	>100%
21-Feb-24	Conventional	ROS WS7	< 5	7.85	1.9	>100%
15-May-24	Conventional	ELS Clarifier Waste	42200	7.00	129.1	>100%
15-May-24	Conventional	ELS Filter Waste	114	6.82	3.5	>100%
14-May-24	Conventional	ROS WS3 Filter Waste	96	7.07	4.6	>100%
14-May-24	Conventional	ROS WS5 Clarifier Waste	1062	7.22	5.2	>100%
14-May-24	Conventional	ROS WS6 Clarifier Waste	1161	7.72	5.2	>100%
14-May-24	Conventional	ROS WS7	< 5	6.95	3.0	>100%
15-Aug-24	Conventional	ELS Clarifier Waste	36570	8.02	88.1	>100%
16-Aug-24	Conventional	ELS Filter Waste	32	7.92	2.2	>100%
13-Aug-24	Conventional	ROS WS3 Filter Waste	77	6.77	3.2	>100%
13-Aug-24	Conventional	ROS WS5 Clarifier Waste	11266	7.37	4.1	>100%
13-Aug-24	Conventional	ROS WS6 Clarifier Waste	1750	7.40	4.4	>100%
13-Aug-24	Conventional	ROS WS7	<5	6.51	2.4	>100%
13-Nov-24	Direct Filtration	ELS Clarifier Waste	2048	8.28	2.3	>100%
13-Nov-24	Direct Filtration	ELS Filter Waste	45	8.015	2.094	>100%
12-Nov-24	Direct Filtration	ROS WS3 Filter Waste	281	8.23	2.311	>100%
12-Nov-24	Direct Filtration	ROS WS5 Clarifier Waste*	NA	NA	NA	NA
12-Nov-24	Direct Filtration	ROS WS6 Clarifier Waste	78	8.325	1.969	>100%
12-Nov-24	Direct Filtration	ROS WS7	6	8.585	1.712	>100%

*Sample not collected due to ROS Plant 1 shutdown

4.2 Wastestream Monitoring Program and Assessment of Impacts of Wastes

Since 2013, EPCOR has conducted a variety of monitoring programs to assess the environmental impacts of WTP residual wastestreams to the NSR. Previous work has included monitoring water quality, sediment quality, benthic invertebrate communities and conducting chronic toxicity tests on residual discharges. Since 2023, EPCOR has been collecting water quality samples as part of the Wastestream Monitoring Program, which was approved by AEPA in December 2022. The goal of the program is to improve wastestream load quantification to better determine if acute and/or chronic guidelines and regional water quality triggers and limits are being met. A report summarizing the 2023 and 2024 results is included as an appendix to the Edmonton Waterworks Annual Report to AEPA.

5 Process Development Initiatives

The PDS team repeated the jar experiments to further reinforce the supporting evidence of the superior organics and Amino Acid removal properties of an alternative PAC product (i.e., Aqua Nuchar®). In collaboration with University of Alberta, bench-scale investigations were repeated to explore alternative powdered activated carbon (PAC) product that is not only more efficient in removing taste and odour causing nitrogenous precursors (i.e., amino acids) in raw water during spring runoff, but would also help to keep WTPs in operation during extreme summer colour events. Preliminary results from previous experiments demonstrated that alum consumption could potentially be reduced by up to 40% with the alternative PAC product (i.e., Aqua Nuchar®), while achieving superior organic removals. This reduction in alum use would directly reduce volume of clarifier waste discharged to the NSR during spring and summer periods when PAC dosing is required.

6 Strategy for Moving Forward

The Approval requirements commits EPCOR to pursue continuous improvement of the residuals management to the NSR and to explore opportunities to further reduce solids loading outside of the November to February winter period. EPCOR's strategy moving forward will continue to emphasize operation of the WTPs in DF mode during the fall and winter months when it is practically feasible and the environmental benefits are greatest. EPCOR has now set a KPI to provide DF for a period of at least 120 days in a year. This target is formalized under the 2022 - 2026 Performance Based Rates (PBR) agreement with the City of Edmonton. Failure to meet this target could result in financial penalties to EPCOR.

Water quality samples were collected from each of the wastestreams in 2024 as part of the wastestream monitoring program, and engineering designs are underway to install flow monitors and autosamplers in clarifier wastestreams. The goal of the wastestream monitoring program is to improve wastestream load quantification to better determine if acute and/or chronic guidelines and regional water quality triggers and limits are being met. This work allows for the development of a science-based strategy for residuals management that will reduce EPCOR's environmental impact on the NSR and will inform if further actions to manage residuals are required.

EPCOR will continue to explore opportunities to enhance the alum dosing strategy, leveraging insights from E.L. Smith WTP, as illustrated in Table 2 and Figure 1, to apply improvements at Rossdale WTP.

EPCOR continues to consider conversion to deep bed filters to further reduce residuals discharged to the river by extending DF operation at the E.L. Smith WTP. Structural rehabilitation of the filters are underway which is necessary for deep bed filter implementation.

Appendix B – Waste Stream Monitoring Program

EPCOR's Wastestream Monitoring Program

Approval 638-04

2023 - 2024 Monitoring Results

Prepared for Alberta Environment and Protected Areas (AEPA)

EPCOR Water Services Inc.
February 2025

1. Introduction

EPCOR's two Water Treatment Plants (WTPs), Rossdale and E.L. Smith, have wastestreams that discharge residuals back to the North Saskatchewan River (NSR). These wastestreams contain concentrated solids and metals originally from the NSR, as well as alum (which contains aluminum), polymer, and at times powdered activated carbon. Some wastestreams contain chlorinated water, which is dechlorinated before it reaches the NSR. Wastestream discharges result in elevated concentrations of solids and metals at the edge of the mixing zone below the WTPs and may contribute to exceedances of dissolved aluminum guidelines downstream of Edmonton at Pakan. While EPCOR has conducted a number of studies characterizing residuals and monitoring environmental impacts, there has previously been insufficient data available to calculate the episodic, daily and annual discharges to the NSR from all wastestreams.

As requested by EPCOR, the *EPEA* Approval for the WTPs states:

> The approval holder shall develop a wastestream monitoring program and assessment of impacts of wastes to the North Saskatchewan River in consultation with Alberta Environment and Parks and submit to the Director by December 31, 2021. (Section 4.5.2)
>
> The approval holder shall implement the wastestream monitoring program and assessment of impacts of wastes to the North Saskatchewan River as authorized in writing by the Director.

EPCOR submitted a proposed wastestream monitoring program to AEPA at the end of December 2021, and the monitoring program was approved by AEPA in December 2022. The wastestream monitoring program began in January 2023, and this report summarizes the results collected from 2023 – 2024.

2. Overview of WTP Wastestreams

At the E.L. Smith WTP, discharges from all three clarifiers are sent through wastestream 1 to a diffuser located mid-channel in the NSR (Figure 1). Filter wastes (filter backwash and filter-to-waste) and plant bypasses enter the NSR through an outfall located along the bank. Water from backwash waste tank # 2, which typically flows to wastestream 2 can also be pumped through wastestream 1, but is dechlorinated. Smaller wastestreams, such as water used to cool the high lift pumphouse and pumps from the low lift pumphouse are also discharged through wastestream 2.

At the Rossdale WTP, all wastestreams enter the NSR along the bank through four separate outfalls (Figure 2). Clarifier discharges (main drains, floc drains and sludge pumps) from Plants 1 and 2 are discharged into wastestreams 5 and 6, respectively. Filter wastes (filter backwash and filter-to-waste) are discharged through wastestream 3. Plant bypass, reservoir and stilling basin discharge flow through wastestream 7. There are a number of small, infrequent or unrelated WTP processes (i.e., stormwater) that enter the various wastestreams at Rossdale.

1 **Wastestream 1 - Clarifiers**

- Receives clarifiers drains
- Flows from backwash waste tank 2 can be diverted here
- Drains to mid-channel diffuser
- Samples primary collected from manhole 67.1, but collected further upstream at MH 47.11 for one event.

2 **Wastestream 2 – Filter Waste**

- Receives filter backwash and filter to waste
- Also receives low lift pumphouse waste, highlift cooling waste and bypasses
- Drains to outfall located on bank
- Samples collected directly from outfall

Figure 1. Wastestream locations at E.L. Smith.

Note: Red dots indicate sampling locations. Diagrams of wastestream locations are for illustrative purposes only and are not intended to be fully accurate.

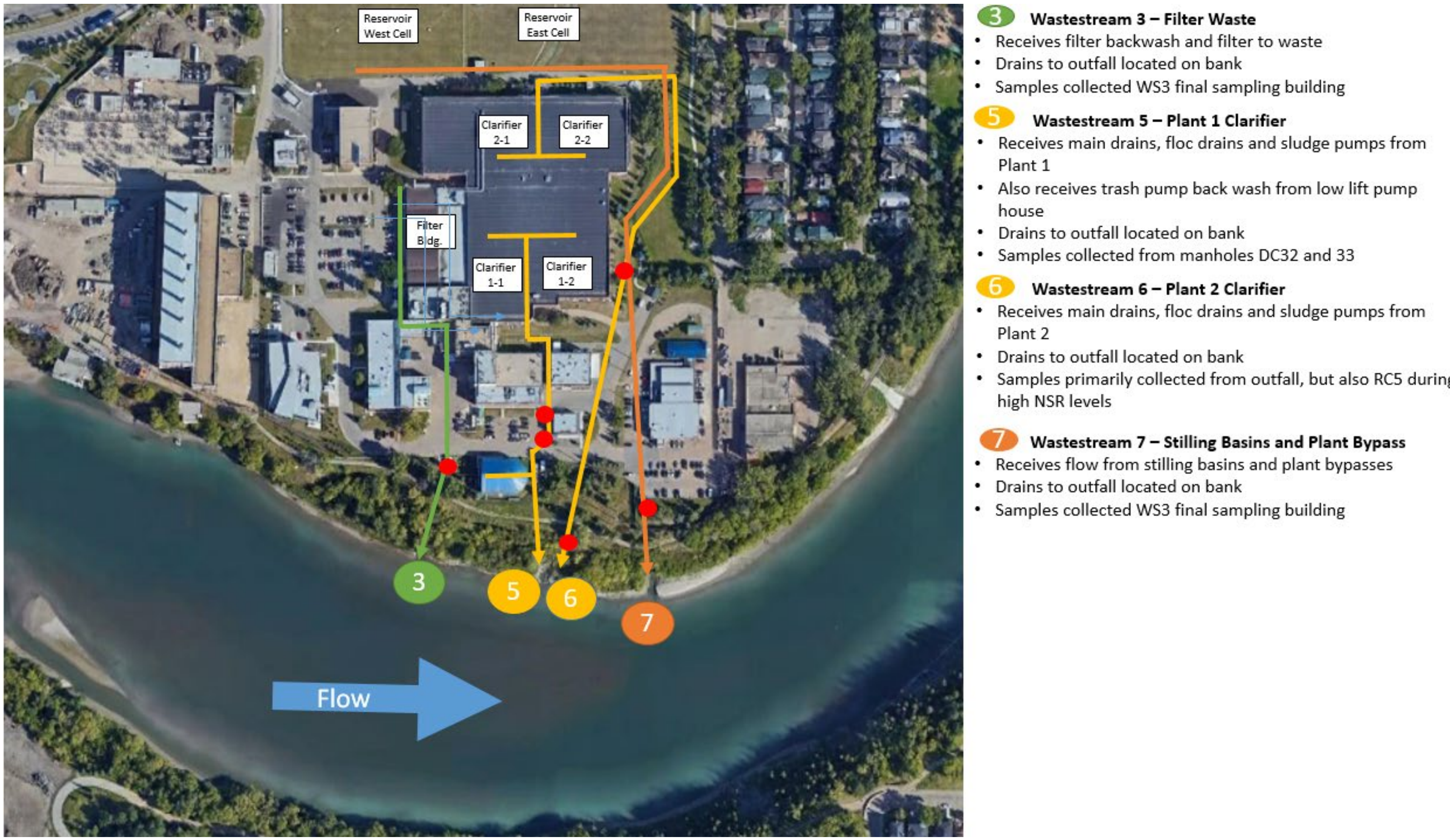


Figure 2. Wastestream locations at Rossdale.

Note: Red dots indicate sampling locations. Diagrams of wastestream locations are for illustrative purposes only and are not intended to be fully accurate.

3. Water Quality Sampling

3.1. Water Quality Sampling Plan

The goal of the wastestream monitoring program is to generate estimates of loads to the NSR by collecting a sufficient number of samples under various plant operations and river conditions to determine concentrations and flows that typically occur under these conditions. As residual production can change significantly with river water quality (which is directly related to river flow) and WTP operation, it is important to characterize water quality being discharged through the wastestreams under various river flow categories. The monitoring program approved by AEPA is outlined in Table 1. These river flow categories align with river flow categories outlined by AEP (2013), except the 'spring runoff' category which is a unique period of time in terms of river water quality in the NSR and WTP operation due to elevated colour and turbidity in the river, and is typically when powdered activated carbon is used to treat drinking water.

Table 1. Flow categories and WTP operational modes to be assessed

Flow Category / Condition	NSR Flow (m^3/s)	Treatment Mode	Estimated Number of Water Quality Samples per Year
Dry and low flow	< 150	Direct Filtration	10
Spring Runoff	-	Conventional	10 or less
Midrange	< 180	Conventional	10
Moist	180 - 300	Conventional	10
Storm 1	> 300	Conventional	10
Storm 2	> 600	Conventional	10 or less

During the late fall and winter months, the WTPs operate in direct filtration (DF) with the aim to reduce solids and aluminum discharged to the NSR. The WTPs will typically enter DF in the late fall when turbidity and colour in the NSR are low, and remain in DF until spring runoff. When the WTPs are in DF, typically NSR flows are < 150 m^3/s; however, the WTPs can remain in DF with higher NSR flows if turbidity and colour remain low. Therefore it is relevant to sample WTP residual wastestreams during direct filtration regardless of the flow values in the NSR.

Throughout the sampling program NSR flows were assessed using the Water Survey of Canada (WSC) gauge station in Edmonton, located at the Low Level Bridge, and samples were collected and assigned to a specific flow category/condition based on the daily average flow and operation of the WTPs. An overview of the samples collected in 2023 and 2024 are outlined in Tables 2 and 3, and Figure 3.

Table 2. Wastestream samples collected at E.L. Smith, 2023 – 2024.

Flow Category / Condition	E.L. Smith			
	Raw	WS1	WS2	
		Clarifier	BW	FTW
Direct Filtration	12	21	10	9
Spring Runoff	1	3	2	2
Midrange	9	18	9	9
Moist	12	22	11	11
Storm 1	3	8	5	5
Storm 2	3	8	4	4

Note: WS = wastestream, BW = backwash, FTW = filter-to-waste, Main = main drain, Floc = floc drain, sludge = sludge pumps

Table 3. Wastestream samples collected at Rossdale, 2023 – 2024.

	Rossdale									
Flow Category / Condition	Raw	WS3		WS5			WS6			WS7
		BW	FTW	Main	Floc	Sludge	Main	Floc	Sludge	
Direct Filtration	12	11	9	3	3	3	7	6	7	12
Spring Runoff	1	1	1	0	0	0	2	1	1	1
Midrange	10	10	9	8	8	8	8	8	4	10
Moist	11	12	9	9	9	8	11	7	6	11
Storm 1	3	3	3	4	4	3	3	4	0	3
Storm 2	2	2	2	2	3	2	2	3	0	2

Note: WS = wastestream, BW = backwash, FTW = filter-to-waste, Main = main drain, Floc = floc drain, sludge = sludge pumps

Validated NSR flow data is currently available for 2023, but wasn’t available at the time of last year’s report. Similarly, at the time of writing this report, validated flow data for 2024 was not available. An analysis of the preliminary versus the validated flow data in 2023 showed little difference for most days, except during periods of ice break up on the NSR. All the analyses in this report are based on the validated 2023 flow data and the preliminary 2024 flow data.

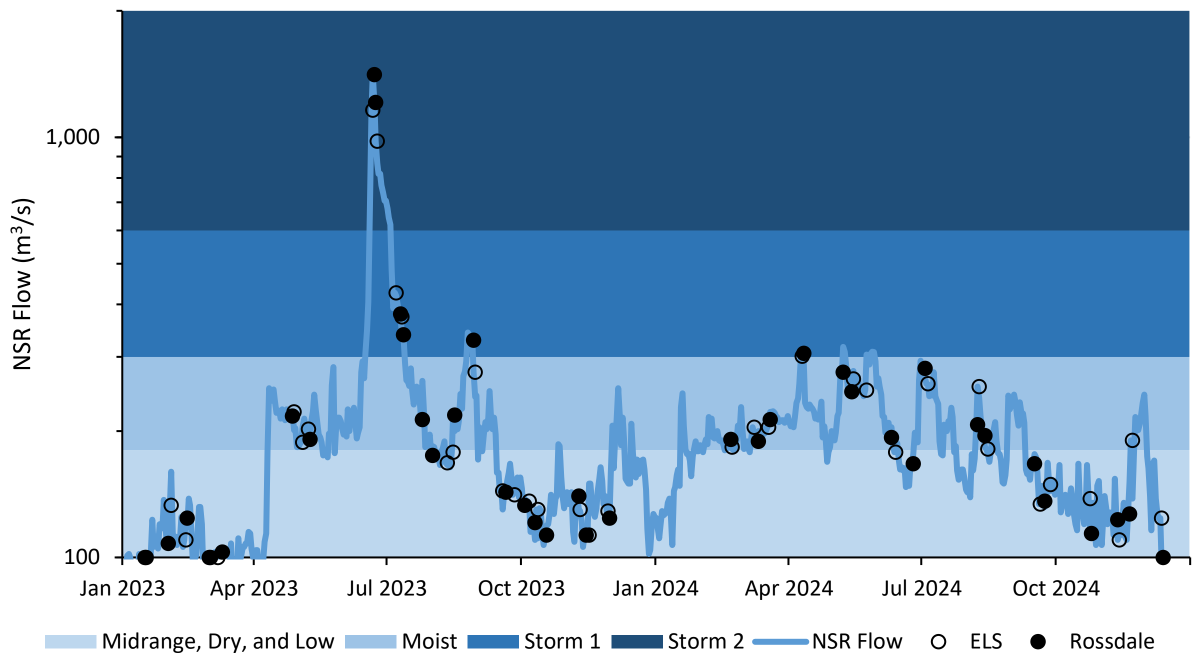


Figure 3. Daily average NSR flows at Edmonton, flow categories, and residual sampling dates, 2023 – 2024.

Note: 2023 flow is finalized data, and 2024 is preliminary. On some winter days, flows ranged from 80 – 100 m^3/s, and are not shown to provide better clarity for the rest of the year. The sampling points on the days when flow was < 100 m^3/s were manually made to appear on the graph.

As described above, the WTPs typically operate in DF from the late fall and through the winter months until spring runoff while colour and turbidity are low in the NSR. The dates that the plants were in DF are in Table 4. In January 2024, the WTPs were unable to operate in DF due to elevated colour in the NSR, as a result, the WTPs were in DF for much fewer days in 2024 compared to previous years.

Table 4. Dates WTPs were in Direct Filtration (DF), 2023 – 2024.

WTP	2023	2024
E.L. Smith	Jan 1 – Mar 23 Oct 16 – Dec 31	Jan 1 – 15 Oct 15 – Dec 31
Rossdale	Jan 1 – Mar 23 Nov 6 – Dec 31	Jan 1 – 15 Oct 17 – Dec 31

The WTPs are in DF approximately one-third of the year, and for most of the remaining days, the NSR flows are in the midrange and moist categories, with only a small number of days being in spring runoff, Storm 1 and Storm 2 conditions (Table 5).

Table 5. NSR flow categories and plant operation at each WTP

Flow Category	Treatment Mode	E.L. Smith		Rossdale	
		Days	% of Year	Days	% of Year
Dry and low flow	Direct Filtration	250	34.2	228	31.2
Spring Runoff	Conventional	11	1.5	11	1.5
Midrange	Conventional	203	27.8	225	30.8
Moist	Conventional	227	31.1	227	31.1
Storm 1	Conventional	25	3.4	25	3.4
Storm 2	Conventional	15	2.1	15	2.1

While a large number of samples were collected in 2023 and 2024, several circumstances led to fewer samples being collected under some flow categories and at some locations. Few spring runoff samples have been collected due to the absence of spring runoff conditions in 2023, and sampling during spring runoff in 2024 was complicated by a return of winter weather. Few Storm 1 and Storm 2 conditions have been collected as there were relatively few days of high flow conditions in 2023 and even fewer days in 2024. Fewer samples were collected from the raw water and WS7 as these sources do not change as radically and as rapidly as clarifier and filter waste wastestreams, and it was determined that a reduced sampling effort from these locations was justified. Sludge pumps at WS6 were difficult to sample due to the presence of drain chamber 10 (DC 10), which will be discussed in greater detail below. Lastly, the Rossdale WTP typically takes one of the two plants offline during the winter, which results in fewer samples being collected during direct filtration.

3.2. Water Quality Sampling Methods

At both wastestreams at E.L. Smith and wastestreams 5 and 6 at Rossdale, composite water quality samples were collected by lowering a plastic pail into the wastestream and placing the collected water into a 4 L plastic composite container. At Rossdale wastestreams 3 and 7, composite water samples were collected from wastestream water that is pumped to auto-analyzer instrumentation, and the sample is collected from a location before the water reaches the auto-analyzers. Photos of the sampling locations are in Appendix A. Raw water samples were collected from raw water sampling locations at the WTP operator laboratory located at each WTP.

For wastestream discharges with short durations (i.e., < 5 min.), composite samples were collected by sampling the wastestream through the entire duration of the discharge event. For wastestream discharges with longer durations (i.e., > 10 min.), composite samples were collected over a period of at least 10 min, but not necessarily for the entire duration of the event. Raw water quality samples from the WTP intakes were also collected on each sampling day in order to compare influent and effluent water quality and to calculate what the resulting water quality would be below the WTPs at the edge of the mixing zone. Sampling bottles provided by a 3rd party commercial laboratory were filled from the composite container and delivered to a commercial laboratory at the end of the day.

Samples were analyzed for TSS, turbidity, total and dissolved metals, hardness and pH. Temperature, pH and conductivity were also measured using a field probe. Dissolved organic carbon was also added to the program starting in April 2023 to compare total aluminum concentrations to newer guidelines from U.S. EPA, Environment and Climate Change Canada and B.C. Ministry of Water, Land, and Resource Stewardship.

Water quality samples were collected from locations that were as close to the river as possible; however, as indicated in Figures 1 and 2, the sampling locations occasionally had to be relocated. All samples from Wastestream 1 at E.L. Smith were collected from manhole 67.1, but due to the installation of a backflow valve, samples on one sampling day had to be collected at manhole 47.11, which is located approximately 60 m upstream (a difference in water quality between these two locations was not anticipated). Samples at Wastestream 5 at Rossdale were collected in early 2023 from DC32 as DC33, located approximately 18 m downstream, could not be readily located under snow and ice. Once the ice melted, samples were collected from DC33 for then on (a difference in water quality between these two locations was not anticipated). During high river flows in June 2023, samples from wastestream 6 could not be collected from the outfall as it was not possible to collect wastestream samples without also collecting water from the NSR. During the high flow event, wastestream 6 samples were collected at RC5 which was located approximately 200 m upstream (a difference in water quality between these two locations was not anticipated).

As some of the outfalls also carry rainwater from parking lots and rooftops, samples were intentionally not collected on days where notable runoff from rain or snow melt was occurring. In future years, it may be challenging to collect samples during spring runoff or high flows on the NSR without some interference from stormwater runoff as these events typically only occur for a few days each year.

4. Residual Flow Estimation

4.1. Flow Estimation Methods

EPCOR does not currently monitor the flow at the end-of-pipe at any of the residual wastestreams. EPCOR is working to install flow meters on the three clarifier wastestreams at the two WTPs. The installation of flow meters has always been closely tied to the on-going flood protection/gates project at both WTPs. Challenges encountered on the flood gates project have impacted the schedule for installation of the flow meters. The flood gate on Rossdale wastestram 5 is now rescheduled to be installed by fall 2025, while the flood gate at wastestream 6 is expected to be completed by March 2025. At E.L. Smith, wastestream 1 resumption of flood gate construction will be after spring runoff. With this information, installation of the flow meters will be completed by the end of 2025. Detailed design is well underway for the installation of flow monitors. Although we are confident with the schedule as proposed, there is some risk of schedule slippage depending on potential operational constraints. Installation of auto-samplers in the clarifier wastestreams was proposed in EPCOR's original proposal to AEPA; however, EPCOR is currently in discussions with consultants to determine if auto-samplers can realistically be used to capture short duration discharges from many of these wastestreams (frequently < 3 minutes).

While direct flow data for each of the wastestreams is not available, the WTPs have a large amount of data that can be used to calculate flow volume, duration, frequency and intervals for all of the WTP wastestreams and processes. The status of valves, pumps and drains are monitored throughout both WTPs and recorded and available through the plant's SCADA system. This data was extracted for the entirety of 2023 and 2024 using a one minute time-step. Further detail on the specific methods used to generate flow estimates for each wastestream process can be provided if needed. This approach generated a dataset that contains the minute flow totals from each wastestream process for each WTP for the entirety of 2023 and 2024.

While this estimated flow data provides essential information needed to calculate loads and the concentrations of parameters at the edge of the mixing zone in the NSR, there are limitations to using this approach to estimate flows. Firstly, this method does not account for leaks, infiltration, plugged or partially plugged drains. Therefore, these flow values should be considered as estimates, and not absolute values. Second, this method does not account for some of the smaller or unmonitored flows or drains in these wastestreams. Thirdly, many of the flows are estimated using the status of valves (open or closed); however, the valve status alone does not necessarily indicate that flow is occurring through the valve, such as during maintenance activities or when the valve becomes stuck. Lastly, the approach does not consider travel time within wastestreams, or that flows are likely delayed or extended while travelling through pipes.

The purpose of generating this flow dataset, along with the water quality sampling program, is to evaluate how the regular routine operation of WTPs and the discharge of residuals impact water quality in the NSR. However, throughout the year, the WTPs will occasionally take a clarifier offline for maintenance and drain the entire volume of the clarifier. While draining an entire clarifier results in a large volume of flow discharged to the NSR, the majority of solids and alum sludge will be discharged in the first few minutes. While sampling routine clarifier drains throughout the year it was regularly observed that the 'first-flush' was quite turbid, but towards the tail end of a short two minute drain, the sample would frequently become quite clear. Therefore, large drains of clarifiers were not considered as part of this monitoring program and were removed from the resulting dataset. It is not that these drains are unimportant or do not contribute to the overall load to the NSR; however, these large drains only occur a few times per year, and that highly concentrated residuals are only discharged during the initial drain of the clarifier, and that the resulting water is low in solids and total metals. As a result, the flow values used in this report are different than those reported in the main body of the Annual Report. The goal of adding flow monitors to clarifier wastestreams will improve flow estimations.

One challenge that occurred while calculating wastestream flows is that the valve status for the C2-1 main drain at Rossdale was offline from January 1 to September 28, 2023.

During this period, the valve was manually opened and closed, and the times that this occurred is not known. Operations staff confirmed that the main drain was opened with approximately the same frequency, duration and intervals as the C2-2 main drain. A similar situation occurred in 2024 where the status of the C2-1 main drain value was not being recorded in SCADA. To fill the missing C2-1 main drain data, values from C2-2 main drain data was applied to C2-1, but was offset by one hour to avoid having the two main drains being open simultaneously, which would not have occurred. This approach provides an estimate of the daily flow total, discharge frequency, etc.; however, it is acknowledged that there are differences between the actual and estimated volumes, frequency, etc. for the C2-1 main drain.

4.2. Flow Estimation Results – E.L. Smith

For each of the E.L. Smith wastestreams, graphs are provided in Appendix B showing the total daily volume, duration (number of hours discharged per day), frequency (number of discharges per day), average interval (the average amount of time that occurs between discharges) as well as the average duration per discharge event. These graphs provide a lot of information into how each wastestream operates. The following text provides high-level summaries of the various discharges and the figures in Appendix B.

Clarifiers (Wastestream 1)

The E.L. Smith WTP has three clarifiers (C1, C2 and C3) that discharge to the NSR. The clarifiers discharge smaller volumes per day during direct filtration and typically discharge the highest volumes during periods of high flow in the NSR. The clarifiers will also discharge higher daily volumes when converting to DF.

During direct filtration, each of the clarifiers typically only discharges once or twice a day, for a few minutes each day, and occasionally do not discharge at all. However, during periods of higher NSR flow or transitions between seasons, each clarifier can discharge multiple times per day for up to one or two hours in total. Individual clarifier discharge events only occur for brief periods, typically less than 8 minutes per discharge.

Filter wastes (Wastestream 2)

Filter backwashes and filter-to-waste contribute large volumes of flow to wastestream 2. The daily volume of filter backwashes and filter-to-wastes is relatively constant over time, and doesn’t change dramatically over the year. Water from backwash waste tank 2 (BWWT2) is normally discharged through wastestream 2 as filter backwashes; however, the water in this tank can also be pumped into wastestream 1 to help prevent any residual material from settling in the pipe. Water from BWWT2 is dechlorinated regardless of which wastestream it is discharged to. Pumping water from BWWT2 into wastestream one is only done periodically, and annual volumes are small compared to backwashes and filter-to-waste.

A single filter backwash typically lasts approximately 20 min, but multiple backwashes occur each day and generally discharging for two to ten hours per day. Similarly, each filter-to-waste typically lasts 20 to 40 min, and occur multiple times per day, generally discharging for two to ten hours per day, but can discharge nearly continuously during some periods.

Other wastes (Wastestream 2)

The low lift silt pumps pump water and settled solids from the inlet and pumpwells and discharge it to wastestream 2. Likewise, water used for cooling the highlift pumps are also diverted to wastestream 2. The silt pumps are run fairly consistently throughout the year except during periods of increased turbidity in the NSR when they are run nearly continuously. High lift cooling water is discharged nearly continuously to the NSR and is only stopped for plant shutdowns.

Filter bypasses and UV / post-filter bypasses are relatively infrequent events, but do discharge relatively large volumes when they occur.

4.3. Flow Estimation Results – Rossdale

For each of the Rossdale wastestreams, graphs are provided in Appendix C showing the total daily volume, duration (number of hours discharged per day), frequency (number of discharges per day), average interval (the average amount of time that occurs between discharges) as well as the average duration per discharge event. These graphs provide a lot of information into how each wastestream operates. The following text provides high-level summaries of the various discharges and the figures in Appendix C.

The Rossdale WTP is divided into two plants, Plant 1 and Plant 2 and each plant contains two clarifiers (i.e., four clarifiers in total). Each clarifier has a separate main drain, floc drains and set of sludge pumps. The Plant 1 clarifiers (C1-1 and C1-2) discharge to wastestream 5 and the Plant 2 clarifiers (C2-1 and C2-2) discharge to wastestream 6.

Plant 1 (Wastestream 5)

Discharge volumes from the main drains, floc drains and sludge pumps all show a similar seasonal pattern with increased volumes during periods of higher flow in the NSR. Plant 1 was often shut down for multiple months during the winter. Plant 1 main drains and floc drains will only discharge for a few minutes a day during direct filtration, but up to over an hour during periods of high NSR flow. The sludge pumps discharge more frequently and would regularly run for more than 5 hours a day, but run nearly continuously when flows and turbidity in the NSR were elevated.

The low lift pumphouse spray wash pumps take raw water from the NSR and use it to backwash the traveling screens that are used to remove larger debris from entering the treatment process, and this water is discharged into wastestream 5. Essentially this water is raw water from the NSR with some additional debris in it and it does not receive any treatment or chemical additions. This water enters wastestream 5 below the water quality sampling location, and a short distance upstream of the NSR. There is no safe or feasible monitoring location downstream of the low lift pumphouse; therefore samples from wastestream 5 must be collected above this discharge. The low lift spray wash pumps run continuously when the WTP is operational and provides a significant dilution to the water in wastestream 5 as the annual volumes from the low lift trash pumps are approximately 5 times greater than the flows from the clarifier flows. This plays a significant role in determining the edge-of-mixing zone concentrations below the WTP. In late 2023, due to construction associated with flood barriers, water from the low lift pumphouse was diverted from wastestream 5 to a separate pipe that drains directly into the NSR a short distance upstream and a few meters away from the shore. While these flows technically do not enter wastestream 5, they still have a similar effect of diluting flows in the mixing zone, and are still treated the same in the calculations. Because the pumps from the low lift pumphouse run continuously, the duration, frequency and interval graphs are not presented in Appendix C.

Plant 2 (Wastestream 6)

Main drains, floc drains and sludge pumps from Plant 2 do not go directly to the NSR, but first flow into drain chamber 10 (DC10). When DC10 fills, water and residuals are pumped out of DC10, which then flow to the NSR. There is also an overflow on DC10 that prevents the DC10 from overflowing. Because this overflow is not monitored, it is not possible to estimate the flows from DC10. The flow data presented in Appendix C ignores the presence of DC10 and assumes that the volumes drain directly to the NSR. Due to the large volumes from main drains and floc drains, these drains can fill DC10 in less than a minute, so effectively, DC10 does not hold back main drains or floc drains for any significant period of time. However, the smaller flows from the sludge pumps can take an extended period of time to fill up DC10, so there can be an extended period of time between when a sludge pump runs and that volume of water enters the NSR. Additionally, the sludge pumps do not cause the pumps in DC10 to activate, rather, the additional water will leave DC 10 through the overflow. This creates a number of challenges and assumptions: Firstly, when a main drain or floc drain occurs, the water already within DC10 is also pumped out and that water may have been from a main drain, a floc drain or a sludge pump, making it difficult to characterize the water quality associated with that discharge event. Secondly, because sludge pumps do not cause DC 10 to be pumped out, it can be difficult to discern at the sampling location when sludge pump water is present or not due to the presence of leaks and other flows in the wastestream. As a result, sludge pumps from wastestream 6 were often not sampled.

Similar to the trends in Plant 1, the volumes from the main drains, floc drains and sludge pumps in Plant 2 all show a similar seasonal pattern with increased discharges during periods of higher flow and turbidity in the NSR; however, Plant 2 has much larger floc drain volumes compared to Plant 1 as a result of the larger number of floc drains in this plant. Plant 2 main drains will only discharge for a few minutes a day during direct filtration, up to half-an-hour during periods of high NSR flow. Due to the large number of floc drains, they can discharge up to 3.5 hours per day The sludge pumps regularly run for more than 5 hours a day, but run nearly continuously when flows and turbidity in the NSR were elevated.

Filter wastes (Wastestream 3)

The daily volume of filter backwashes and filter-to-waste is relatively constant through the year; however the volume does tend to increase with the onset of direct filtration. A single filter backwash or filter-to-waste typically lasts approximately half-an-hour and each process typically occurs for a total of two to ten hours per day.

Other wastes (Wastestream 7)

Wastestream 7 contains flow that is largely leakage from the stilling basins, which allow for contact time with chlorine before it enters the filtration process. Post-filter bypass is used to send filtered water to waste instead of the reservoirs. There is also a flow estimate for reservoir drains and ground water that are drained into wastestream 7; however the total annual flow of this source was < 0.01 ML, and is not considered further. Stilling basin volumes discharge continuously through the day and show little variation in the volume discharged through the year. Post-filter bypasses produce a large amount of volume in a short period of time, but are otherwise not discharging.

5. Water Quality Results

Water quality results from 2023 - 2024 are graphed for each of the sampled wastestream processes for total suspended solids (TSS), total and dissolved aluminum and for every other metal that has an Alberta surface water quality guideline for the protection of aquatic life (i.e., arsenic, boron, cadmium, cobalt, copper, lead, molybdenum, nickel, selenium, silver, thallium, uranium, zinc and dissolved iron). Due to the large number of samples, wastestream processes and parameters, there is a large amount of data to display, and for clarity, this data is spread across a large number of graphs. For simplicity, these graphs are included as two appendices, one for E.L. Smith (Appendix D) and one for Rossdale (Appendix E). While graphs could be made for all measured parameters, parameters with applicable water quality guidelines were deemed to be the most relevant.

Water quality guidelines for cadmium, cobalt, copper, lead and nickel are based on hardness values. To calculate the appropriate guideline, hardness values from the raw water samples were used, and values were extended to the next sampling date. Hardness concentrations were elevated in clarifier wastestreams and would be elevated at the edge of the mixing zone compared to the raw water of the NSR. This would effectively increase the guidelines during clarifier discharges, but would be unlikely to alter any of the overall trends and conclusions. For simplicity, the chronic guidelines were based on raw water hardness concentrations, which is a conservative assumption.

Some reported values had elevated detection limits that exceeded water quality guideline values. This generally corresponded with samples with elevated solids. Samples with concentrations below the detection limit were left as the detection limit in figures and calculation. Notes in Appendix D and E flag the number of samples that exceed guideline values but were reported as below the detection limit.

This report does not go into a detailed analysis of the water quality results; however, several trends and patterns were evident:

- Concentrations of TSS and total metals were highest in clarifier wastestreams, followed by filter backwashes, and lowest in filter-to-waste and Rossdale's wastestream 7.
- Concentrations of TSS and total metals were notably higher in E.L. Smith clarifier wastestreams compared to Rossdale clarifier wastestreams.
- Concentrations of TSS and total metals in raw water and all wastestreams were typically higher during conventional operation than in direct filtration, and were typically highest during the high flow event on the NSR in June 2023.
- Clarifier samples from E.L. Smith regularly exceeded chronic and acute guidelines of arsenic, boron, cadmium, cobalt, copper, lead, nickel, selenium, silver, thallium, uranium, and zinc, particularly during conventional operation, and occasionally during direct filtration.
- Clarifier samples from Rossdale regularly exceeded chronic and acute guidelines of arsenic, cadmium, cobalt copper, lead, nickel, selenium, silver, thallium, uranium, and zinc during conventional operation, and rarely during direct filtration. The magnitude and frequency of exceedances was lower at Rossdale compared to E.L. Smith.
- Filter backwash samples at E.L. Smith only exceeded guidelines for cobalt and only did so during the June 2023 high flow event when concentrations in the raw NSR water were even higher than backwash samples.
- Filter backwash samples at Rossdale occasionally exceeded chronic guidelines of arsenic, cobalt, copper, lead and zinc, and concentrations were typically higher than those observed at E.L. Smith.
- No filter-to-waste samples exceeded guidelines at Rossdale, and only cobalt, copper and zinc guidelines were exceeded by filter-to-waste samples at E.L. Smith, and only in June when concentrations in the raw NSR water were even higher than filter-to-waste samples.
- Dissolved aluminum concentrations exceeded chronic guidelines in nearly every clarifier sample from both WTPs, and exceeded acute guidelines in most samples from clarifiers from both WTPs.
- Dissolved aluminum concentrations were not as high in filter backwash, filter-to-waste and wastestream 7 samples, but still regularly exceeded chronic guidelines and frequently exceeded acute guidelines.
- Total Aluminum concentrations of nearly every clarifier and backwash sample exceeded ECCC's Federal Water Quality Guideline (FWQG) for total aluminum, as well as a number of raw and filter-to-waste samples.

While the concentration of metals regularly exceeded chronic and acute guidelines, the WTPs are not sources of these metals (with the exception of aluminum). These metals originate from the NSR and the WTPs discharge them back to the NSR. The concentrations of metals are elevated compared to raw water conditions due to WTP processes of settling out and concentrating particulate materials.

For all parameters in all wastestreams, the concentrations were quite variable, even among samples collected during similar river conditions and WTP operations. Sometimes even samples collected on the same day, from the same location, from the same WTP process displayed a significant amount of variability. This high level of variability could be the result of the inherent variability among wastestream processes, or introduced variability from the sampling process. It was observed that the turbidity of many wastestream processes changed significantly in very short periods of time. For example, when a floc drain or a main drain would start, the sampling would begin immediately, but it would take several seconds to lower and retrieve the sampling device. Frequently there would be a notable difference in the turbidity of the collected water between the first and second grab samples, which would only be collected a few seconds apart. This suggests that the precise time that the grab samples are collected can have a significant effect on the water quality in the composite sample. Significant variability has also been observed between two different clarifier drains collected only few minutes apart. Therefore there is likely a high degree of variability in these samples which cannot easily be controlled for. One other potential reason for the high level of variability is that it was not always possible to isolate individual wastestream discharges. For example, sludge pumps would sometimes be running or not running while main drains and floc drains were being collected, and there were typically insufficient opportunities to collect a main drain without a sludge pump also running at the same time. While it would be ideal to sample every combination of wastestream discharge, the number of samples and sampling effort would quickly become unfeasible.

6. Edge of Mixing Zone Concentrations

To evaluate the potential impacts of residuals to the NSR, the concentration at the edge of the mixing zone was calculated for each parameter using the formula outlined in AEPA's Water Quality Based Effluents Limits Procedures Manual (1995).

$$C = (QeCe + ff(Qs)Cs)/(Qe + ff(Qs))$$

Where:
- Qe = volume of effluent discharge
- Qs = volume of receiving stream available for mixing
- Ce = concentration of a substance in the effluent
- Cs = upstream concentration of substance
- *ff* = fraction of flow
- C = resulting instream concentration of substance after mixing

The volume of effluent discharge was generated as described in Section 4. The volume of receiving stream is the daily average flow of the NSR as described in Section 3. The concentration of substance in the effluent and upstream are described in Section 5. The fraction of flow was set to 0.1 for chronic guidelines and 0.05 for acute guidelines as described by AEP (1995). For parameters with both chronic and acute guidelines, edge-of-mixing-zone calculations were run twice. For total aluminum, ECCC's Federal Water Quality Guideline (FWQG) a chronic mixing zone was assumed. For the E.L. Smith WTP, the two wastestreams were assumed to discharge into a single mixing zone as requested by AEPA; however, one wastestream discharges from the bank and the other discharges mid-channel. Even if these two wastestreams do begin to merge at the edge of the mixing zone, the resulting fraction of flow should be much larger than 10%. However, for the purposes of this report, the edge of the mixing zone for E.L. Smith is assumed to only be 10% of the NSR.

While flows were available for the entire year, water quality concentrations were only available for a relatively small subset of days. In order to generate daily edge-of-mixing-zone values, the water quality data needed to be extrapolated to days that were not monitored. Water quality data was organized by NSR flow category and plant operation as outlined in Table 1. The median value of that water quality data was taken and applied to all days of the same NSR flow category. For example, 21 samples were collected from the E.L. Smith clarifiers during direct filtration. The median value for each parameter was used as the effluent concentration for all dates that the WTP was in direct filtration, and separate median concentrations were calculated and applied for the ‘spring runoff’, ‘midrange’, ‘moist’, ‘storm 1’ and ‘storm 2’ conditions. As discussed in Section 5 there is a lot of variability within and among samples, and by using median data, the challenge of a single extremely high or extremely low value having an oversized effect was avoided.

As wastestream flows were calculated on a minutely time-step, the resulting concentration in the NSR at the edge of the mixing zone was also calculated on a minutely time-step. While this approach may initially seem excessive, it was necessary for capturing the fact that many wastestream processes, such as clarifier discharges, only occur for a few minutes, and then will not discharge again for multiple hours (see Section 4). Calculating the concentration at the edge of the mixing zone using minutely data not only provides a more accurate understanding of the actual range of instream concentrations, but also provides an estimate of how long concentrations may exceed water quality guidelines. In their review of the proposal, AEPA requested that the edge-of-mixing-zone calculations be completed using “both daily (24-hour) average and episodic average concentrations”. The daily average concentrations at the edge of the mixing zone were simply calculated by taking the average of the minute time-step values. However, it was less clear how to effectively present ‘episodic average’ concentrations given the large number of different WTP processes occurring at a wide variety of frequencies and durations. While the minutely data is available, the large volume of data makes the visual presentation of this data in a graph impractical. To capture the intent of AEPA’s request, the maximum daily value from the minutely edge of mixing zone were also plotted. Therefore, each graph displays the daily average and daily maximum concentrations at the edge of the mixing zone. To provide further context to the range of concentrations observed at the edge of the mixing zone, a graph for each parameter was made showing how many hours (minutes) per day that the concentrations exceeded the applicable water quality guidelines. For many parameters, the daily average concentrations were well below guidelines, while the maximum concentration were above the guidelines, therefore the second graph provides information on how frequently (i.e., how many minutes) guidelines were exceeded. The figures are presented in Appendix F.

While NSR flow values are available on 5-minute intervals, for the purposes of these calculations, only daily average NSR flows were used. This kept the edge of mixing zone calculations much simpler and avoided the situation where a single day would belong to more than one flow category. Similarly, it was assumed that the WTPs converted to/from direct filtration and that this condition applied for the entire day, whereas in reality, the plant would technically be in conventional operation and direct filtration for part of the day. These assumptions made the calculations and interpretation much simpler, and would not have an significant impact to the overall results.

In the figures presented in Appendix F, the x-axis displays the percent of the days (i.e. 0 to 100), instead of the number of days in 2023 – 2024 (i.e., 1 – 731). The graphs contain the data for all 731 days, but displaying the x-axis as 0 to 100 seemed more intuitive. Additionally, the days on the x-axis organized according to NSR flow category, and then are secondarily organized chronologically. For example, the left side of the graph shows the category of ‘direct filtration’, and within that category are all the days that the plant was in DF, in chronological order. Graphing the data in this fashion allows data from the same flow category to be compared more easily as opposed to simply plotting the data chronologically. These graphs also make it easier to determine what NSR flow conditions and WTP operations generate impacts on downstream water quality compared to a graph that only plotted the data chronologically.

There were also a few WTP wastestream processes where insufficient number of water quality samples were collected to generate direct estimations of median water quality concentrations. Concentrations from the Rossdale low lift pumphouse that were not measured were assumed to be equal to raw water, and the Rossdale post-filter bypass were conservatively assumed to be equal to the concentrations measured in filter backwashes. At E.L. Smith, concentrations from the low lift silt pumps and the high lift cooling water was not known. Using raw water quality likely underestimates the load from these sources, but using any process wastestream data likely over estimates the amount of total and dissolved aluminum, which are not added to this wastestream. To estimate the concentrations from these wastestreams, concentrations from filter backwashes were used, which likely over-estimates the concentrations; however, since the flows from these processes are relatively small, their overall impact on the load is small. Likewise, the bypass flows at E.L. Smith were estimated using filter-to-waste concentrations, which again, likely over-estimates the concentrations of some parameters, but the difference is likely to be small.

The 2023 results were recalculated using the finalized 2023 NSR flow values and using the combined 2023 – 2024 water quality dataset. Likewise, the 2024 results were calculated using the preliminary NSR flow values and using the combined 2023 – 2024 dataset. Using the combined dataset is a better approach due to the high variability observed among samples and will avoid the impact of outliers among relatively small datasets.

In 2023, edge-of-mixing-zone calculations were completed for all parameters, but as indicated in the 2023 report, this task was very time consuming, and for 2024 the calculations would only be completed on TSS, total and dissolved aluminum. If required, EPCOR can complete edge-of-mixing-zone calculations for additional parameters.

Total suspended solids – Concentrations of TSS at the edge of the mixing zone were elevated compared to raw water conditions, most notably at E.L. Smith. Concentrations seldom exceeded TSS guidelines during direct filtration, but during conventional operation guidelines were exceeded daily, but only for short periods of time (typically < 2 hours). The TSS guidelines used in this report are for maximum increases of 25 mg/L from background for any short-term exposure (e.g. 24 hour period) and an increase of 10% when background concentrations are > 250 mg/L. Interestingly, even when using the TSS guideline of no increases above 5 mg/L, the duration of increases still typically remained < 2 hours (data not shown). This shows that when TSS concentrations are increased (such as during a clarifier discharge), the increases are relatively large, but for the large majority of the day, the increases of TSS below the WTPs are small.

Total aluminum – Concentrations of total aluminum at the edge of the mixing zone were elevated compared to raw water conditions, most notably at E.L. Smith. Concentrations exceeded guidelines least frequently during low NSR flows, and typically less than 5 hours per day. During 'moist', 'storm 1' and 'storm 2' conditions, raw NSR conditions frequently exceeded guidelines. The FWQG guidelines is currently used by the U.S. EPA, Environment and Climate Change Canada and B.C. Ministry of Water, Land, and Resource Stewardship, but is currently not used by AEPA. Further consideration should be given to the appropriateness of this guideline for the NSR as raw water samples frequently exceed this guideline, even at E.L. Smith.

Dissolved aluminum - Concentrations of dissolved aluminum below E.L. Smith never exceeded chronic or acute guidelines at the edge of the mixing zone. Below Rossdale, daily maximum concentrations often exceeded acute and chronic guidelines at the edge of the mixing zone, most notably during 'midrange' flow conditions. It is uncertain why raw water and the edge of mixing zone concentrations were highest during 'midrange' conditions, particularly because alum dosing from the WTPs would have been relatively low during these conditions. This result could be the result of a small sample size, or it could be reflective of pH, hardness or dissolved organic carbon of the samples, which could push more aluminum into the dissolved fraction. This result will continue to be explored. Despite the high dissolved aluminum concentrations below Rossdale during 'midrange' conditions, concentrations only exceeded chronic guidelines for < 2 hours per day, and acute guidelines were never exceeded for more than 35 min per day. During 'spring runoff' and 'storm 2' conditions (i.e., flows > 600 m^3/s) at Rossdale dissolved aluminum exceeded chronic guidelines in raw water and at the edge of the mixing zone.

Caution should be applied, as only small numbers of raw water samples have been collected during spring runoff and storm 2 conditions.

The edge of mixing zone calculations for dissolved aluminum should be interpreted with caution, as parameters such as pH, hardness and dissolved organic carbon can affect if aluminum remains in a dissolved phase, or if it becomes particulate aluminum. Once the wastestream starts mixing with the NSR, the resulting dissolved aluminum concentration could increase or decrease. For these calculations, no modifications of instream changes to dissolved aluminum were applied. One potential solution would be to use newer guidelines from U.S. EPA, Environment and Climate Change Canada and B.C. Ministry of Water, Land, and Resource Stewardship that are based on total aluminum, but consider the pH, hardness and dissolved organic carbon on the samples as described above

Total metals – As described above, the mixing zone calculations were not calculated for 2024, but based on the results from the 2023 report, the concentration of many total metals regularly exceeded guidelines at the edge of the mixing zone below E.L. Smith. These exceedances typically occurred during periods of higher flow in the NSR, but guidelines were never exceeded during direct filtration and seldom during 'midrange' flows. Even when guidelines were exceeded, they typically exceeded guidelines for less than 2 hours per day, similar to the trends observed for TSS. During the 'storm 2' flow category, many metals were above guidelines in the raw water and below the WTP. Concentrations downstream of Rossdale were typically much lower compared to E.L. Smith.

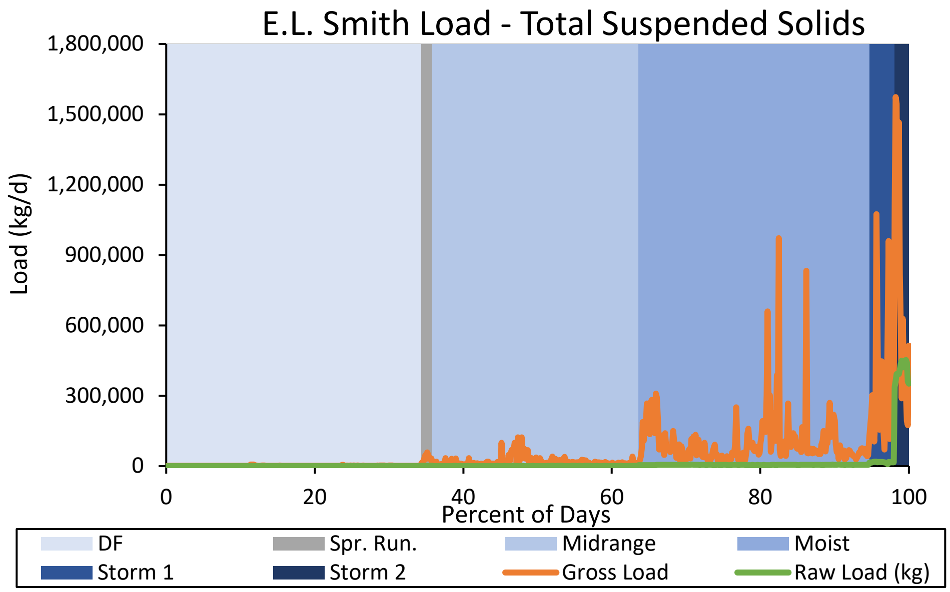
7. Load Estimates

Daily load estimates for TSS, total and dissolved aluminum were calculated using the minute time-step flow data and median effluent concentrations for each flow category, similar to the edge of mixing zone concentrations described in Section 6. The graphs present both the gross and raw loads for each parameter from each WTP. The gross loads represent the total amount of material discharged by the WTPs without considering the load taken up by the WTPs from the NSR, which is the raw load. EPCOR considered presenting the net loads of the WTP (i.e., gross load minus raw load); however this generated some negative load values, typically during 'storm 2' flow conditions. While negative load values are counter-intuitive, there are some circumstances where they could occur. For example, during the start of a high flow event in the NSR, the load of solids in the river could be greater than the load of solids discharged by the WTPs. Also, the loads of dissolved aluminum could also be higher in the river compared to the load discharged by the WTPs given differences in temperature and pH.

While episodic (i.e., minutely) loads were calculated, only daily loads are presented in the figures below. Graphs of episodic loads can be provided if AEPA requires; however, EPCOR determined that the edge-of-mixing-zone graphs and the daily loads are likely more informative than episodic loads presented in terms of kg per minute.

There are a number of limitations in the ability to generate accurate estimates of wastestream loads, and the graphs below should be interpreted with caution. As described in Section 4, a number of assumptions were used to calculate wastestream flows. Secondly, as described in Section 5, there is a significant amount of variability among wastestream samples collected from the same location during similar conditions of river flow and plant operation. This variability makes it very challenging to be able to generate an accurate load estimate from a single wastestream discharge event that was sampled, and it makes it even more challenging to extrapolate the results to events and days that were not sampled. To manage the high level of variability of the water quality results, median values of effluent and raw water quality were used, as described in Section 6; however, median values have inherent limitations for calculating daily load estimates, as it does not adequately capture the range of variably of both wastestream and NSR water quality. An example of this limitation is evident in the loads of TSS during 'storm 2' flow conditions, where raw loads at E.L. Smith were often greater than the gross loads from the WTP. While this situation can technically occur, as described above it is likely that the collection of a relatively small number of raw water samples, and utilizing the median value of these samples was insufficient to characterize the loads during this period of high NSR flows when loads were likely changing rapidly. By being unable to adequately characterize the load of the NSR during the high flow event, it is logical that the raw load could be calculated to be greater than the gross load from the WTP. EPCOR will give more thought to how loads from the WTPs can be better calculated and presented; however, mass-balance approaches (i.e. knowing how much alum is added as part of WTP processes) may yield more accurate estimates of loads than the approach outlined here. While the mass-balance approach may yield better estimates of daily and annual load, it is inadequate to generate estimates of the concentrations at the edge of the mixing zone, because the mass balance approach does not account for the fact that the WTPs 'pulse' their discharges, and that the various wastestream discharges have very different volumes and concentrations.

Caution should also be applied to interpreting the loads of dissolved aluminum to downstream concentrations at Pakan as parameters such as pH, hardness and dissolved organic carbon can affect if aluminum remains in a dissolved phase, or if it becomes particulate aluminum. For the figures below, it is assumed that no changes occur to dissolved aluminum upon mixing with the NSR. The newer total aluminum guideline from U.S. EPA, Environment and Climate Change Canada and B.C. Ministry of Water, Land, and Resource Stewardship which considers the pH, hardness and dissolved organic carbon of the sample may prove to be a more useful guideline than the current AEPA dissolved aluminum guideline, but more thought and consideration will be needed before fully embracing this guideline.



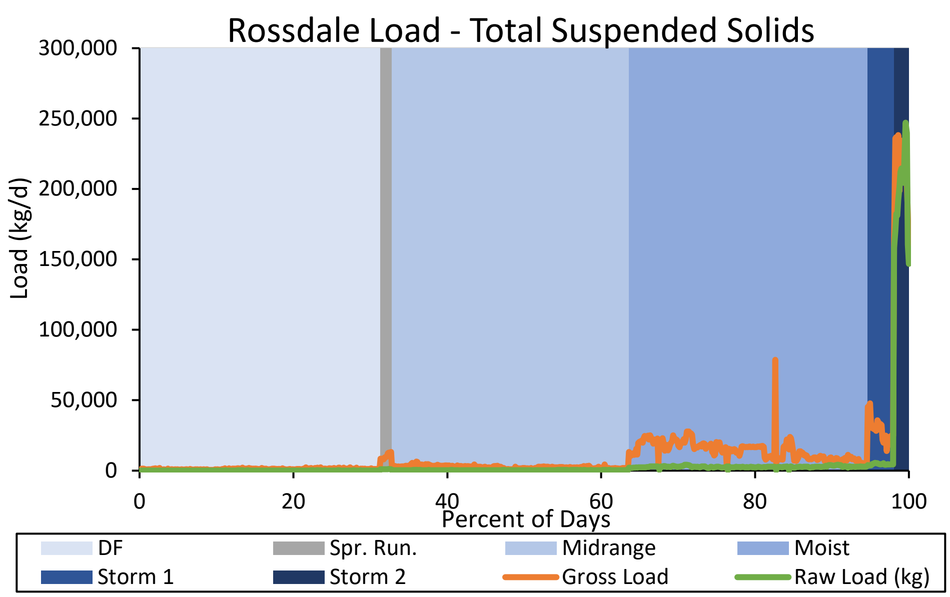
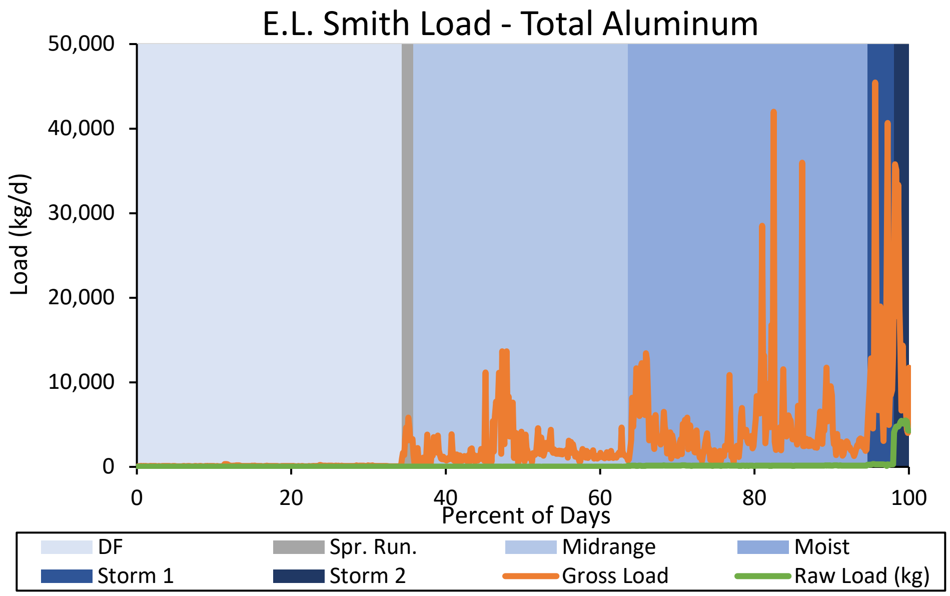


Figure 4. Daily loads of total suspended solids at E.L. Smith and Rossdale, 2023 - 2024.



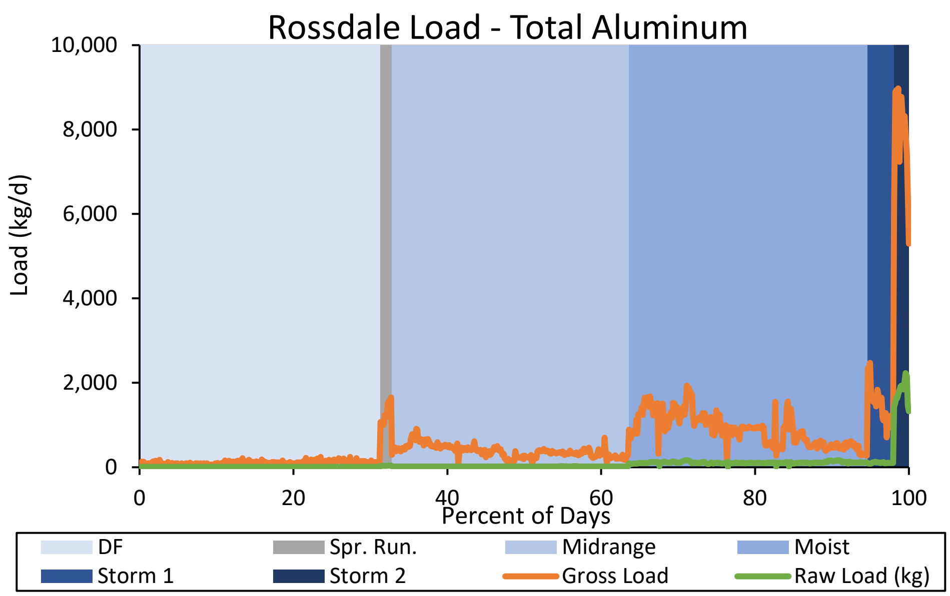
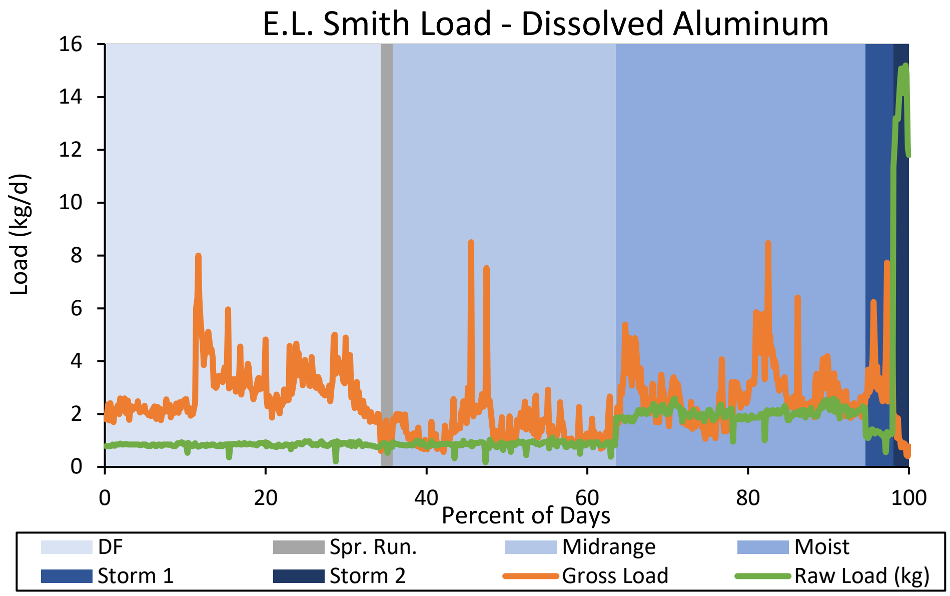


Figure 5. Daily loads of total aluminum at E.L. Smith and Rossdale, 2023 - 2024.



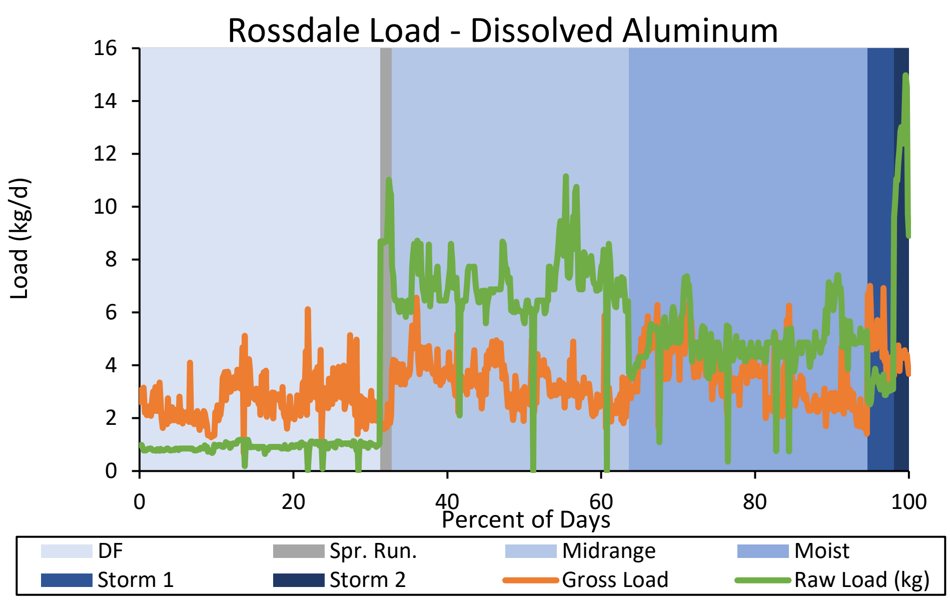


Figure 6. Daily loads of dissolved aluminum at E.L. Smith and Rossdale, 2023 - 2024.

8. 2025 Reporting

EPCOR proposes that the graphs showing the duration, frequency, interval and average event duration of wastestream discharges in Appendix B and C not be included in the 2025 report due to the time and effort required to process the one minute time-step data. One minute time-step data will still be used in the edge-of-mixing-zone calculations and loads, but the graphs will not be updated or included in the 2025 report. As WTP operation does not dramatically change year-to-year, there is limited value in continuing to generate these graphs. The data is backed up and historized and will be readily available if AEPA or EPCOR determines there is need to produce any of these graphs in the future.

In EPCOR's final proposal to AEPA for the wastestream monitoring program in November 2022, EPCOR proposed that the annual wastestream monitoring program report would be delivered on March 31 of each year. However, when AEPA approved the proposal, AEPA indicated that the report would be due on February 28. EPCOR requests that the annual deadline be adjusted to March 31 as originally proposed to allow for adequate time to process and analyze the large amount of data that is used in this report. EPCOR already has multiple Approval to Operate annual reports that are due on February 28.

Appendix A – Site Photographs

Photo A.1. E.L. Smith wastestream 2 outfall and sampling location

Photo A.2. E.L. Smith wastestream 1 sampling location, MH 67.1

Photo A.3. Rossdale Wastestream 3 sampling location

Photo A.4. Rossdale Wastestream 6 outfall and sampling location

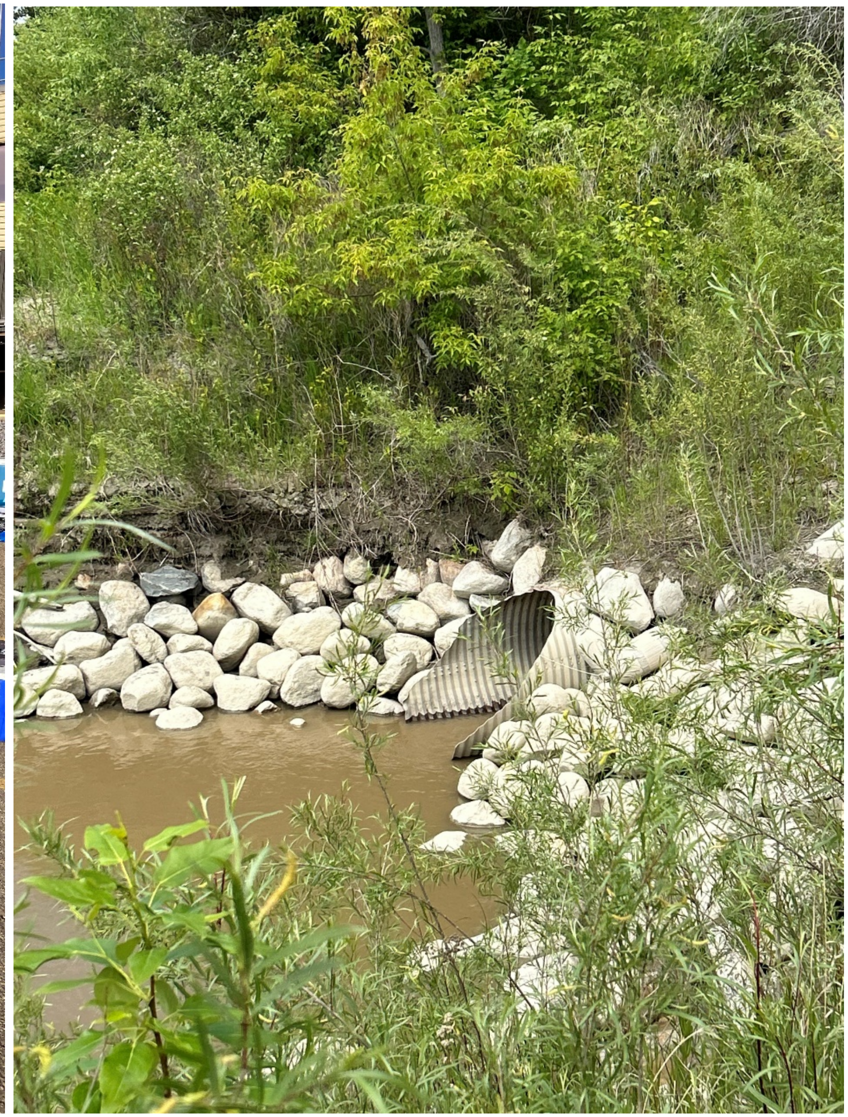


Photo A.5. Rossdale Wastestream 5 sampling location (left), and outfall (right)

Photo A.6. Rossdale Wastestream 7 sampling location

Appendix B – Flow Estimation Results – E.L. Smith

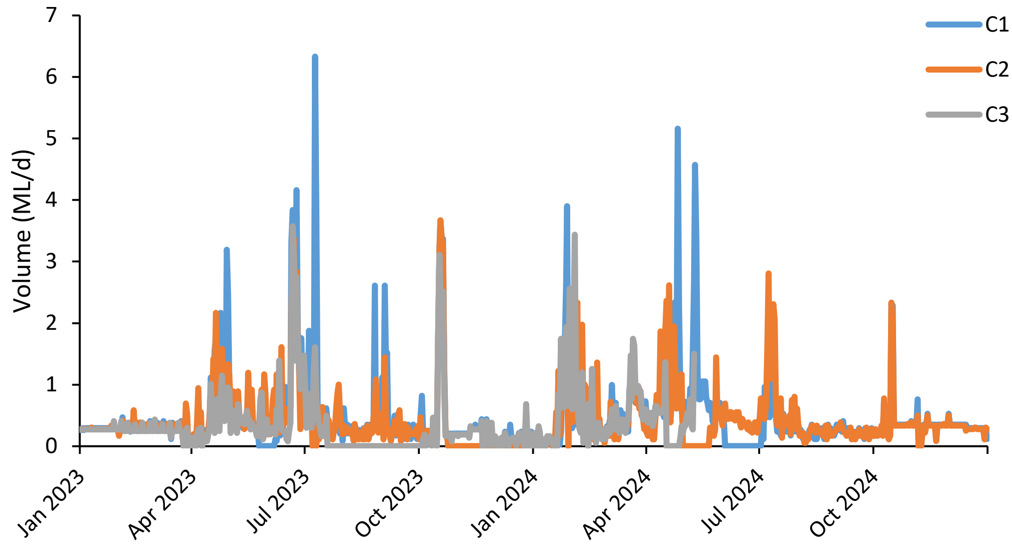


Figure B.1. Total daily volume released from each E.L. Smith clarifier, 2023 - 2024.

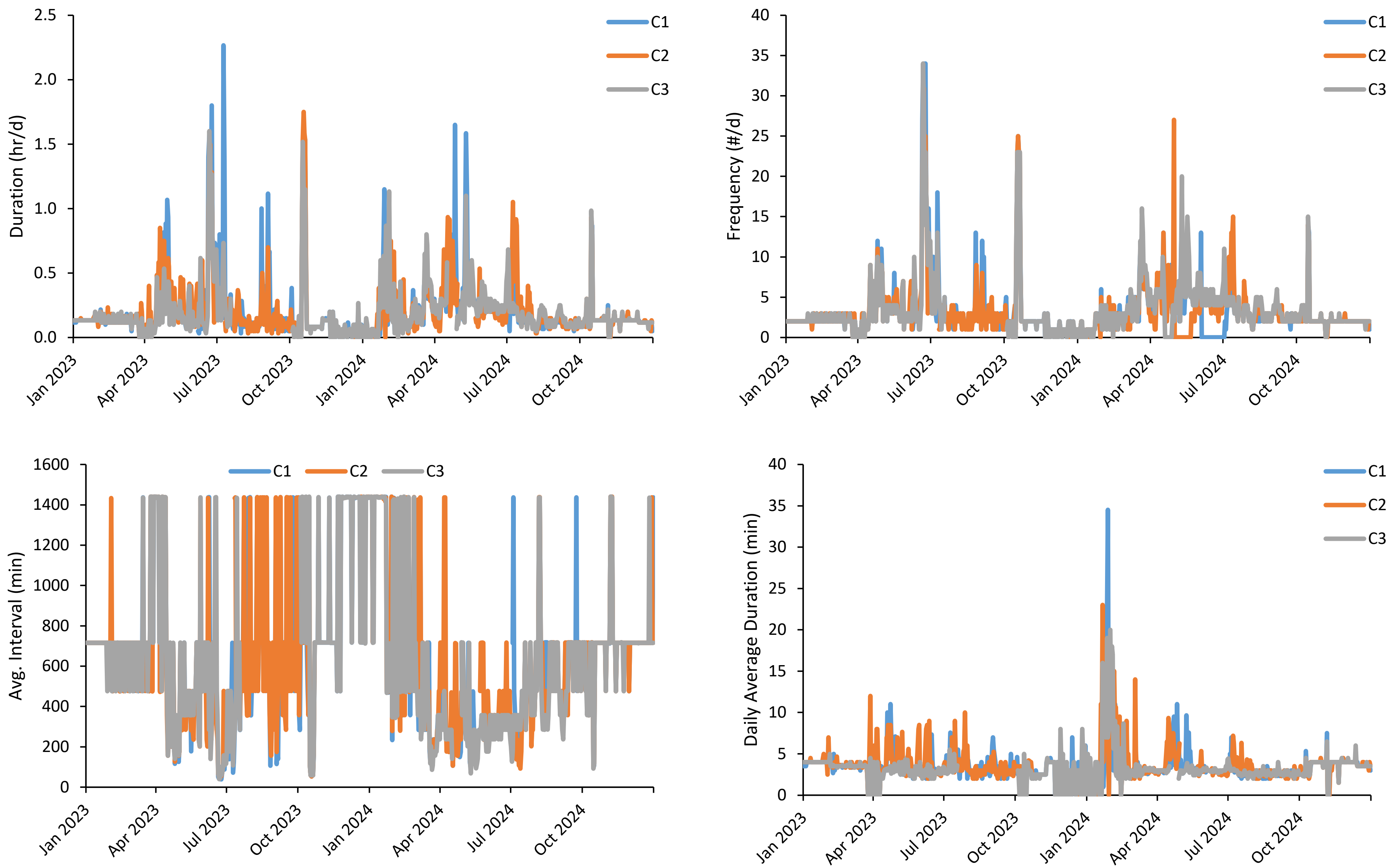


Figure B.2. Duration, frequency, interval and average event duration of E.L. Smith clarifier drains, 2023 - 2024.

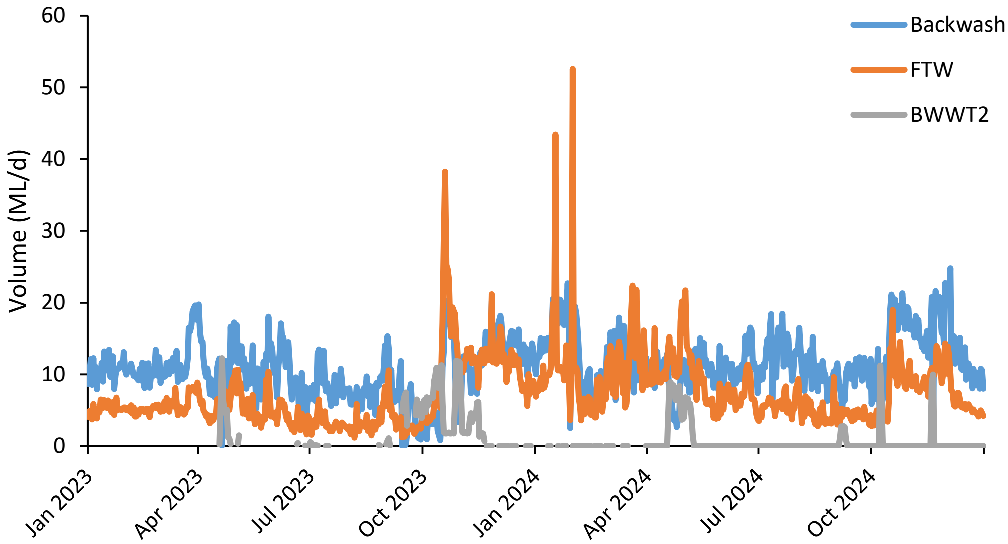


Figure B.3. Total daily volume released from filter backwashes, filter-to-wastes and from backwash waste take 2 at E.L. Smith, 2023 - 2024.

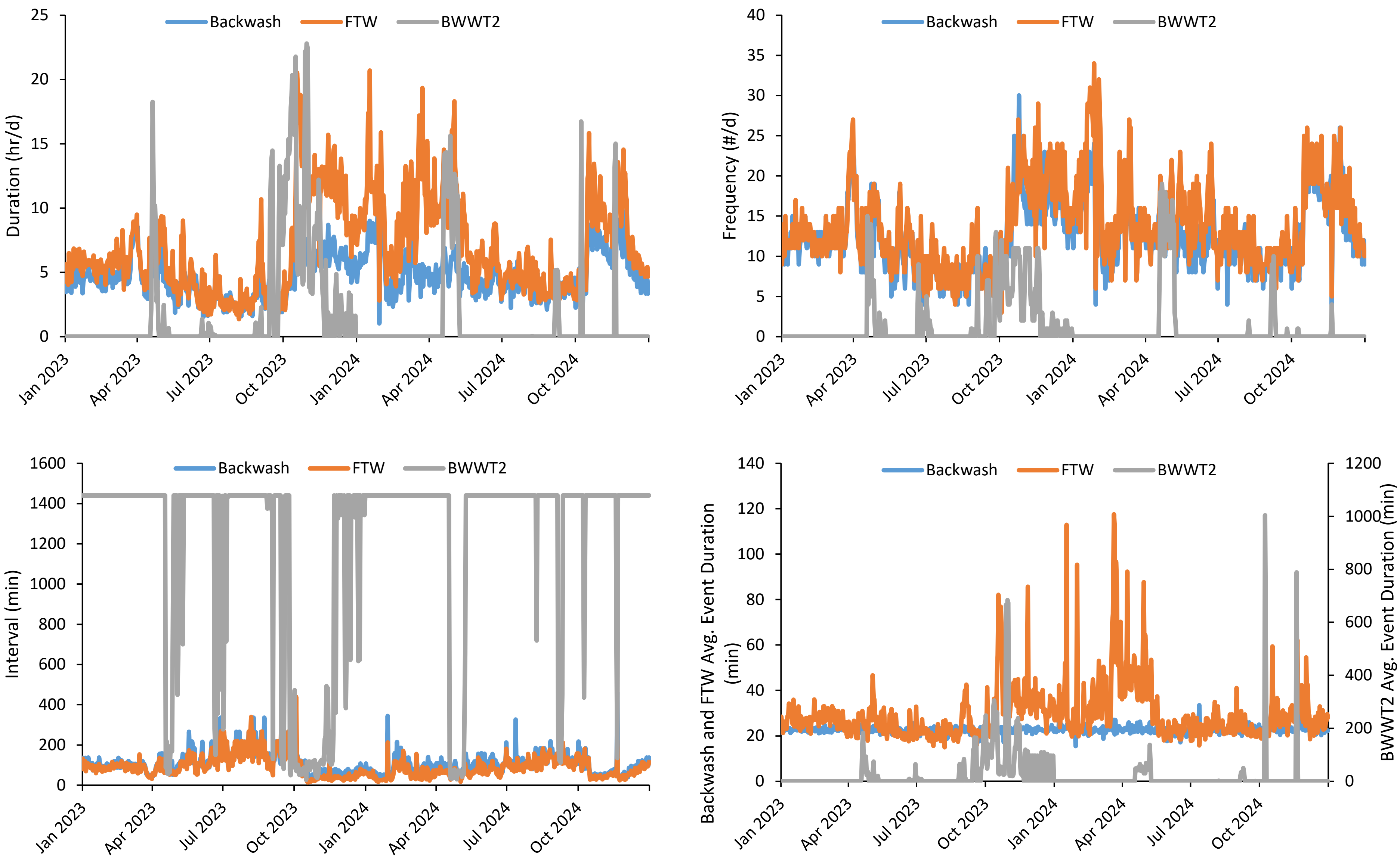


Figure B.4. Duration, frequency, interval and average event duration of filter backwashes, filter-to-wastes and back wash waste tank 2 at E.L. Smith, 2023 - 2024.

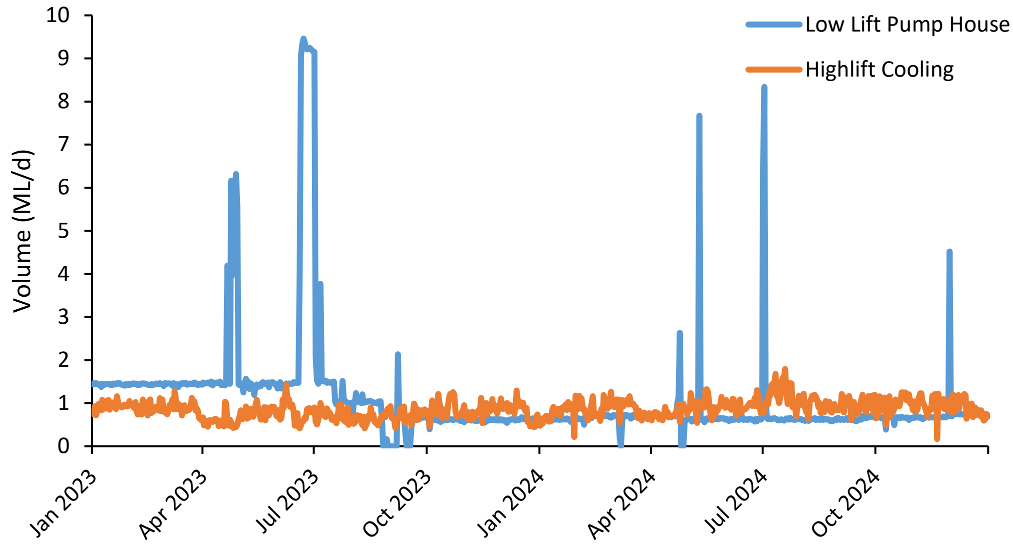


Figure B.5. Total daily volume released from the low lift pump house and high lift cooling at E.L. Smith, 2023 - 2024.

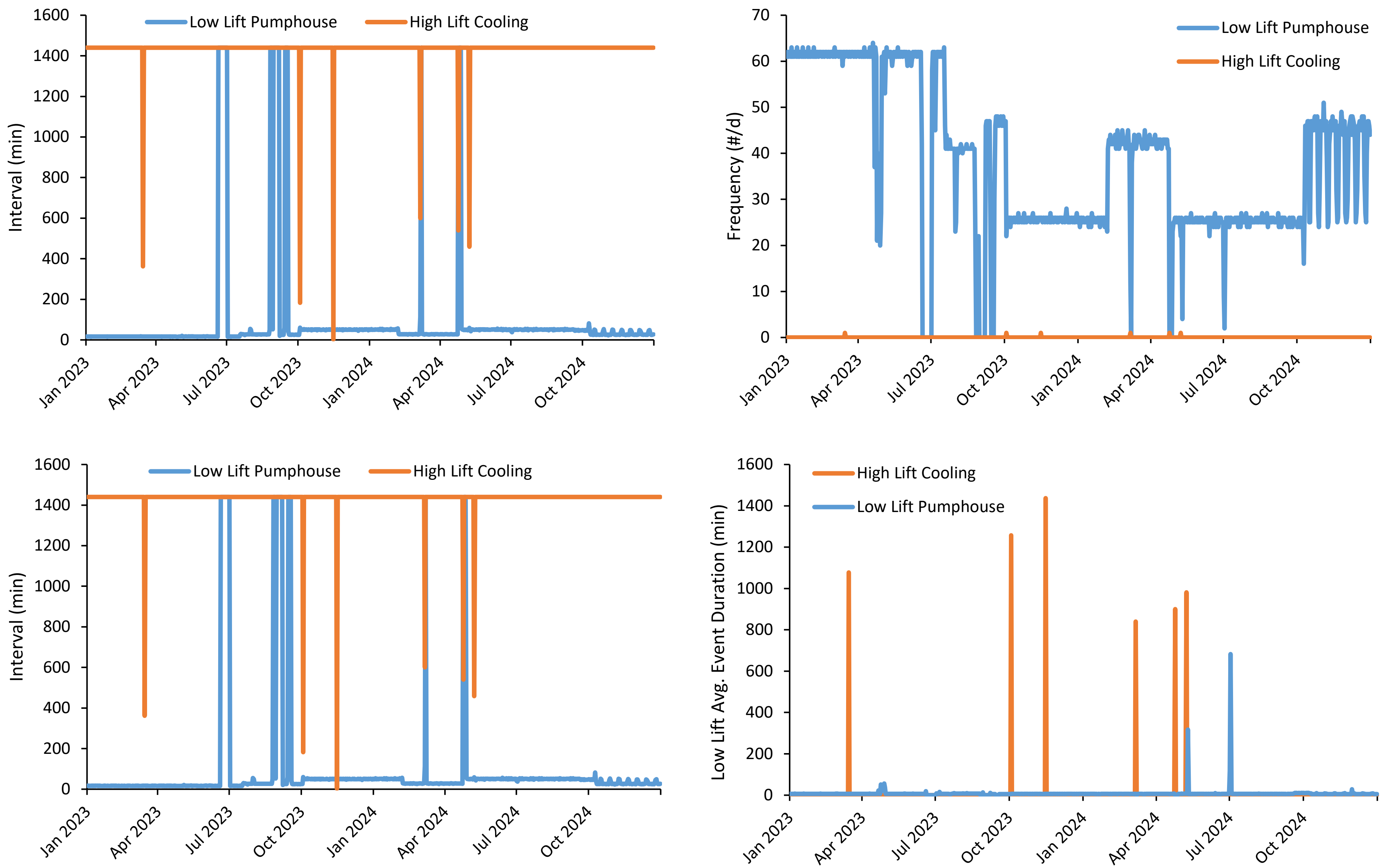


Figure B.6. Duration, frequency, interval and average event duration from the low lift pump house and high lift cooling at E.L. Smith, 2023 - 2024.

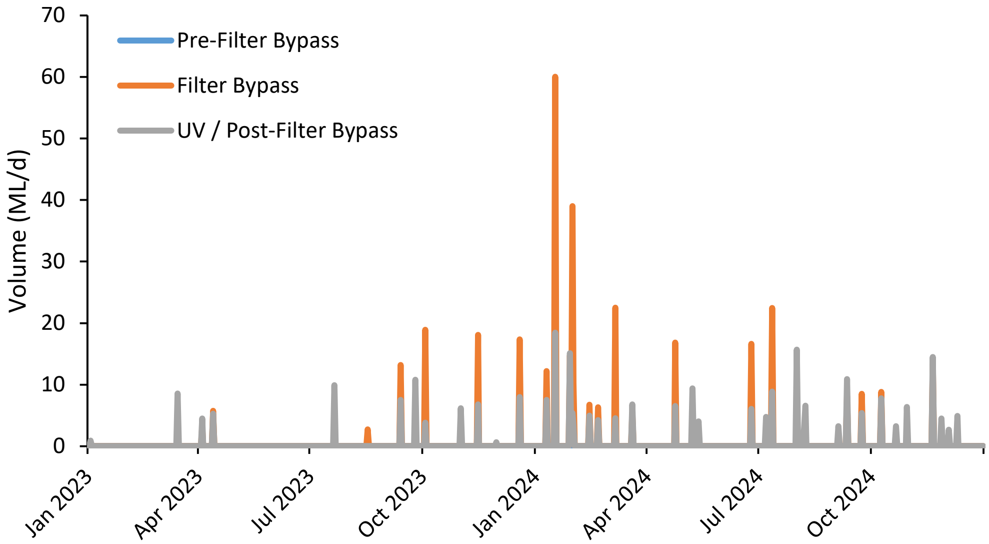


Figure B.7. Total daily volume released from bypasses at E.L. Smith, 2023 - 2024.

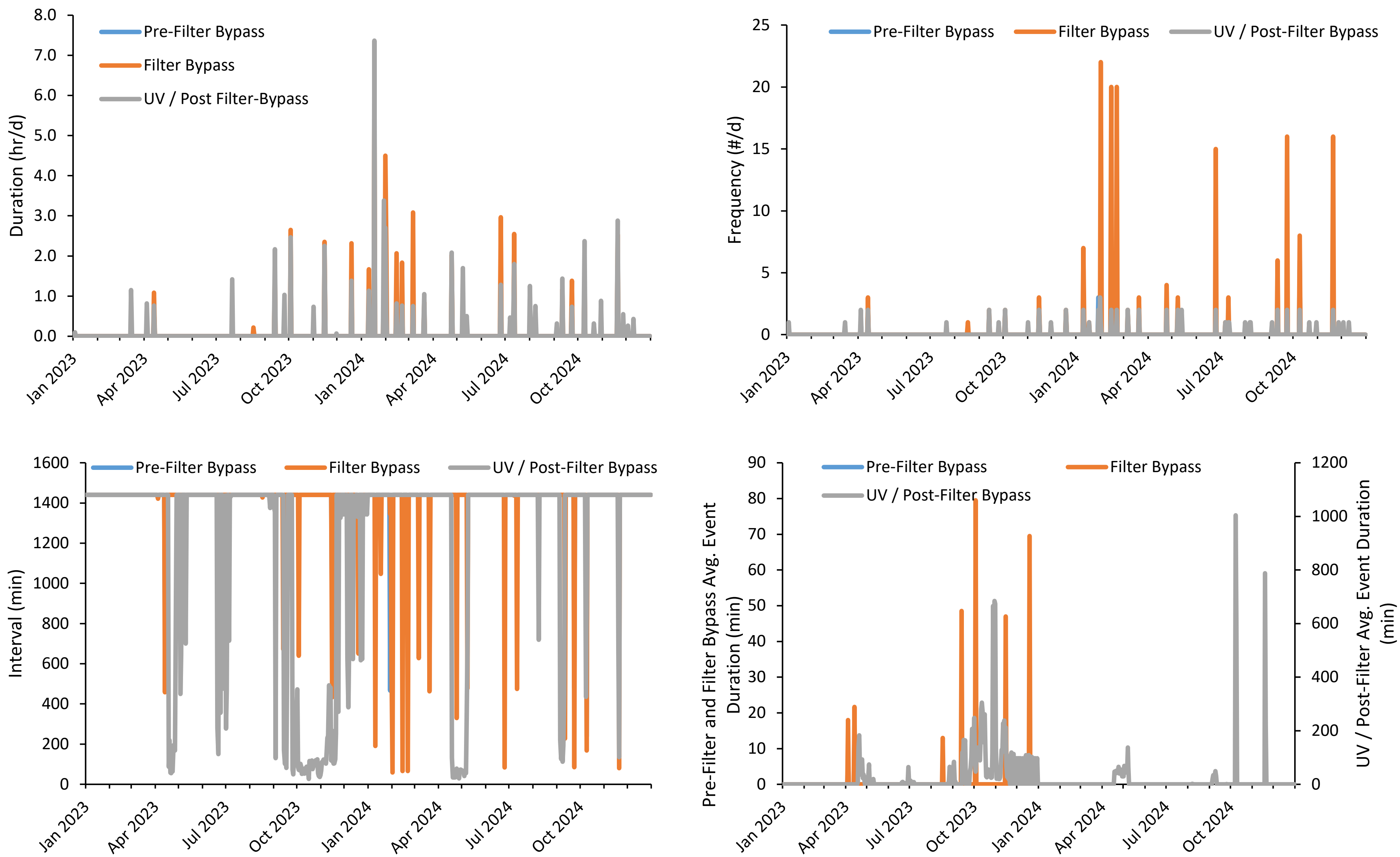


Figure B.8. Duration, frequency, interval and average event duration from bypasses at E.L. Smith, 2023 - 2024.

Appendix C – Flow Estimation Results – Rossdale

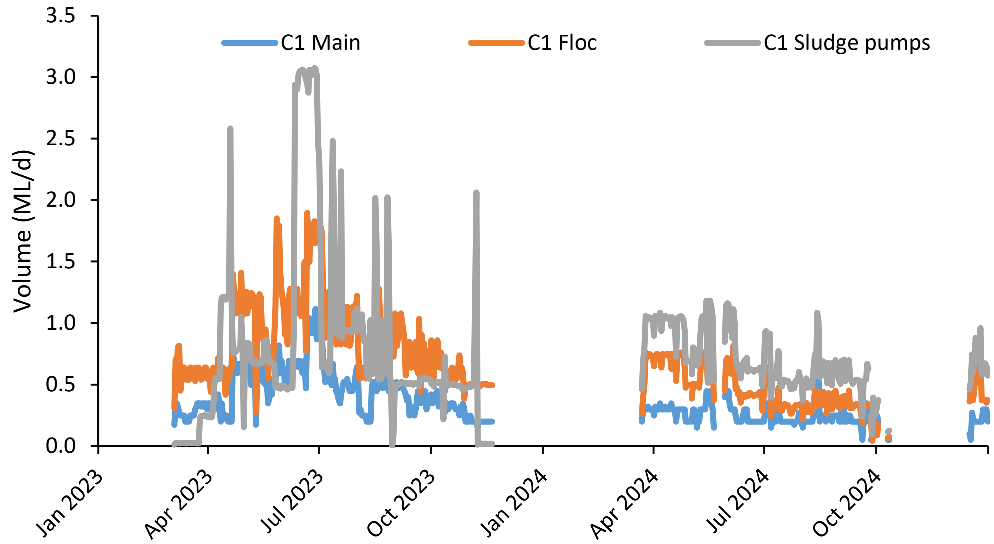


Figure C.1. Total daily volume released from Plant 1 discharges to wastestream 5 at Rossdale, 2023 - 2024.

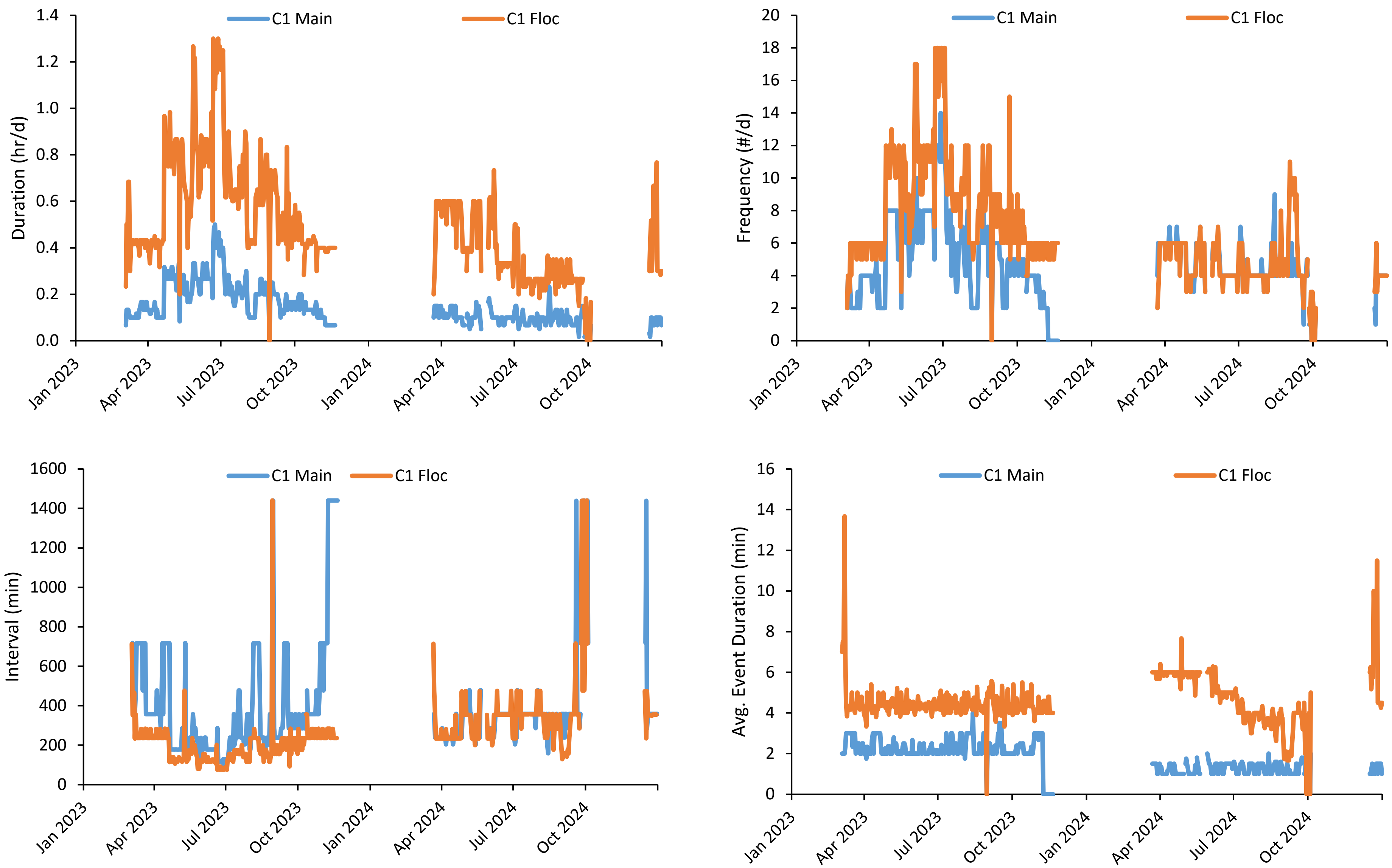


Figure C.2. Duration, frequency, interval and average event duration from Plant 1 main drains and floc drains to wastestream 5 at Rossdale, 2023 - 2024.

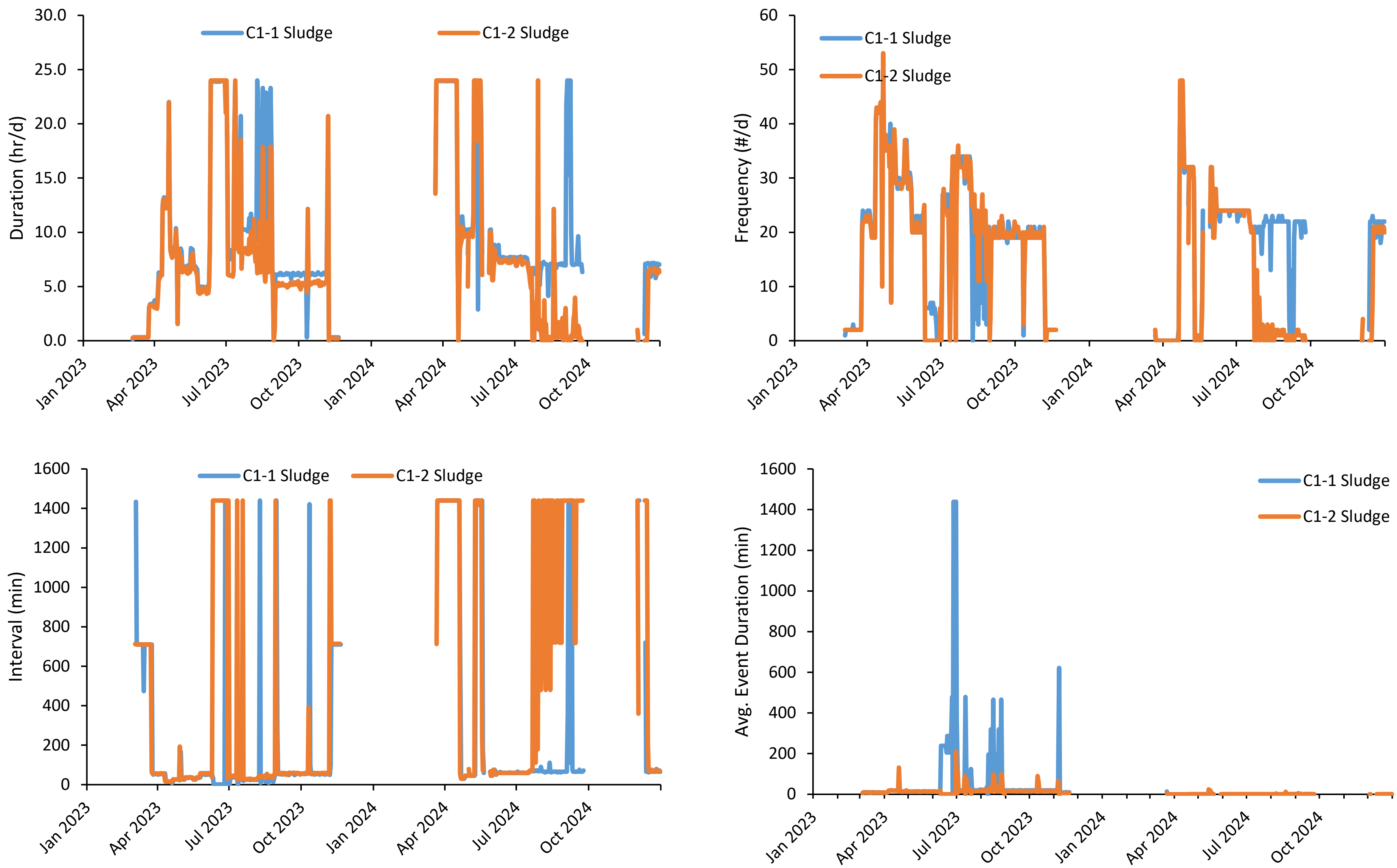


Figure C.3. Duration, frequency, interval and average event duration from Plant 1 sludge pumps to wastestream 5 at Rossdale, 2023 - 2024.

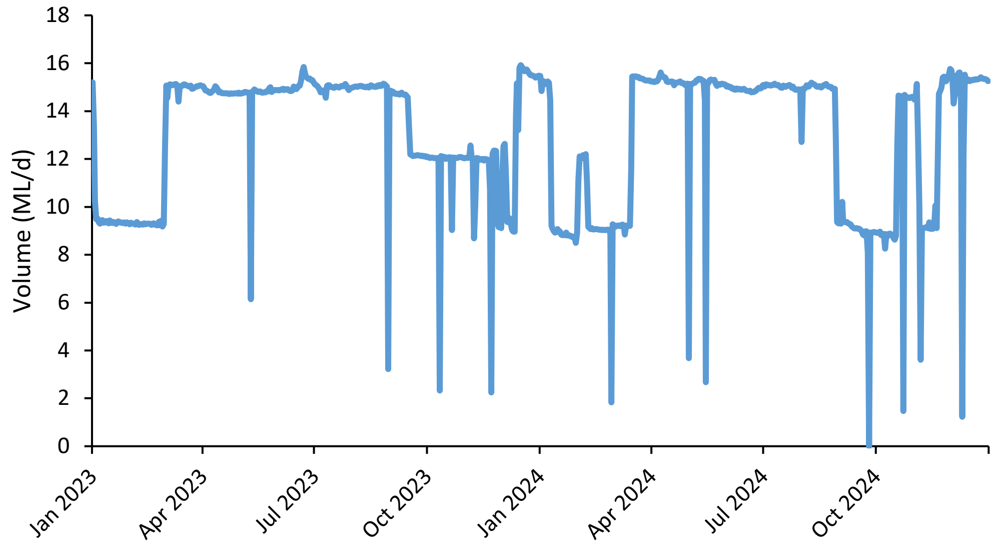


Figure C.4. Total daily volume released from the low lift pumphouse to wastestream 5 at Rossdale, 2023 - 2024.

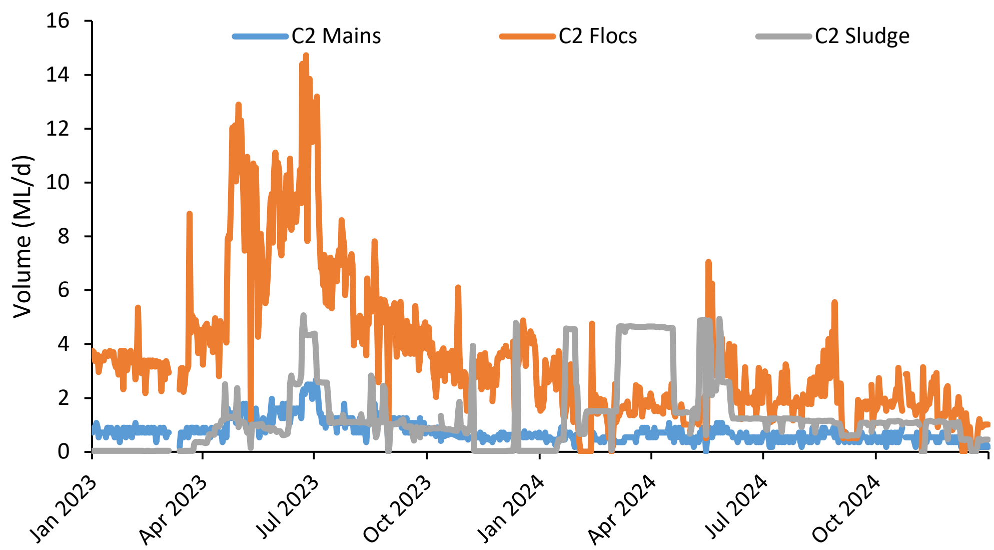


Figure C.5. Total daily volume released from Plant 2 discharges to wastestream 6 at Rossdale, 2023 - 2024.

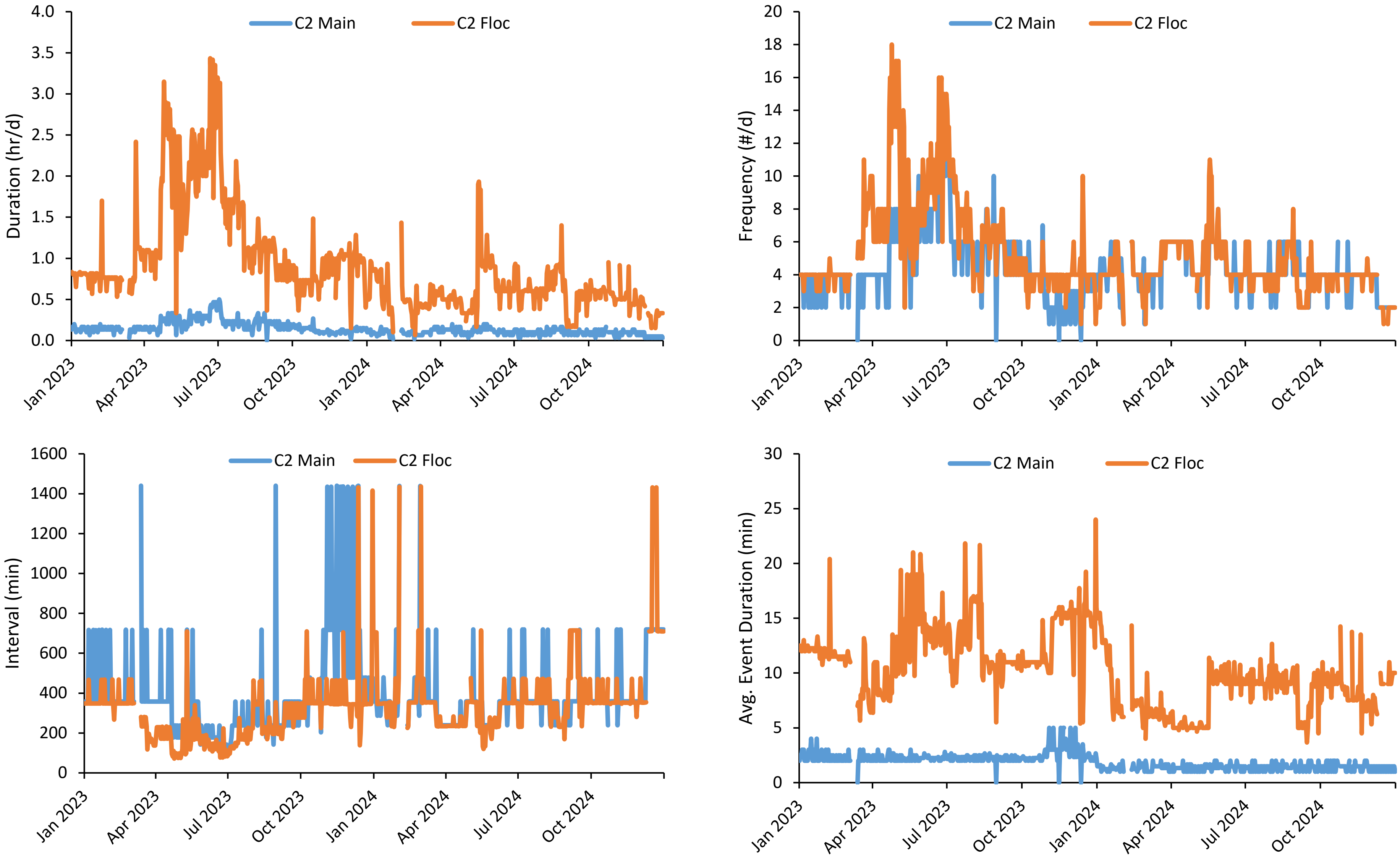


Figure C.6. Duration, frequency, interval and average event duration from Plant 2 main drains and floc drains to wastestream 6 at Rossdale, 2023 - 2024.

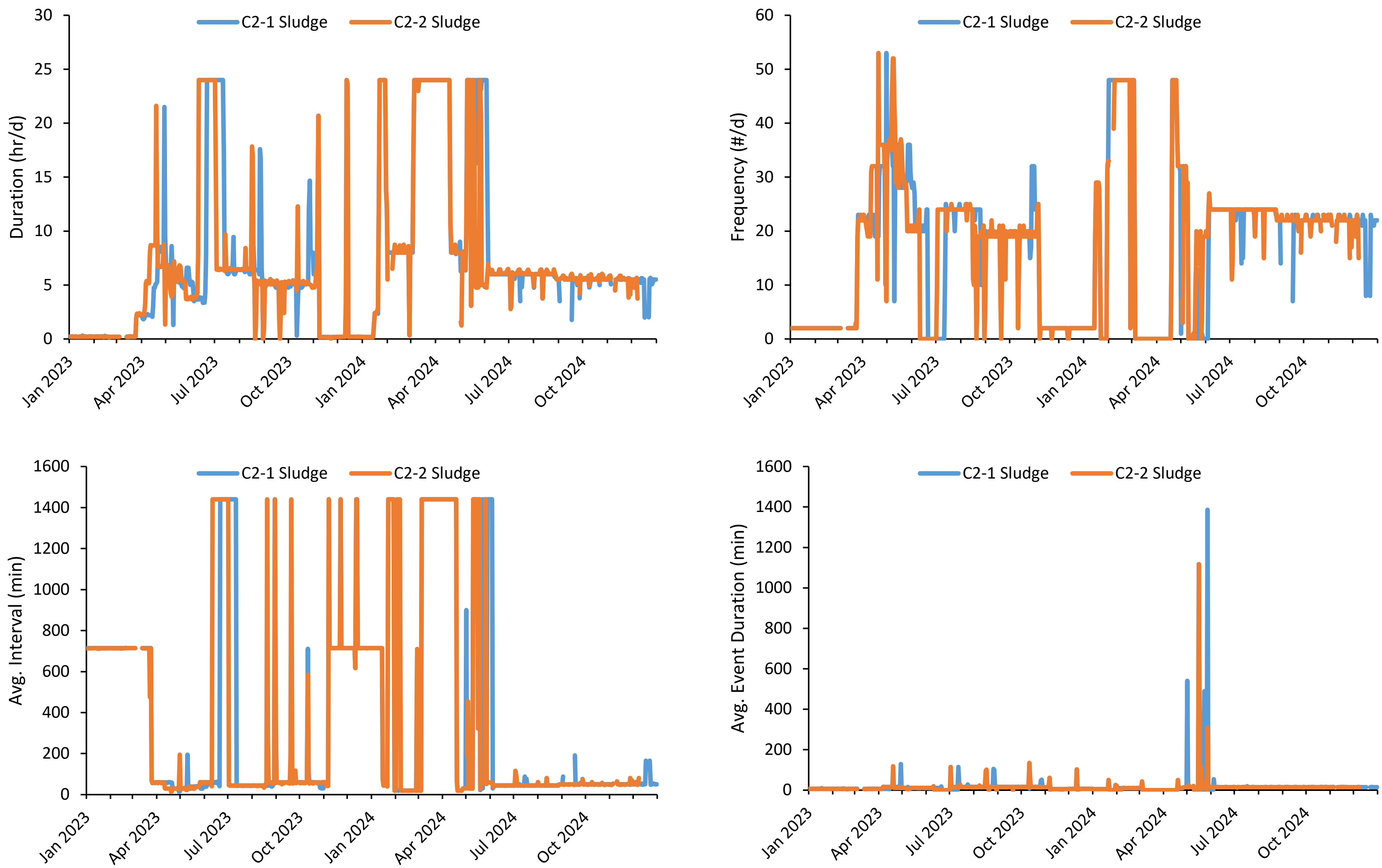


Figure C.7. Duration, frequency, interval and average event duration from Plant 2 sludge pumps to wastestream 6 at Rossdale, 2023 - 2024.

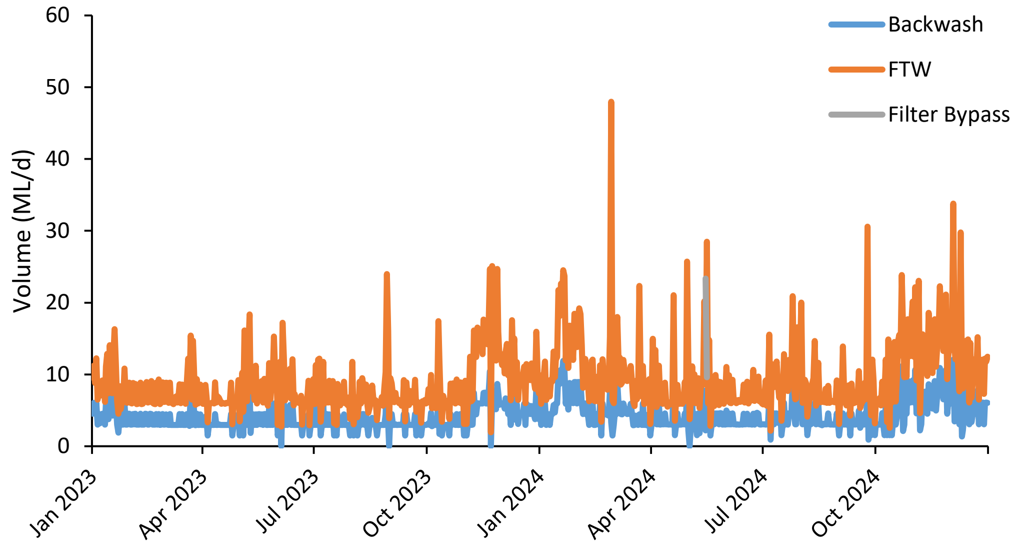


Figure C.8. Total daily volume released from filter backwashes and filter-to-waste to wastestream 3 at Rossdale, 2023.

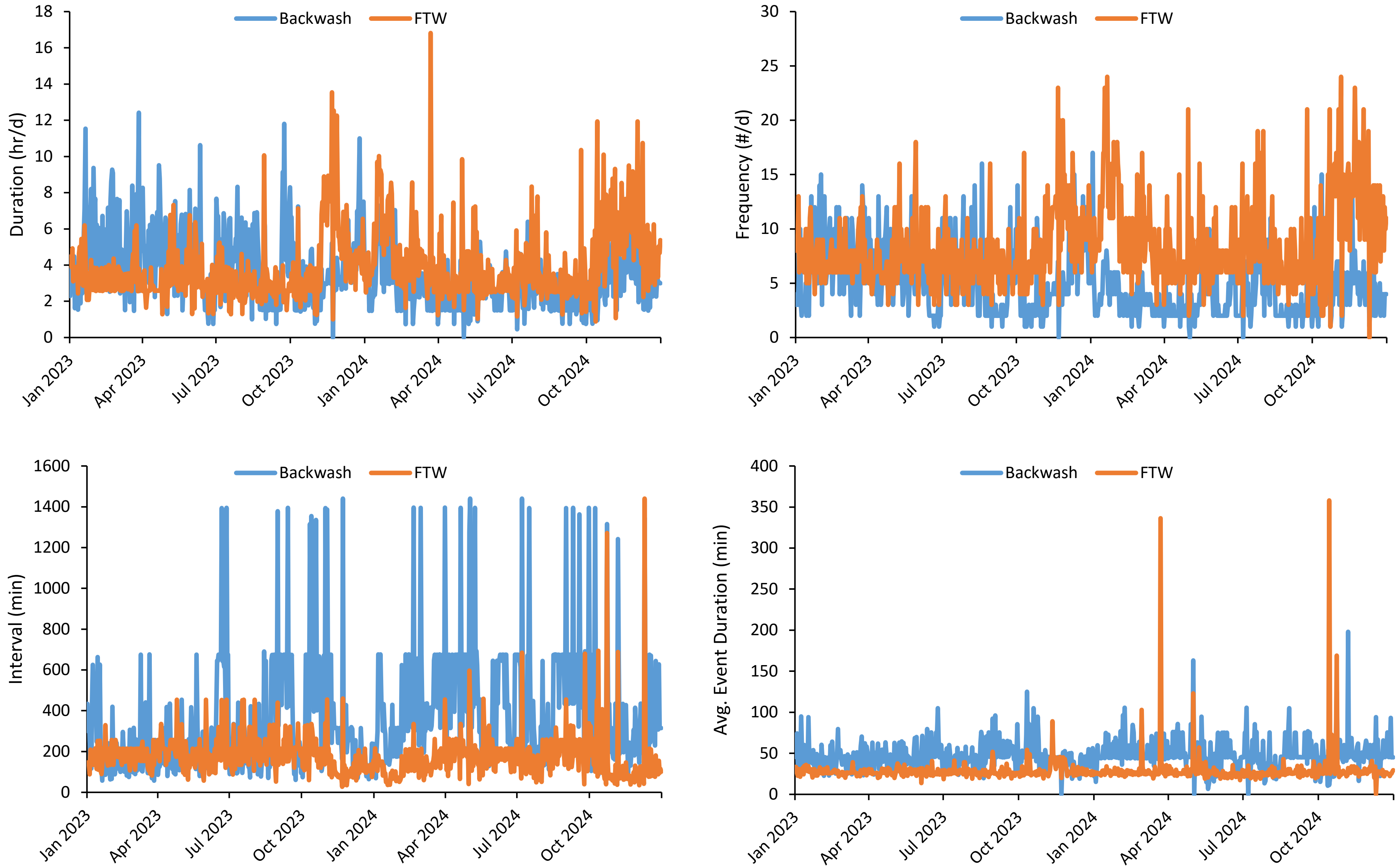


Figure C.9. Duration, frequency, interval and average event duration from filter backwashes and filter-to-waste to wastestream 3 at Rossdale, 2023 - 2024.

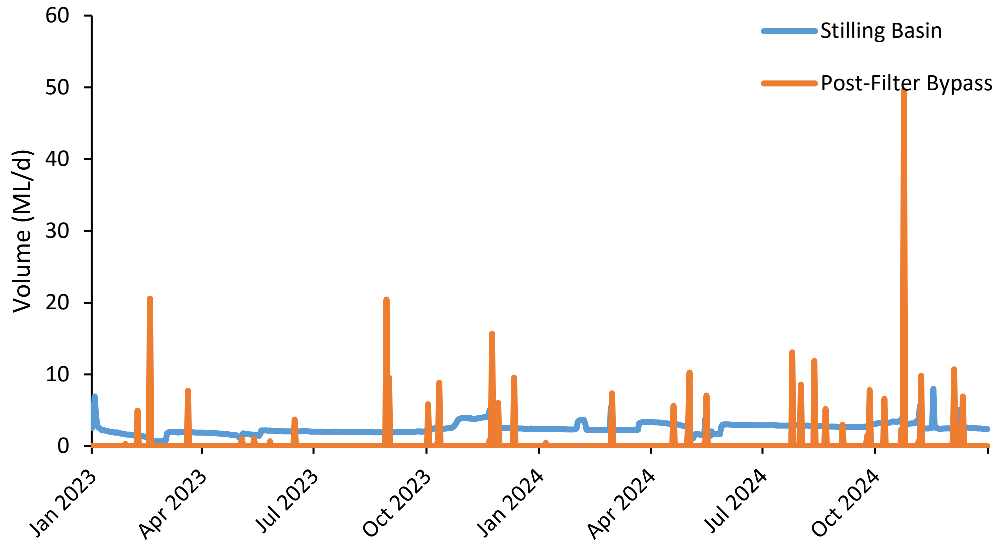


Figure C.10. Total daily volumes from stilling basins and bypasses released to wastestream 7 at Rossdale, 2023 - 2024.

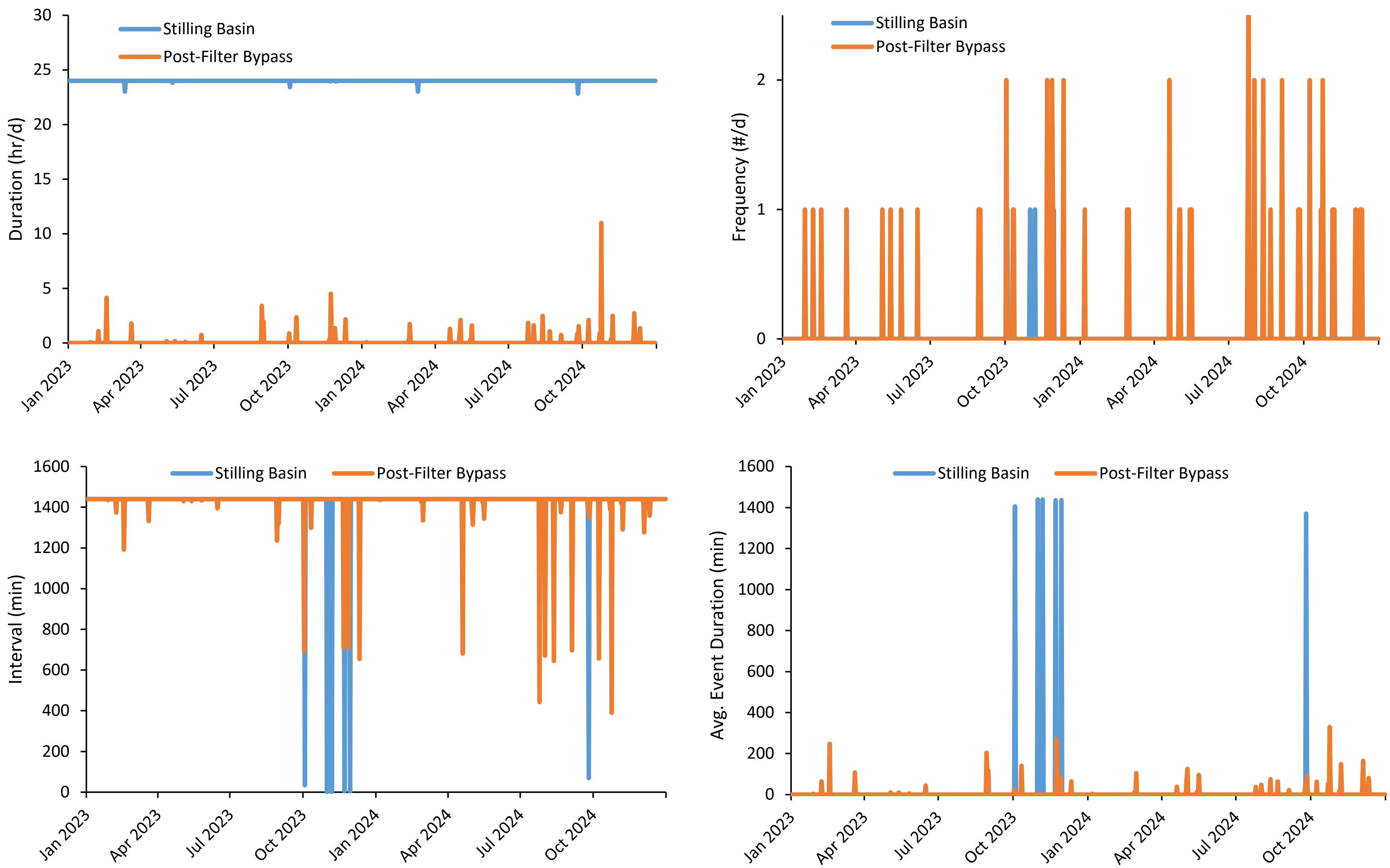


Figure C.11. Duration, frequency, interval and average event duration from stilling basins and bypasses released to wastestream 7 at Rossdale, 2023 - 2024.

Appendix D – Water Quality Graphs – E.L. Smith

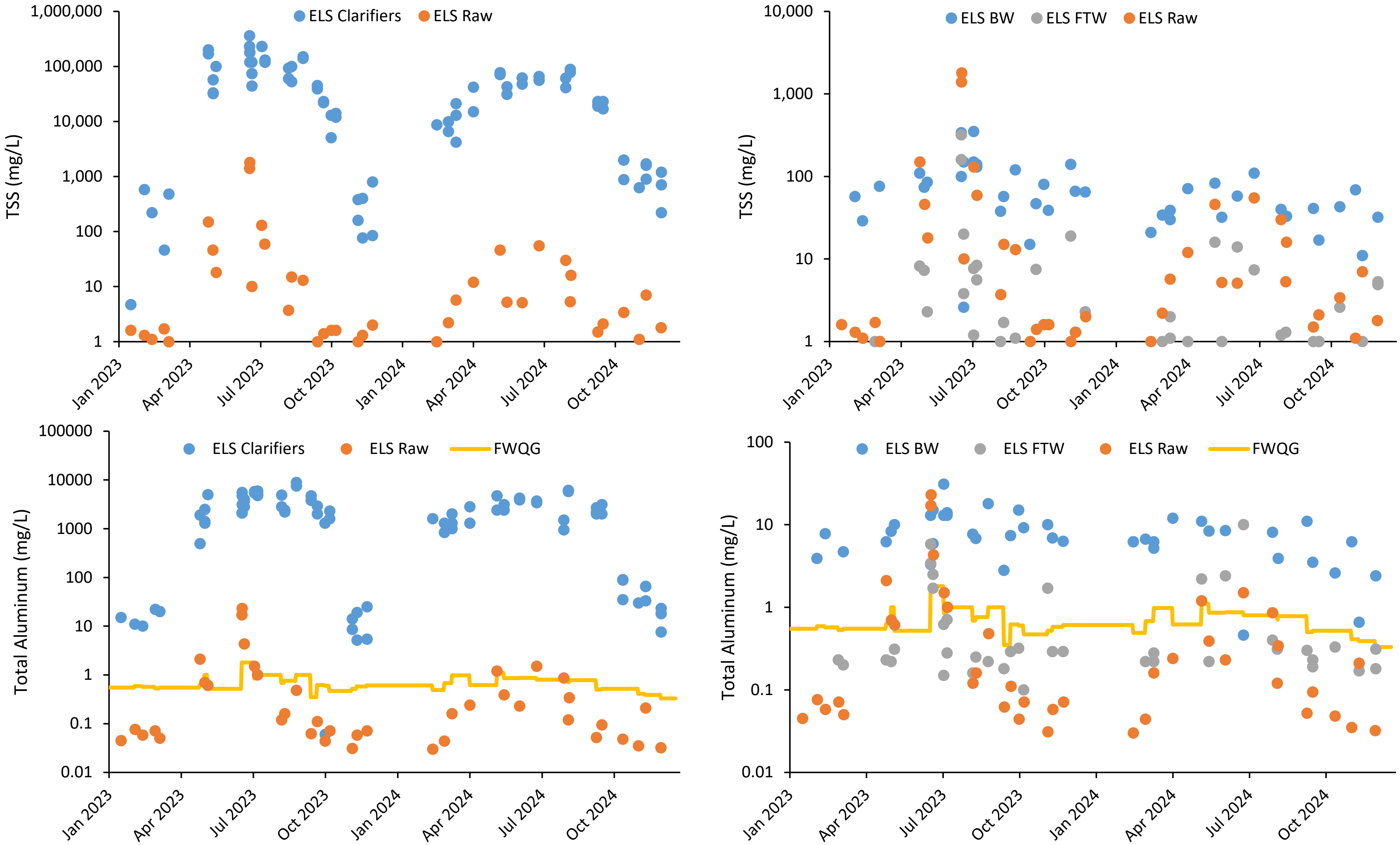


Figure D.1. Concentrations of total suspended solids (top) and total aluminum (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

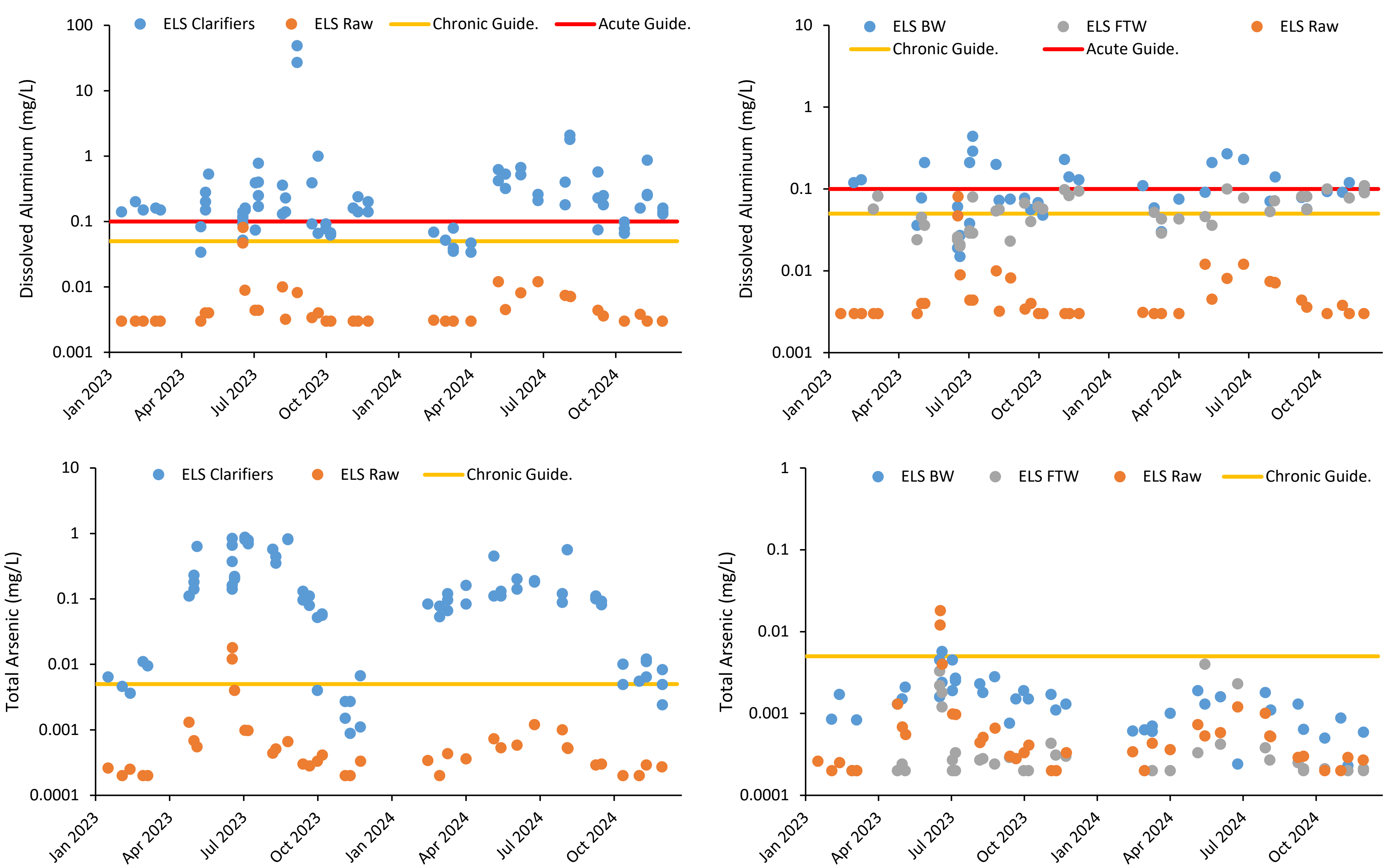


Figure D.2. Concentrations of dissolved aluminum (top) and total arsenic (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note, one raw and one FTW arsenic sample above the guideline were reported as being below the detection limit

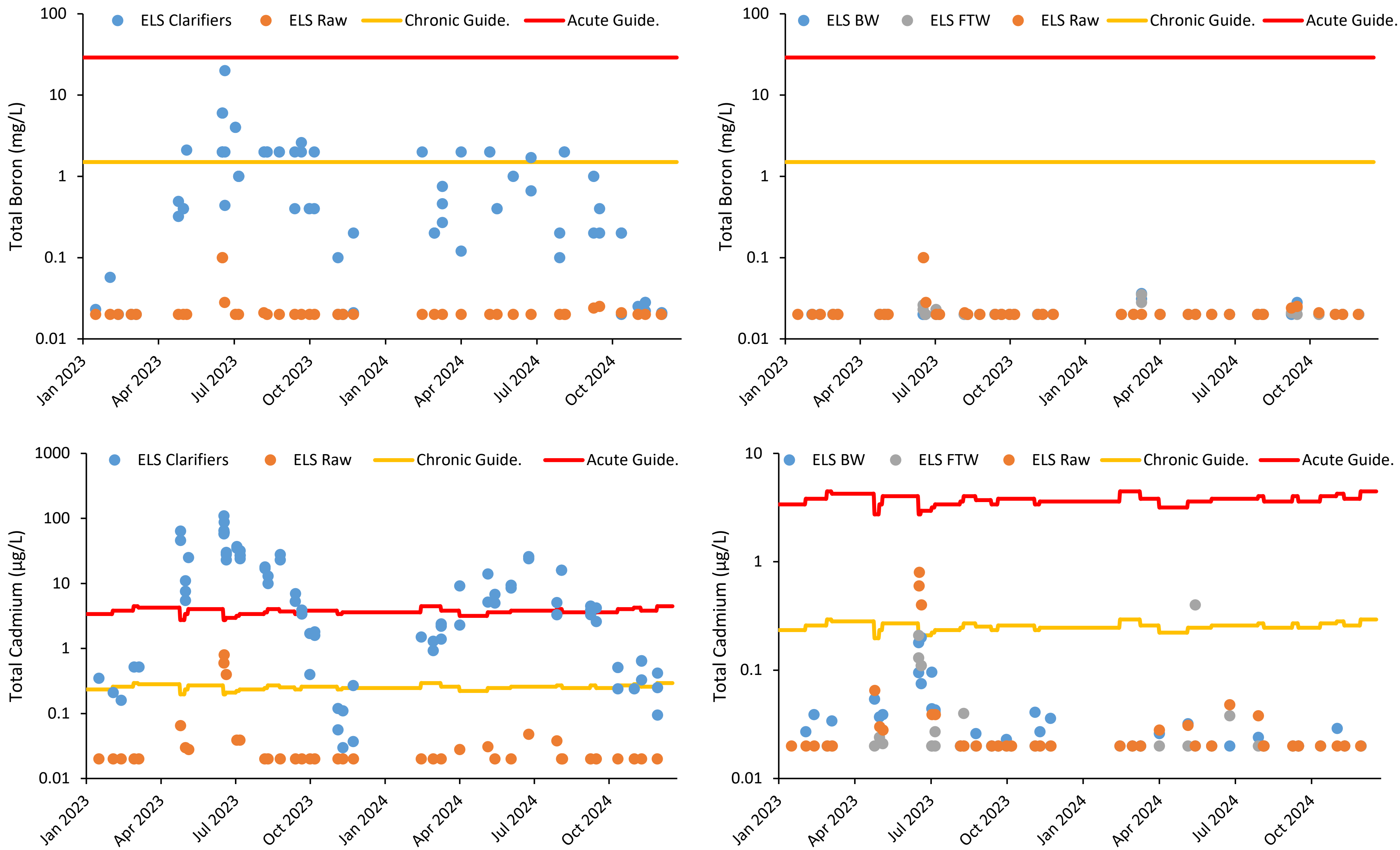


Figure D.3. Concentrations of total boron (top) and total cadmium (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note, 18 boron samples above the guideline were reported as being below the detection limit. One raw, one clarifier and one FTW cadmium sample were reported as being below the detection limit

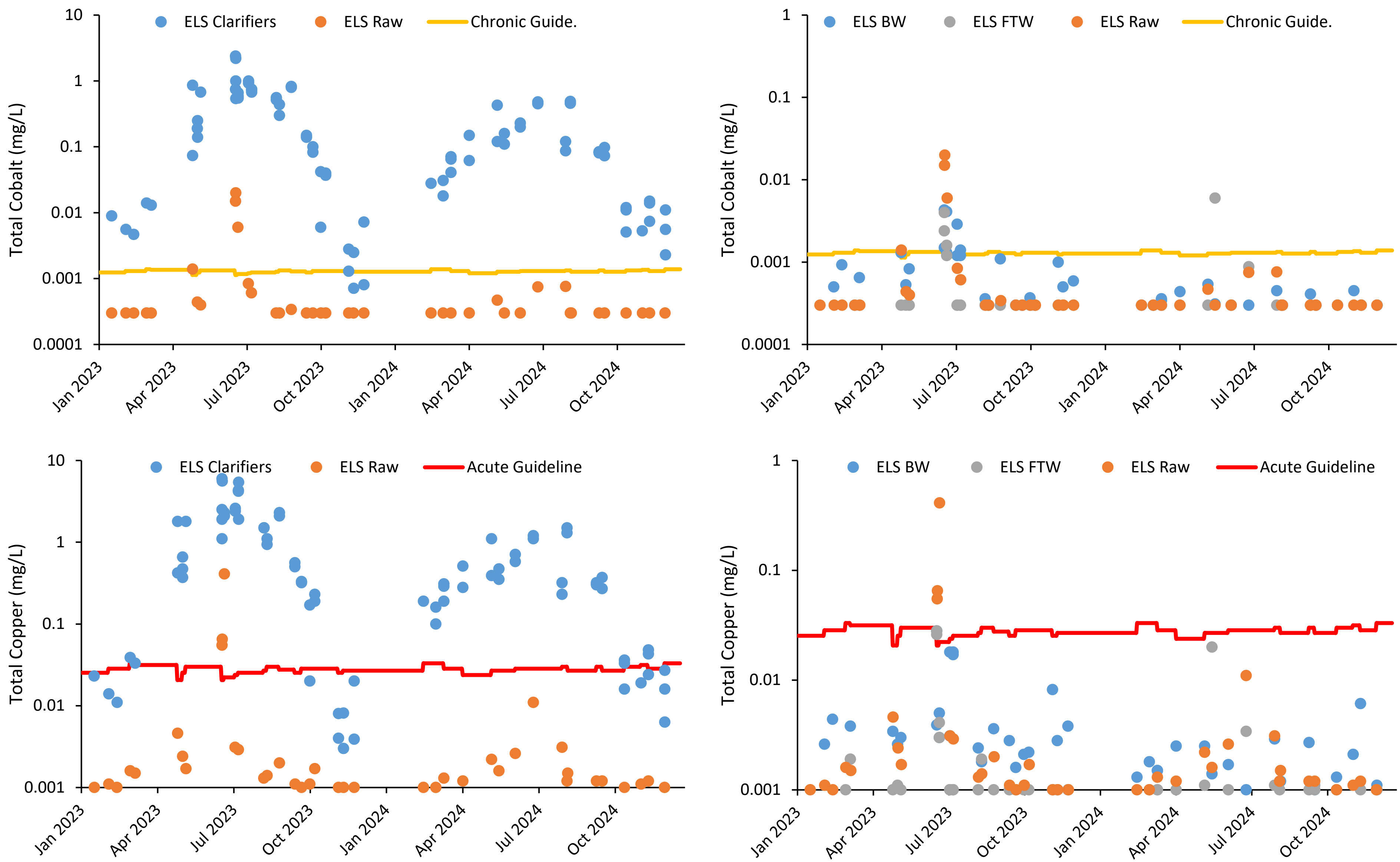


Figure D.4. Concentrations of total cobalt (top) and total copper (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: One raw and one FTW cobalt sample above the guideline was reported as being below the detection limit

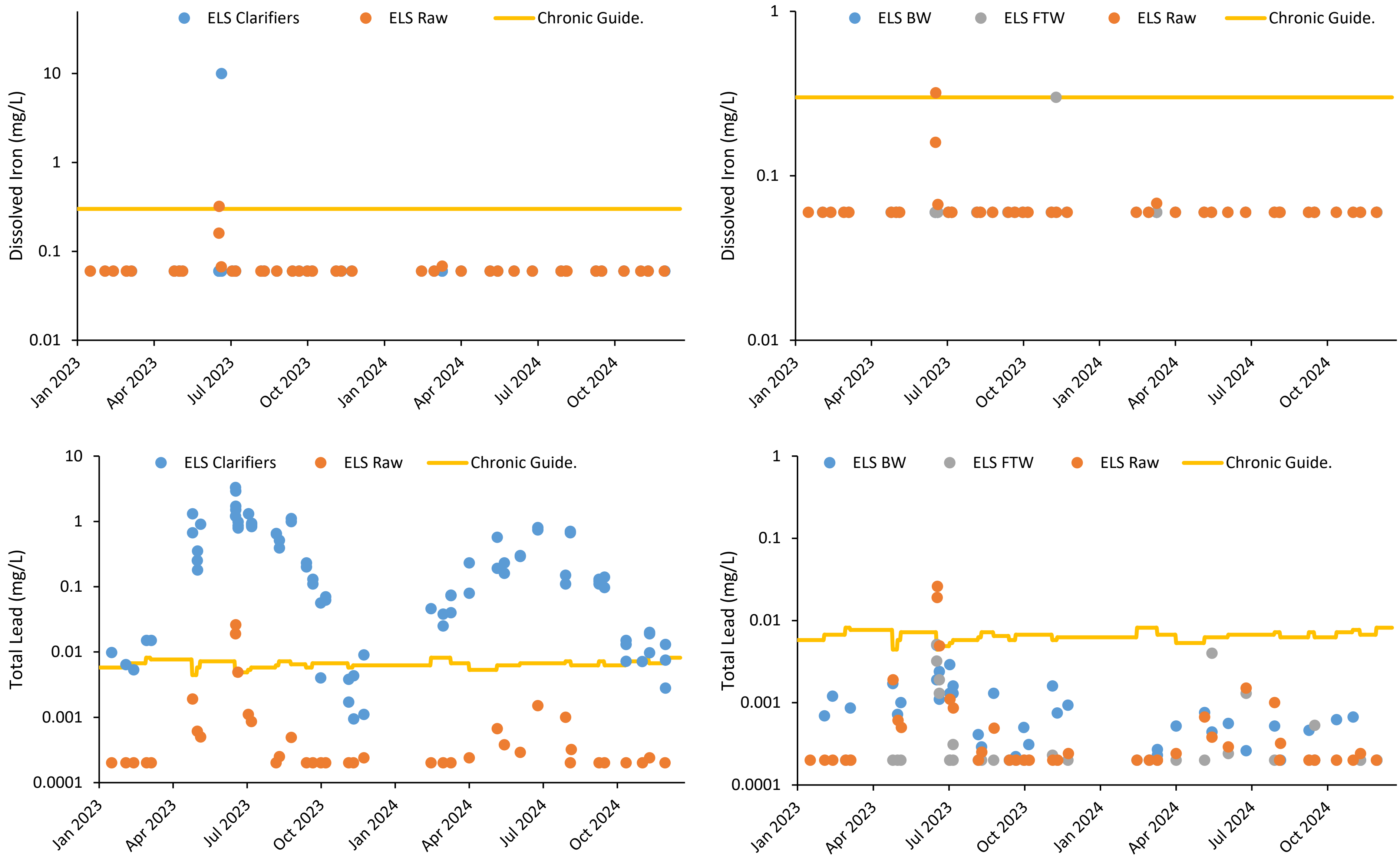


Figure D.5. Concentrations of dissolved iron (top) and total lead (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: One FTW dissolved iron sample above the guideline was reported as being below the detection limit. One clarifier and one FTW lead sample above the guideline were reported as being below the detection limit

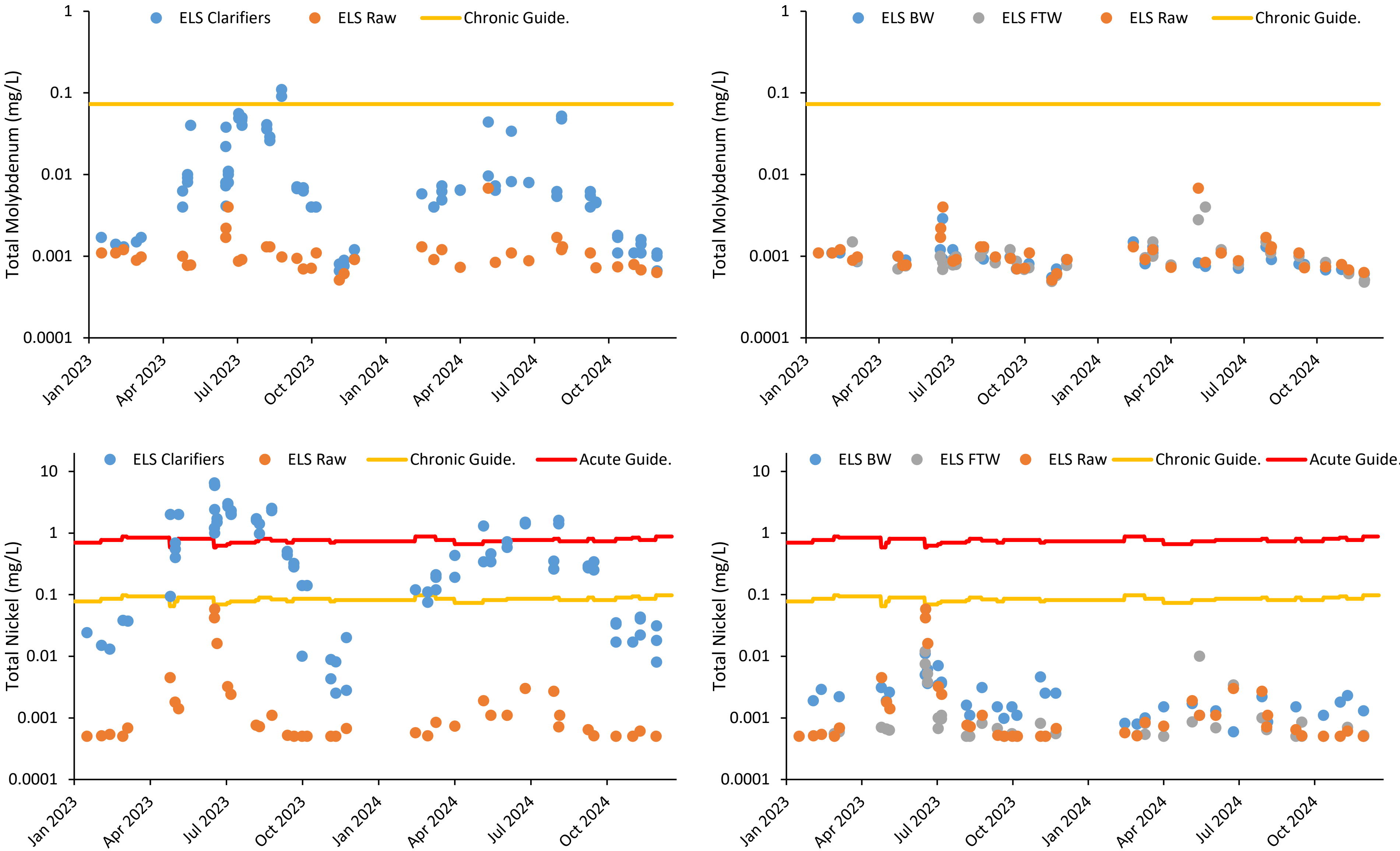


Figure D.6. Concentrations of total molybdenum (top) and total nickel (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: Two clarifier molybdenum samples above the guideline were reported as being below the detection limit

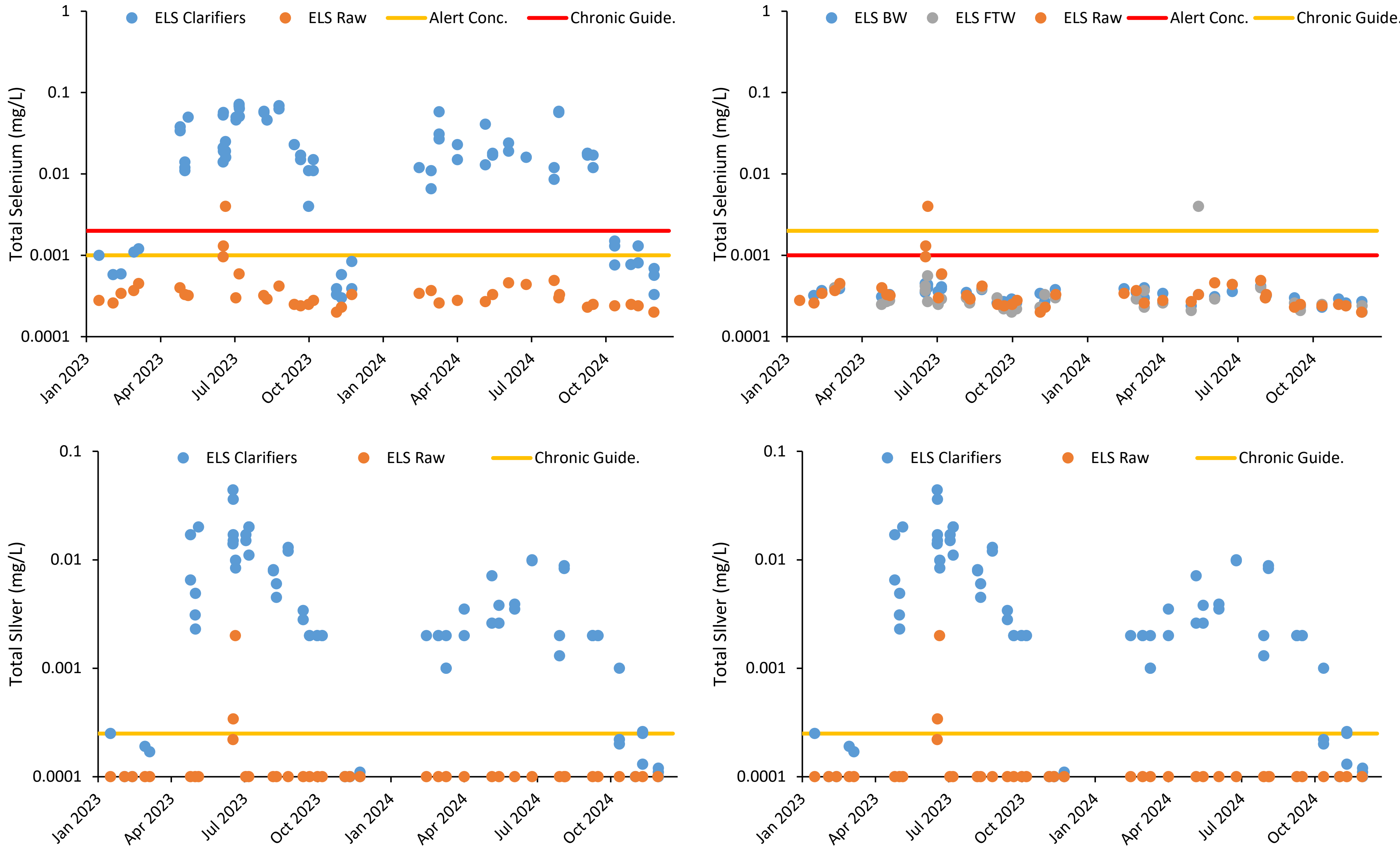


Figure D.7. Concentrations of total selenium (top) and total silver (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: One raw and one FTW selenium sample above the guideline were reported as being below the detection limit. One raw, one FTW and 20 clarifier silver samples above the guideline were reported as being below the detection limit

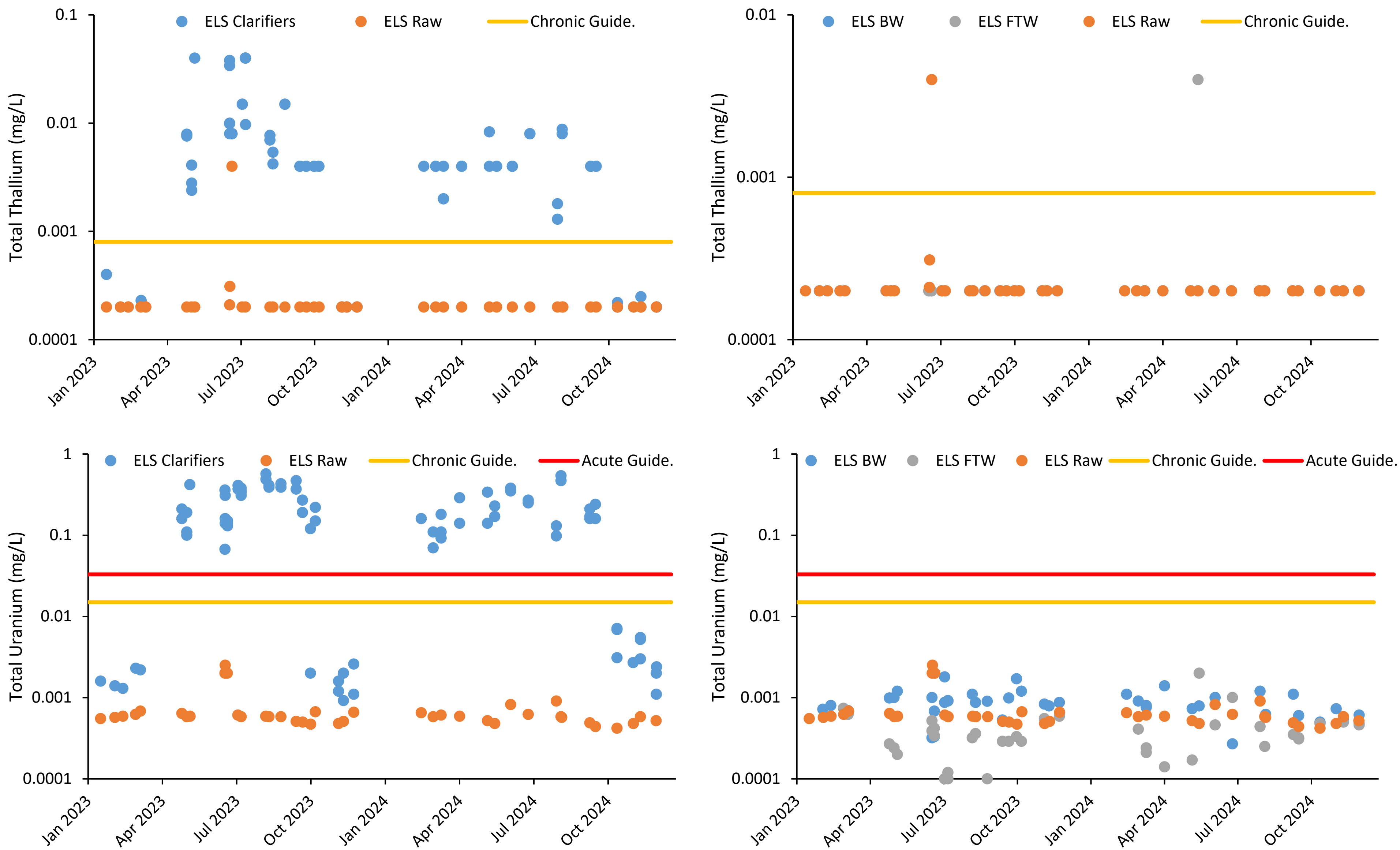


Figure D.8. Concentrations of total thallium (top) and total uranium (bottom) from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: One raw, one FTW and 35 clarifier thallium samples above the guideline were reported as being below the detection limit

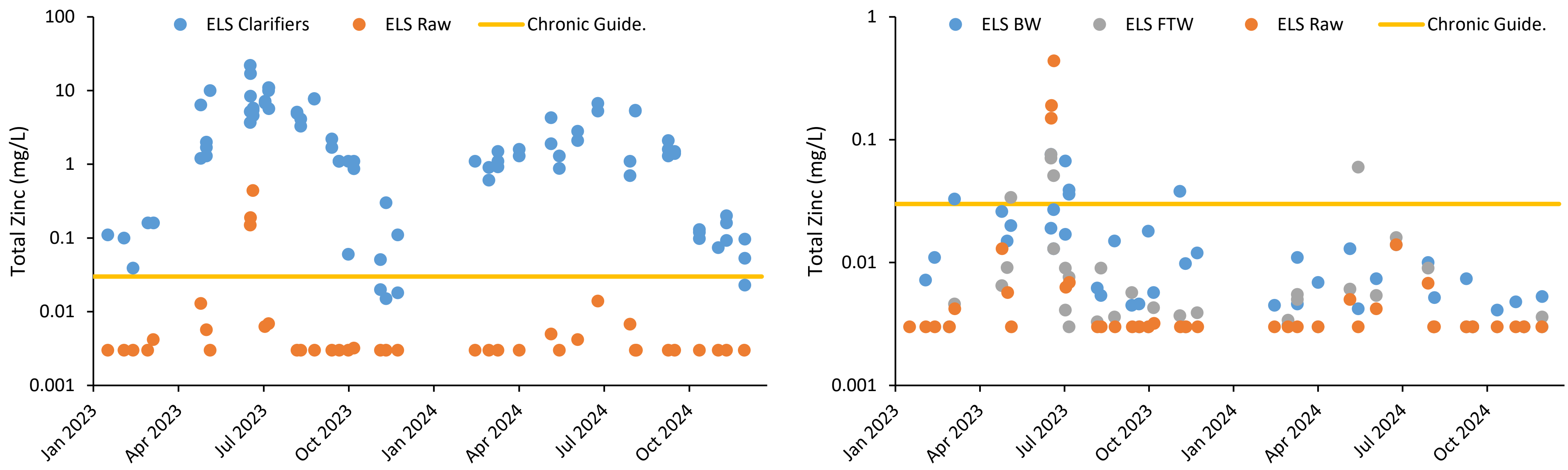


Figure D.9. Concentrations of total zinc from raw water and wastestream samples, E.L. Smith 2023 - 2024.

Note: One FTW and one clarifier zinc sample above the guideline were reported as being below the detection limit

Appendix E – Water Quality Graphs – Rossdale

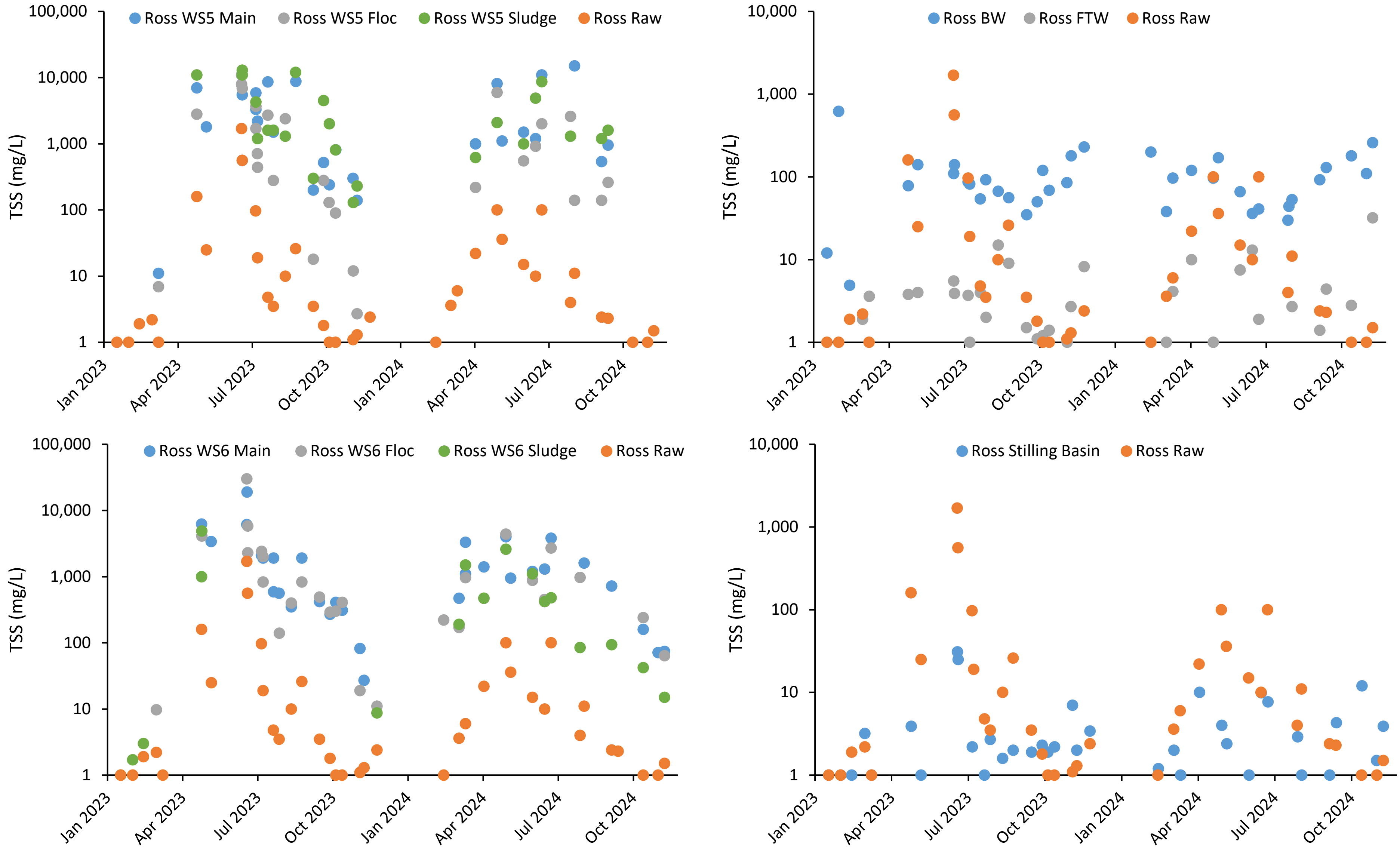


Figure E.1. Concentrations of total suspended solids from raw water and wastestream samples, Rossdale 2023 - 2024.

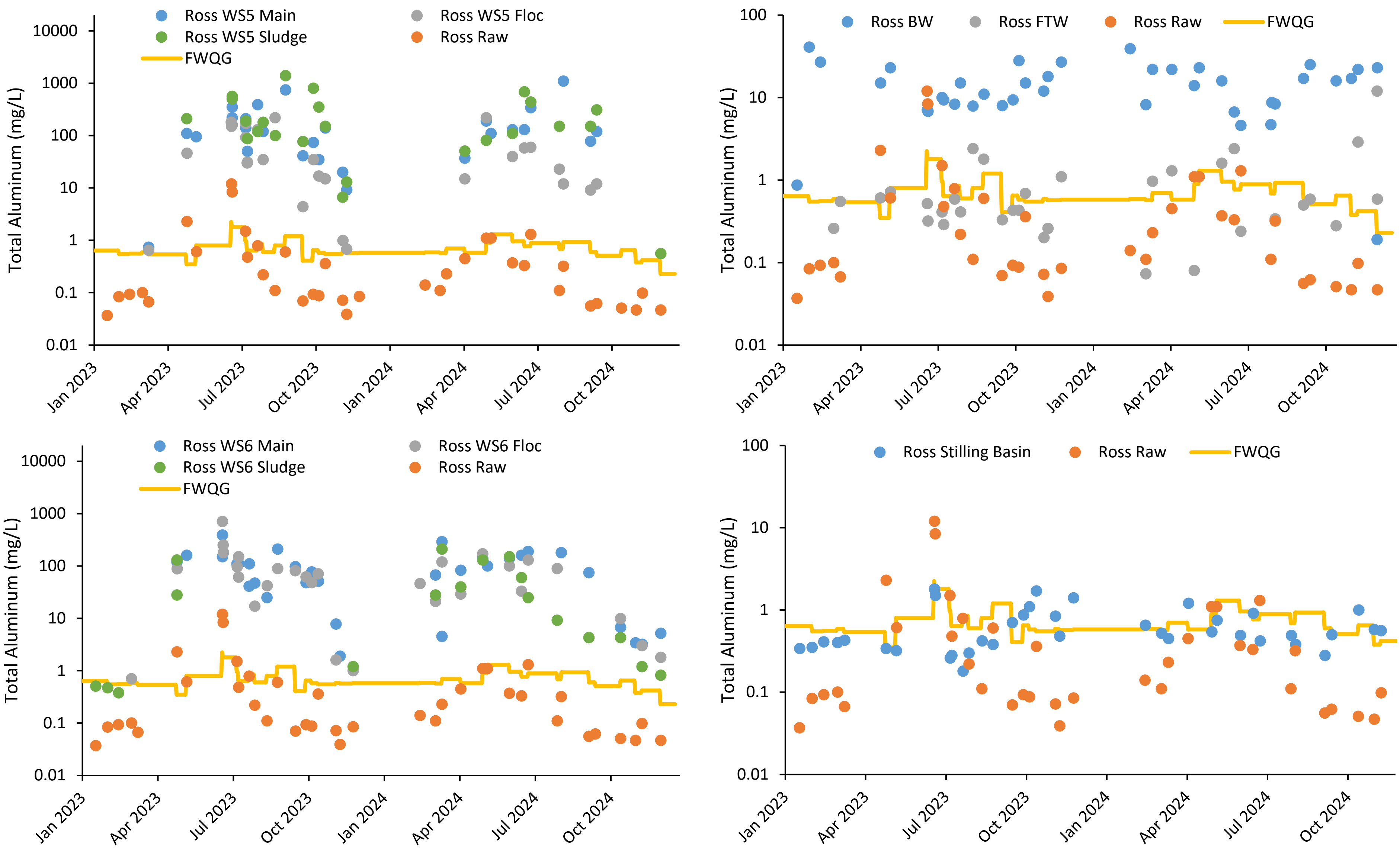


Figure E.2. Concentrations of total aluminum from raw water and wastestream samples, Rossdale 2023 - 2024.

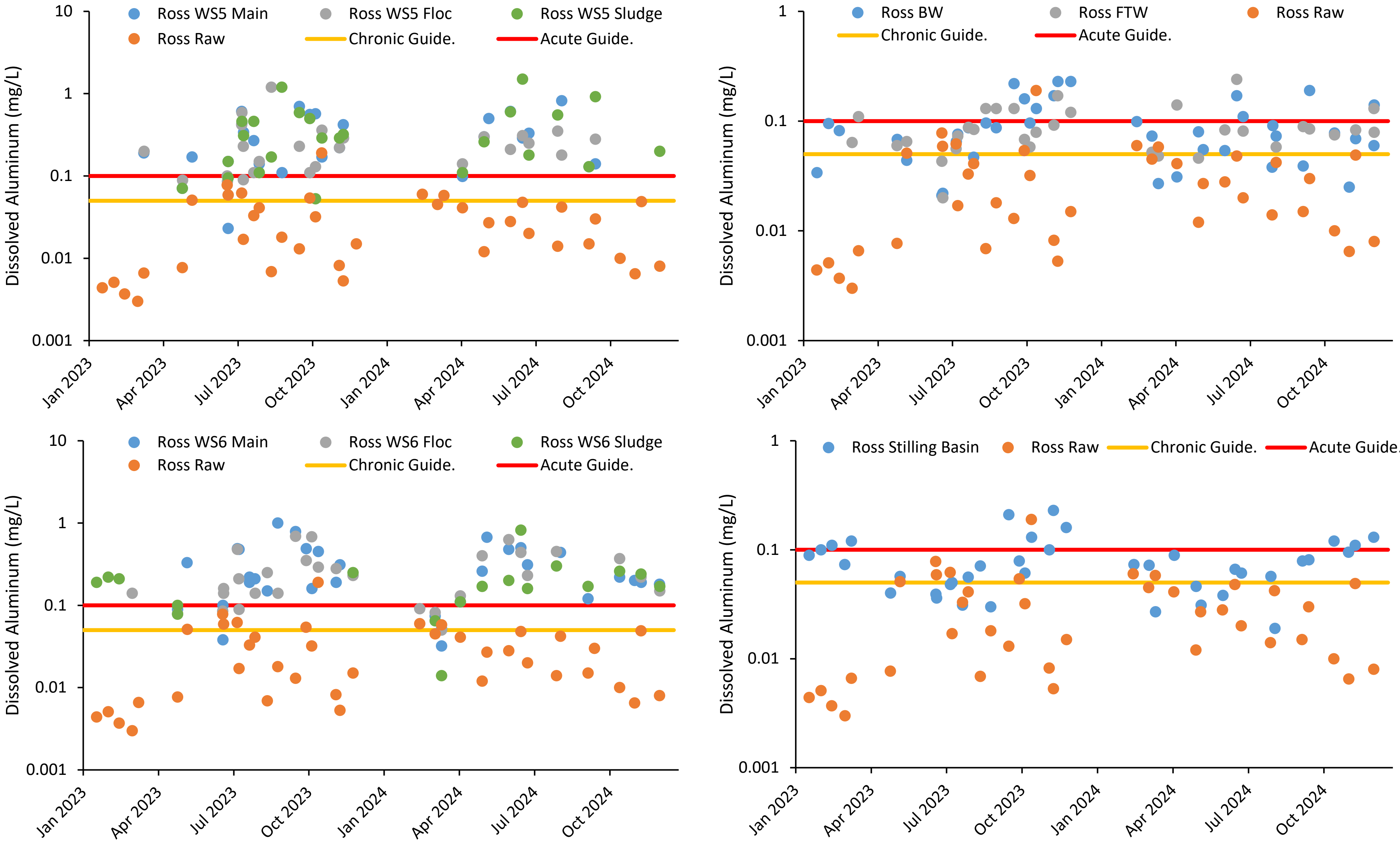


Figure E.3. Concentrations of dissolved aluminum from raw water and wastestream samples, Rossdale 2023 - 2024.

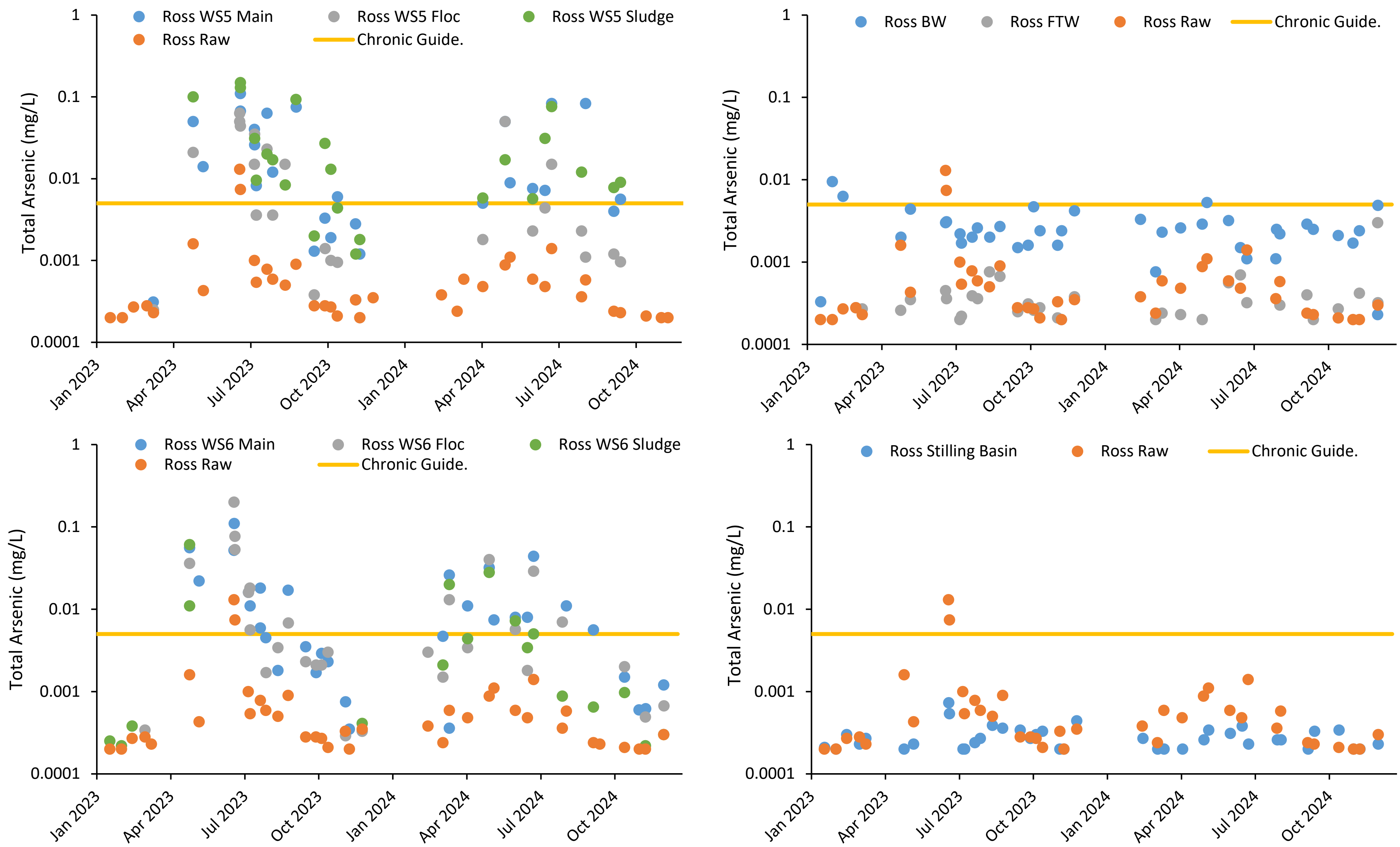


Figure E.4. Concentrations of total arsenic from raw water and wastestream samples, Rossdale 2023 - 2024.

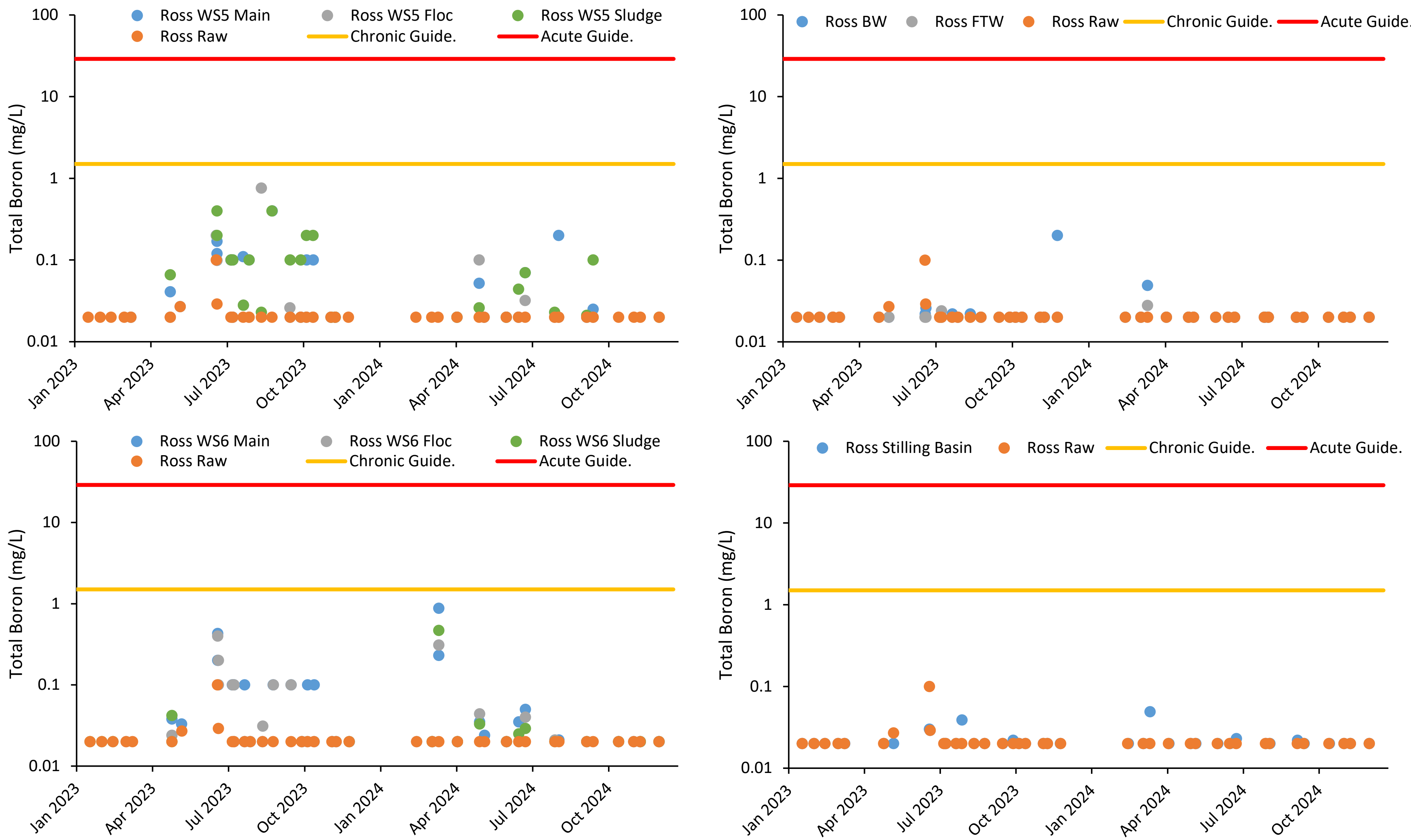


Figure E.5. Concentrations of total boron from raw water and wastestream samples, Rossdale 2023 - 2024.

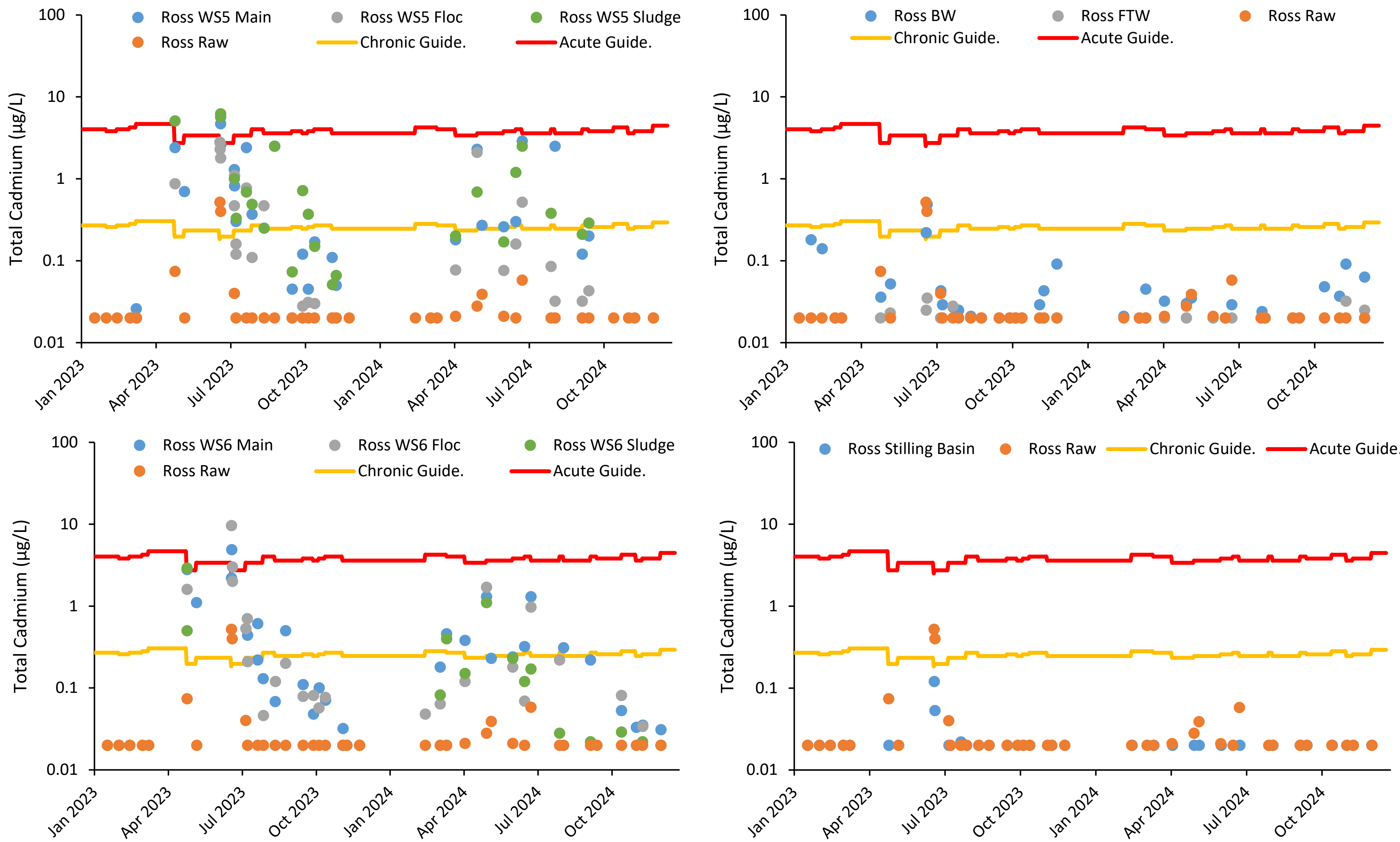


Figure E.6. Concentrations of total cadmium from raw water and wastestream samples, Rossdale 2023 - 2024.

Note, one raw sample above the guideline was reported as being below the detection limit

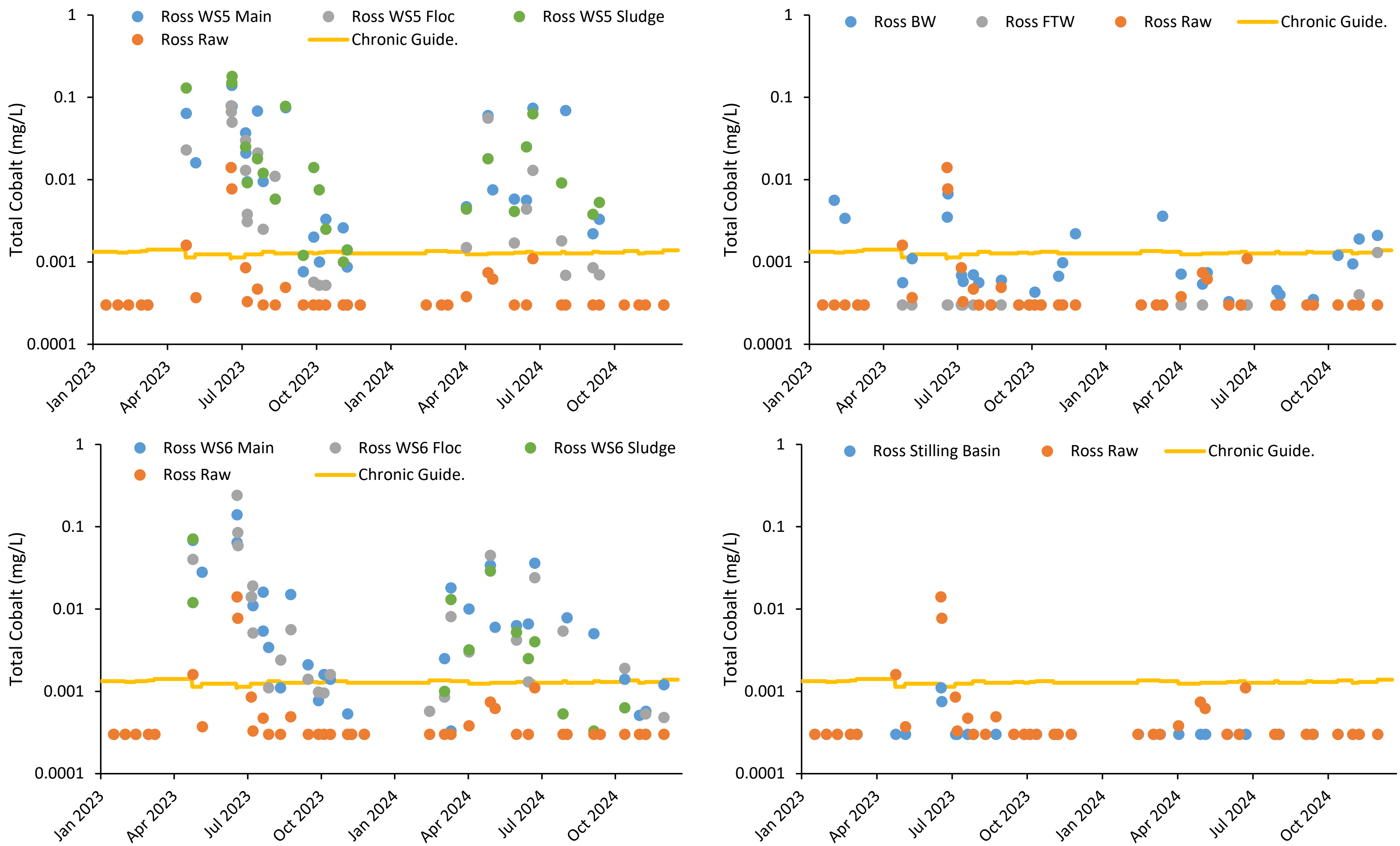


Figure E.7. Concentrations of total cobalt from raw water and wastestream samples, Rossdale 2023 - 2024.

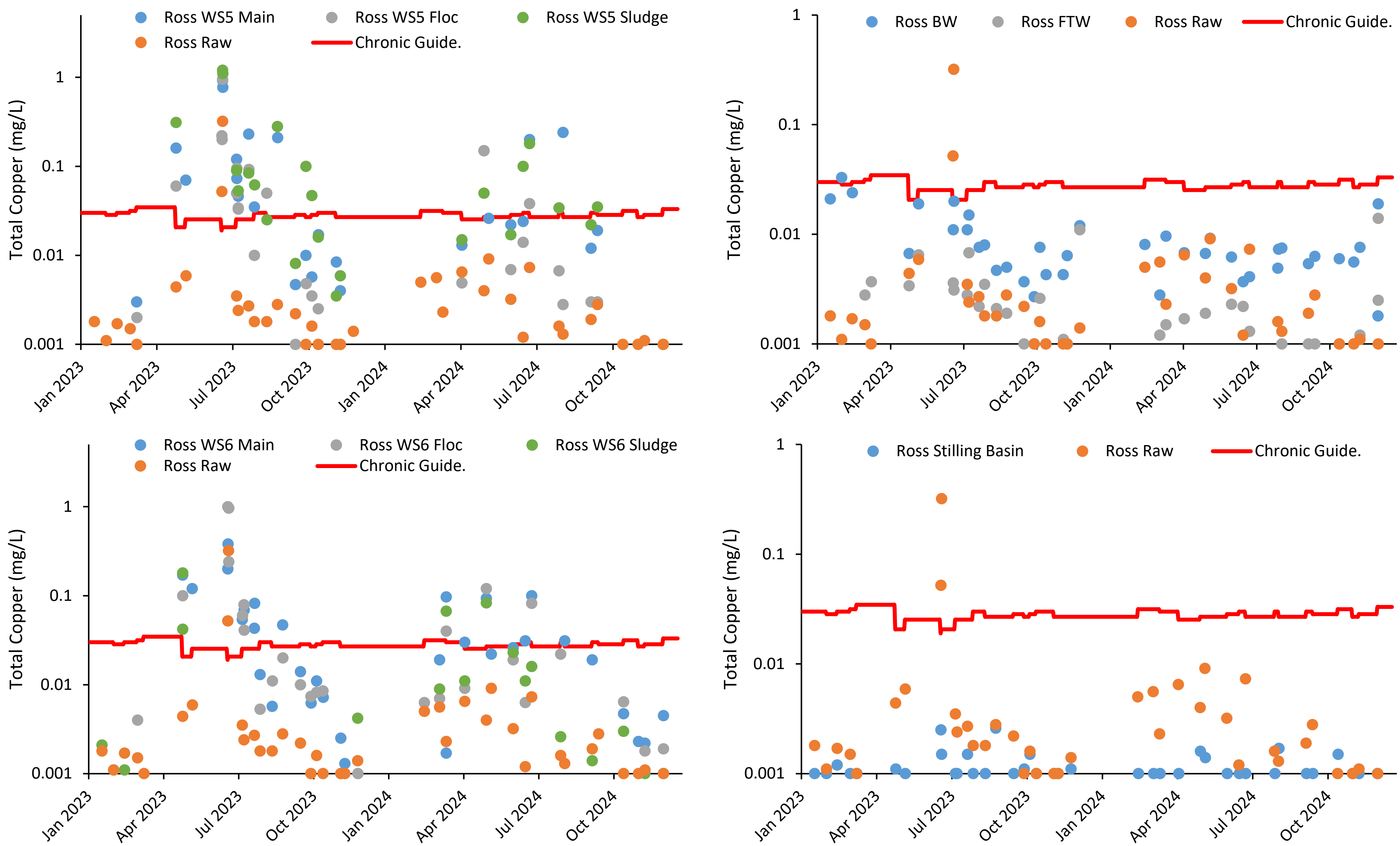


Figure E.8. Concentrations of total copper from raw water and wastestream samples, Rossdale 2023 - 2024.

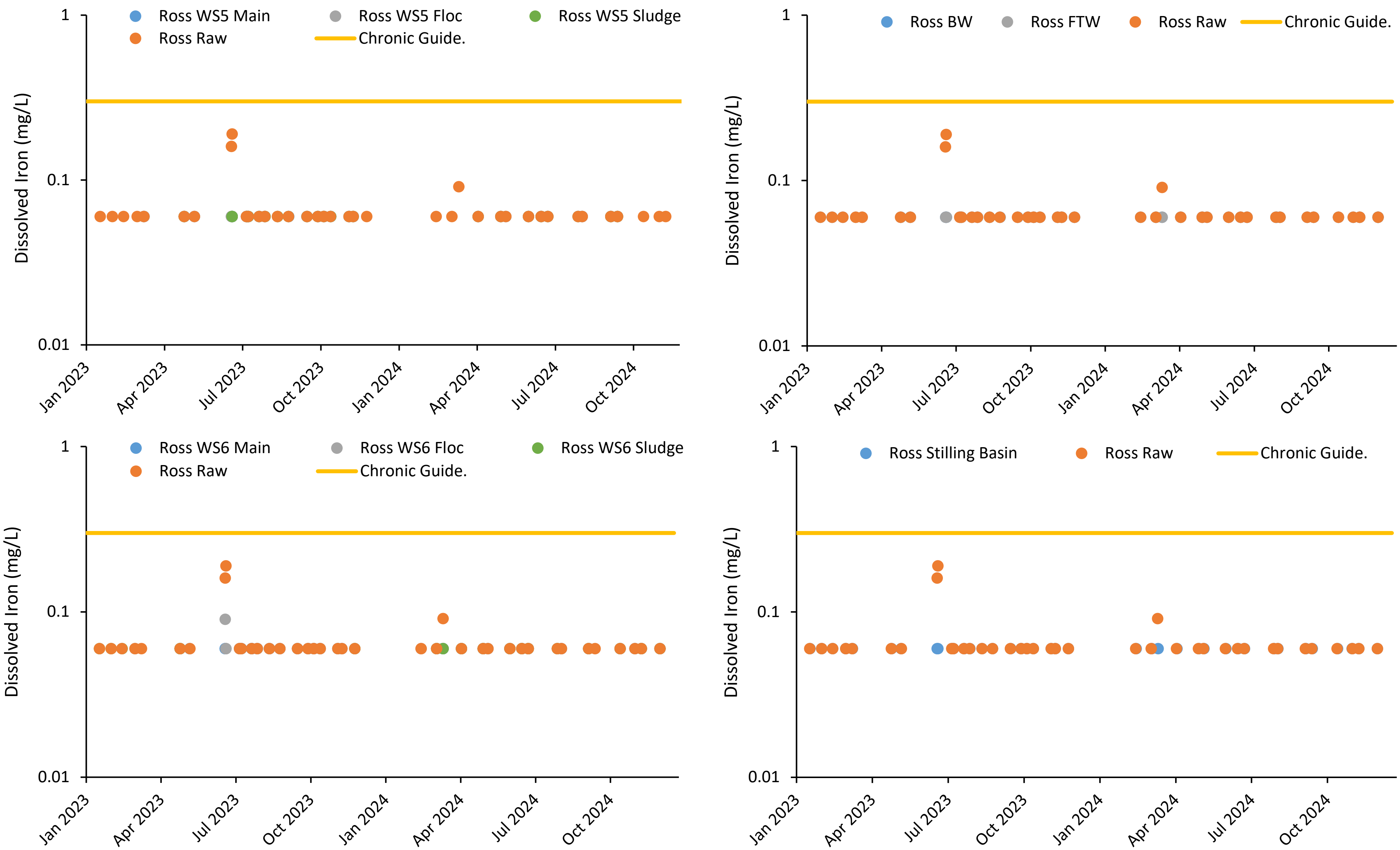


Figure E.9. Concentrations of dissolved iron from raw water and wastestream samples, Rossdale 2023 - 2024.

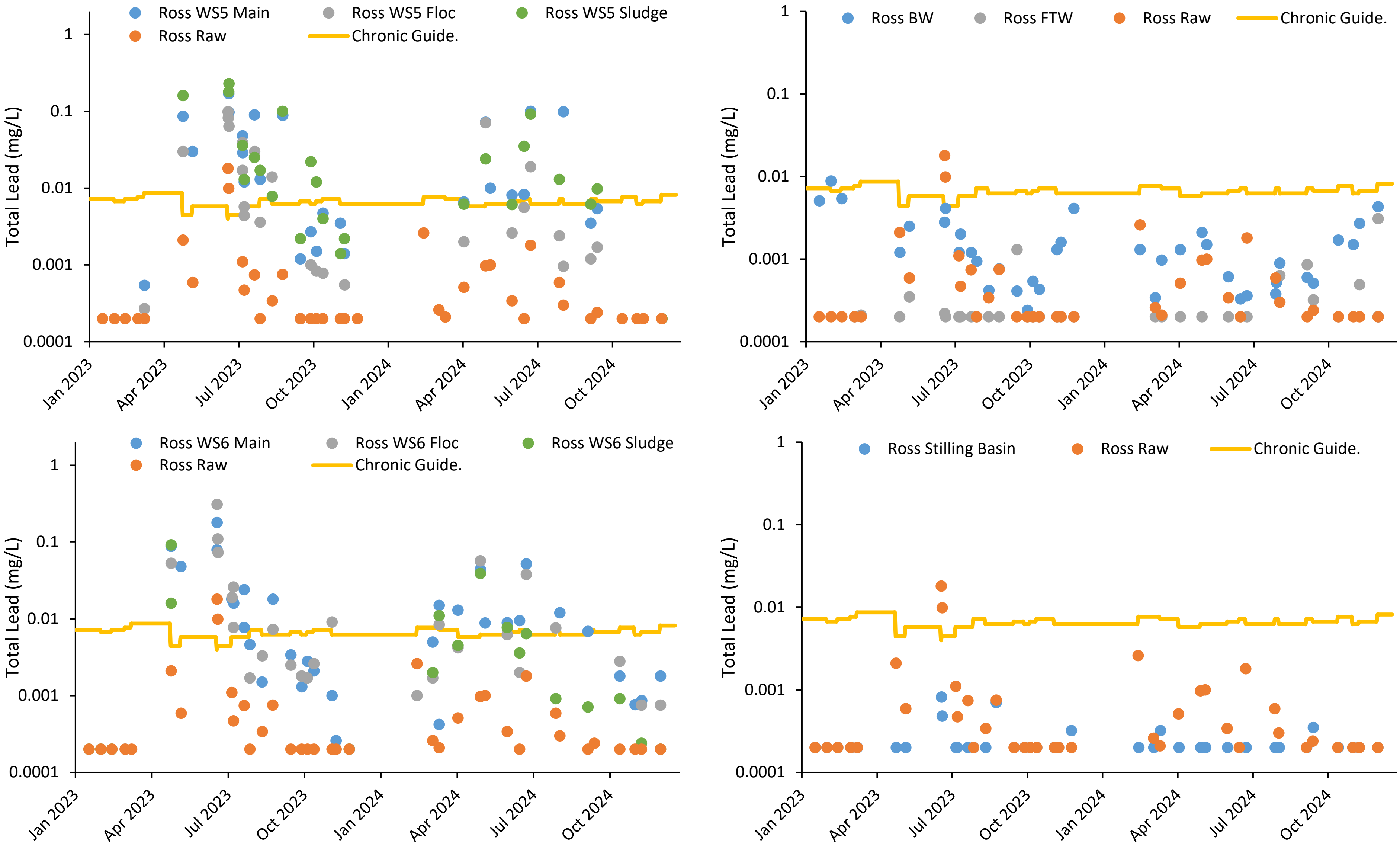


Figure E.10. Concentrations of total lead from raw water and wastestream samples, Rossdale 2023 - 2024.

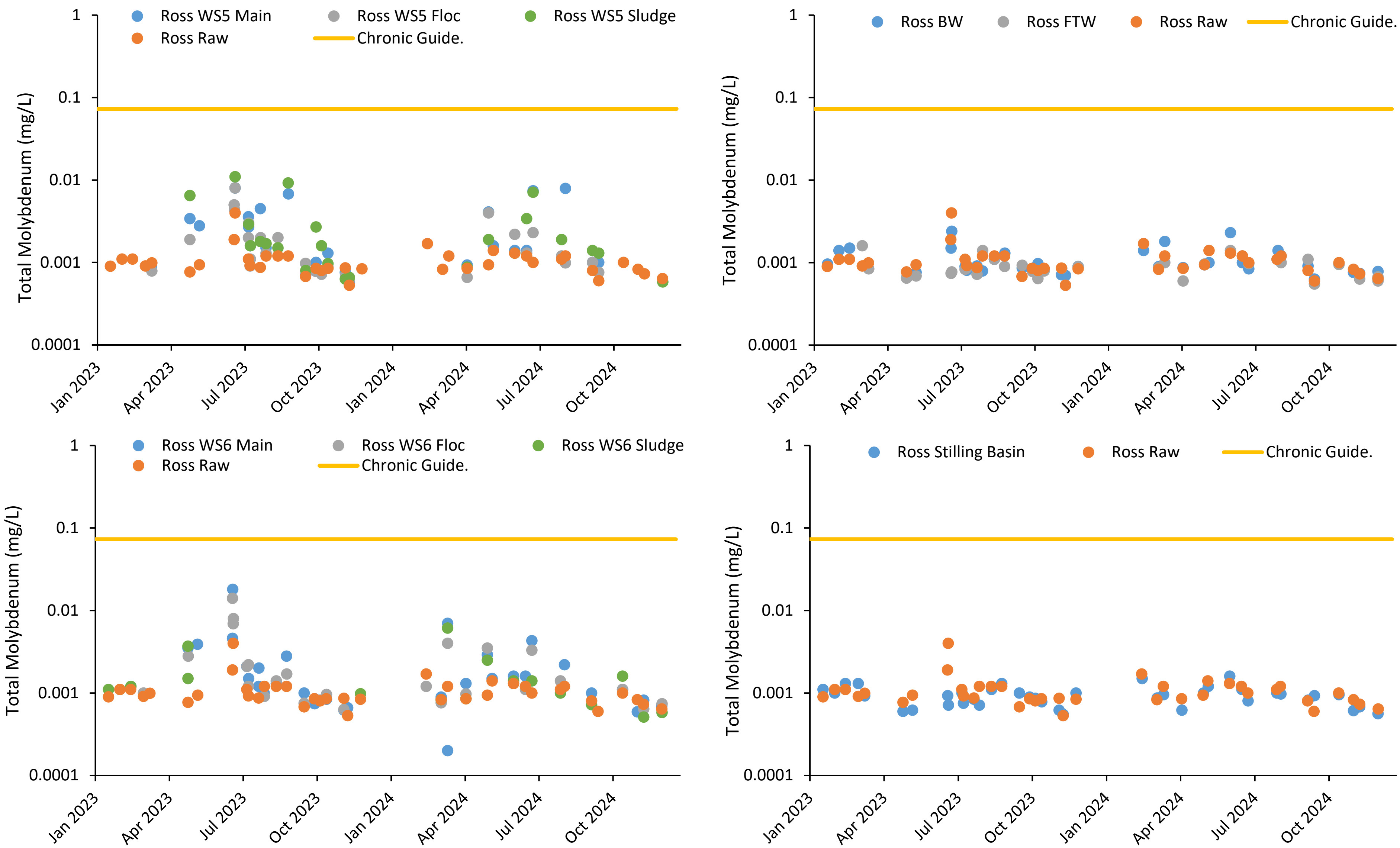


Figure E.11. Concentrations of total molybdenum from raw water and wastestream samples, Rossdale 2023 - 2024.

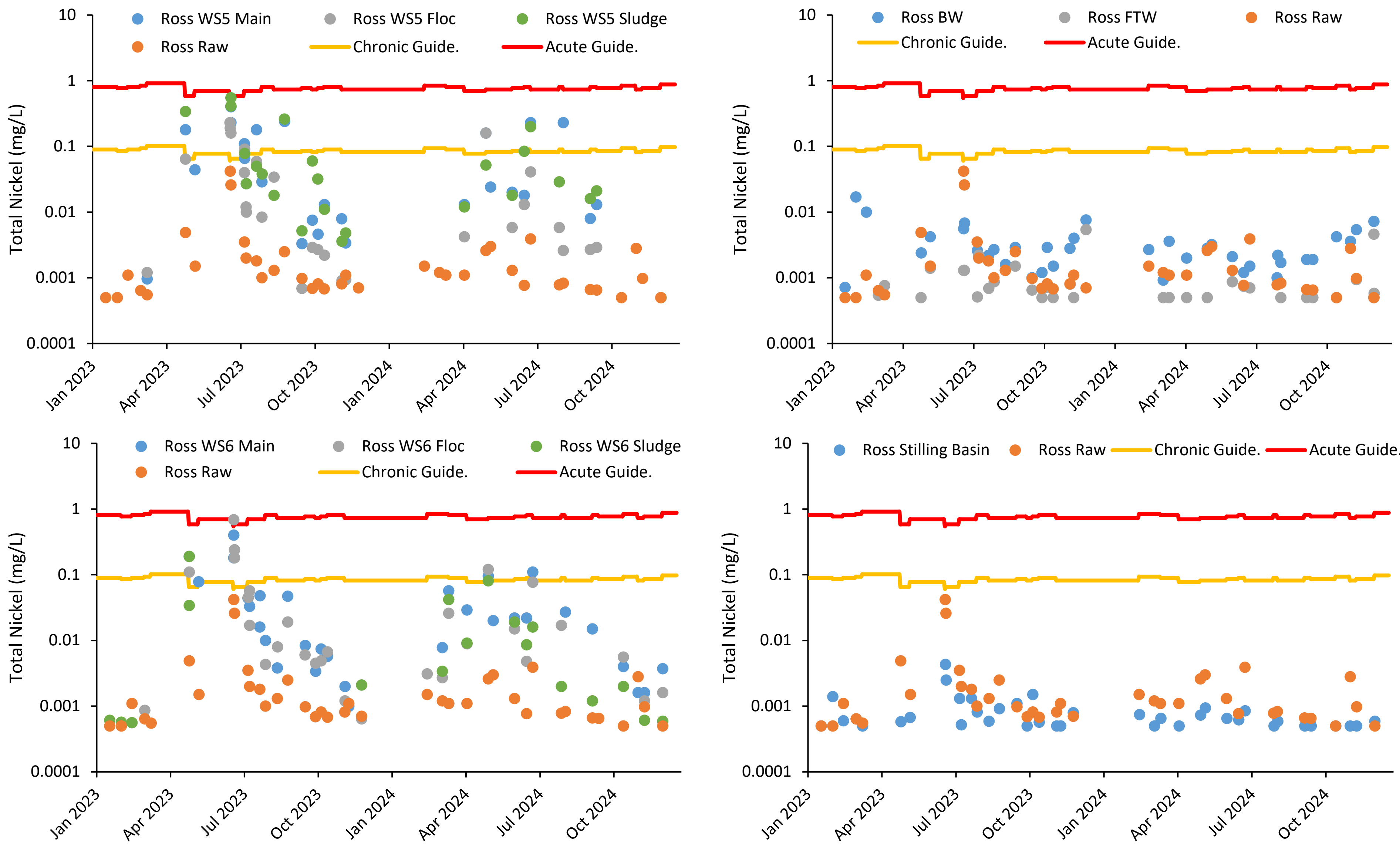


Figure E.12. Concentrations of total nickel from raw water and wastestream samples, Rossdale 2023 - 2024.

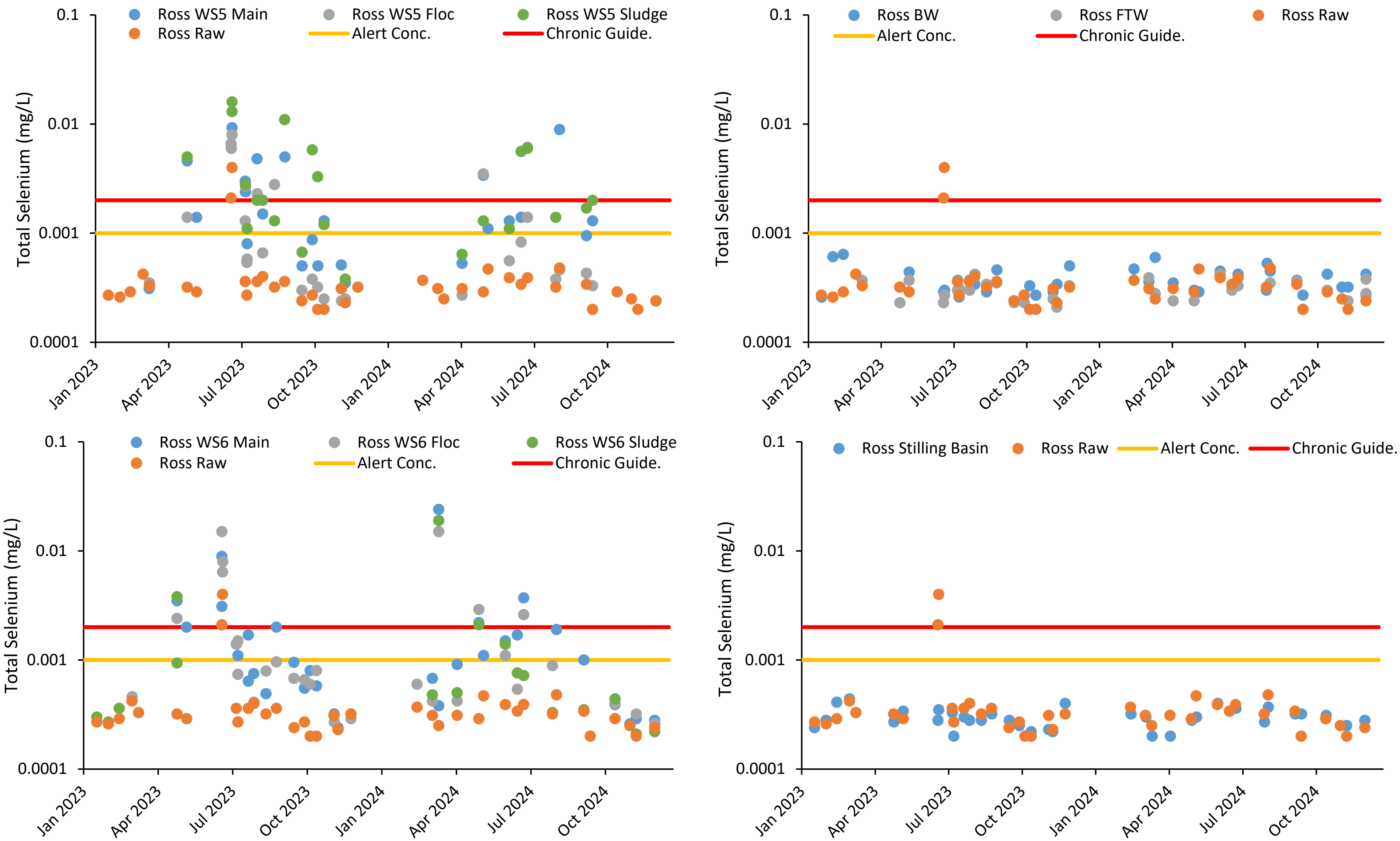


Figure E.13. Concentrations of total selenium from raw water and wastestream samples, Rossdale 2023 - 2024.

Note, one raw sample above the guideline was reported as being below the detection limit

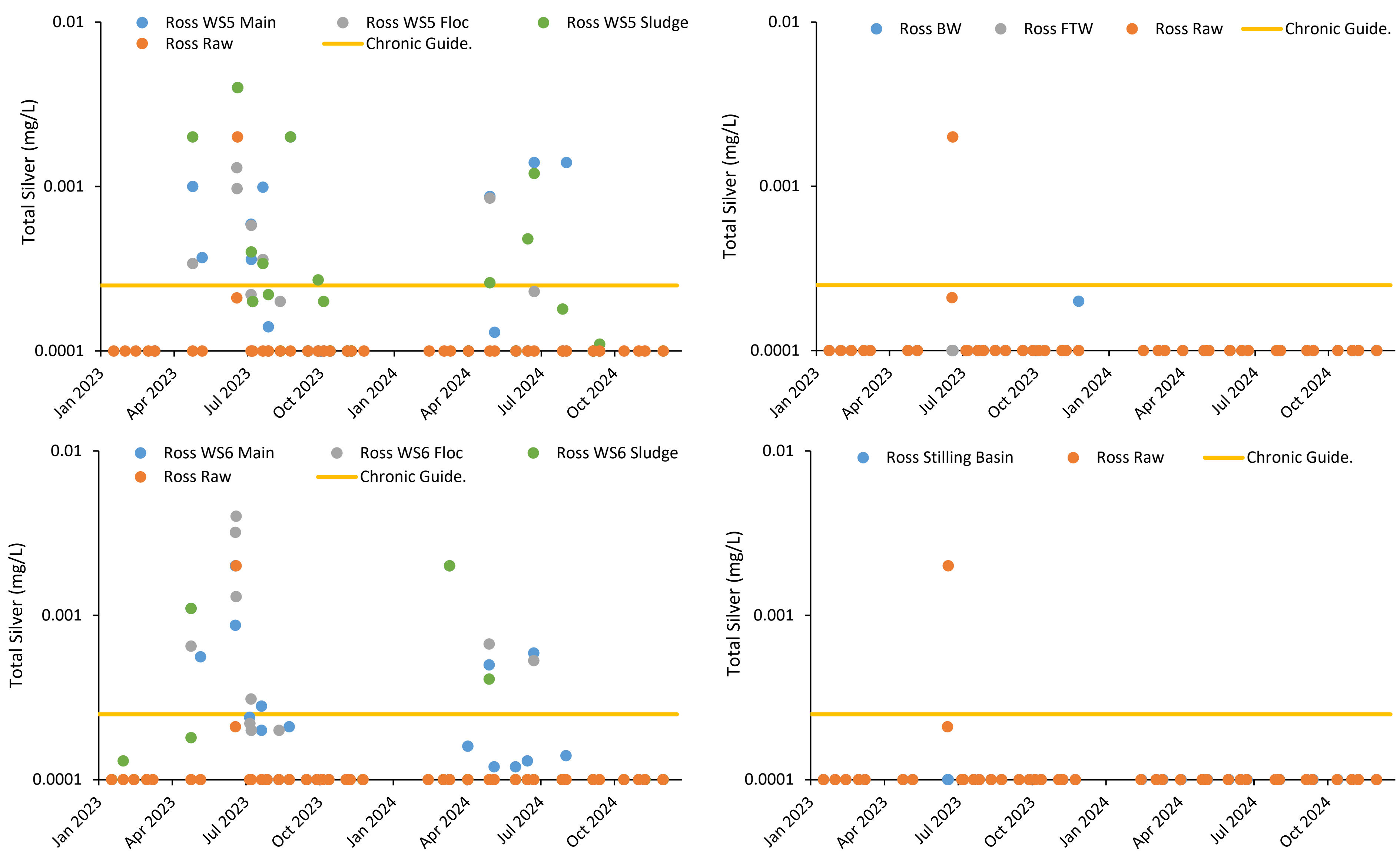


Figure E.14. Concentrations of total silver from raw water and wastestream samples, Rossdale 2023 - 2024.

Note, Nine sample above the guideline were reported as being below the detection limit

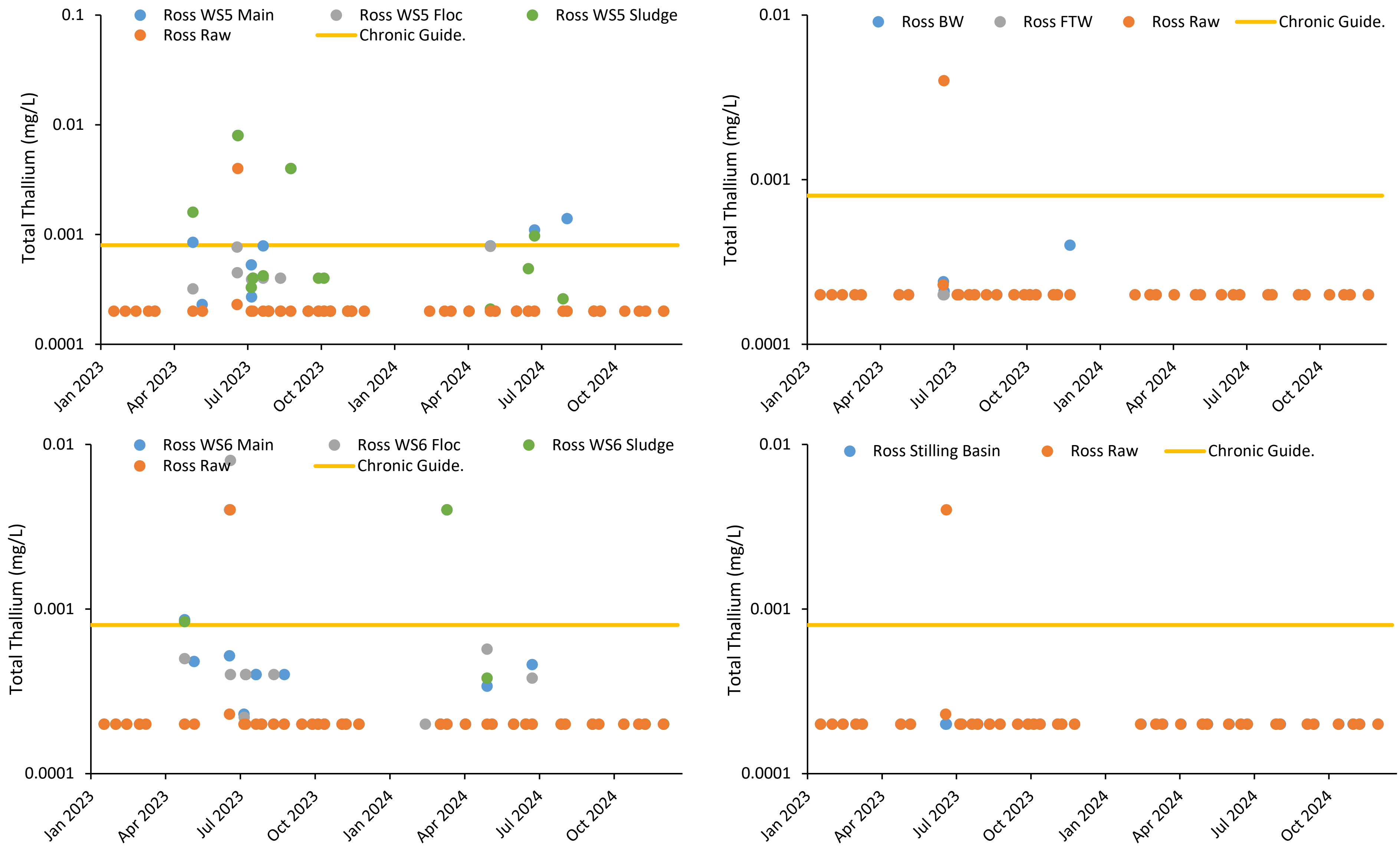


Figure E.15. Concentrations of total thallium from raw water and wastestream samples, Rossdale 2023 - 2024.

Note, Eleven sample above the guideline were reported as being below the detection limit

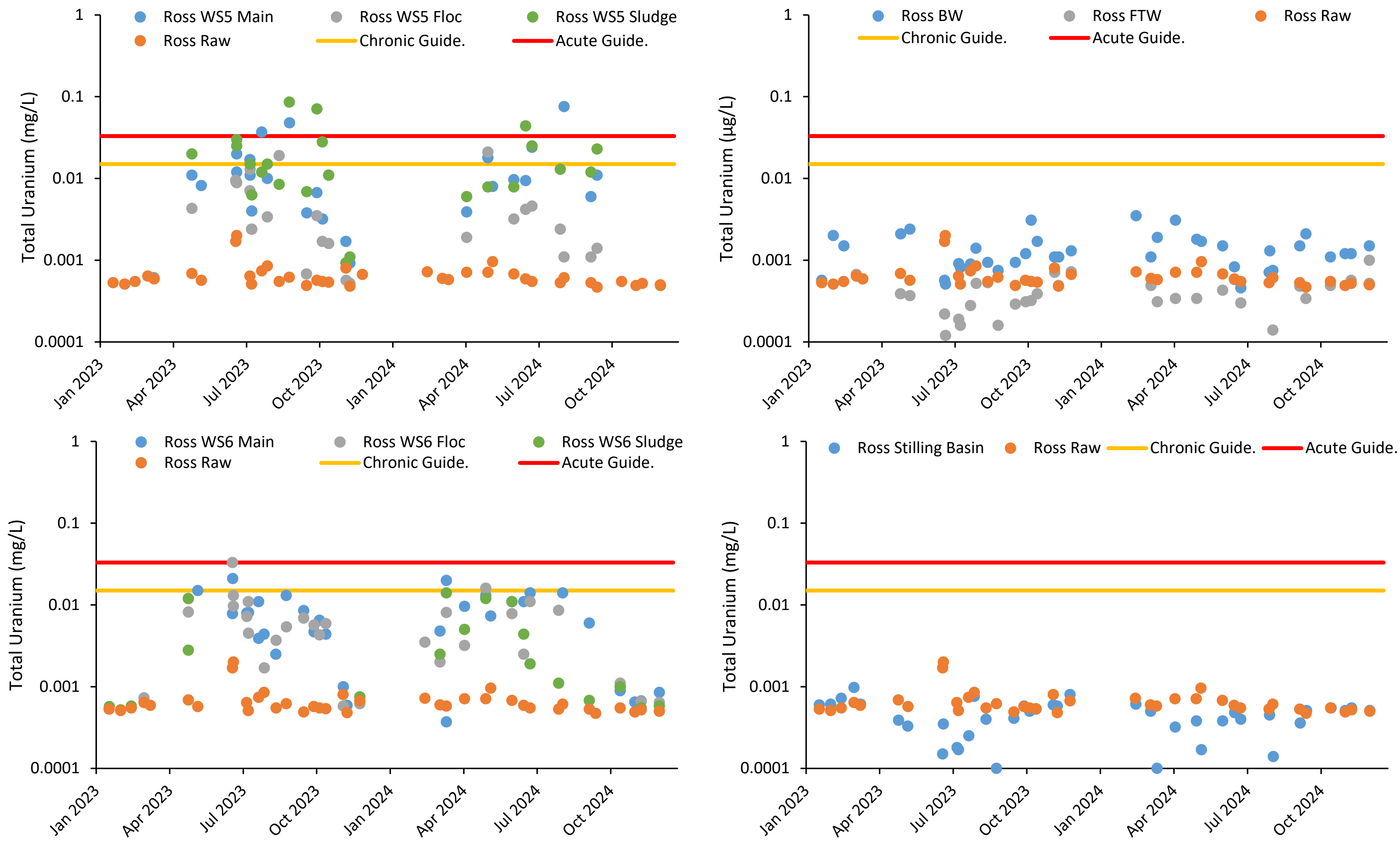


Figure E.16. Concentrations of total uranium from raw water and wastestream samples, Rossdale 2023 - 2024.

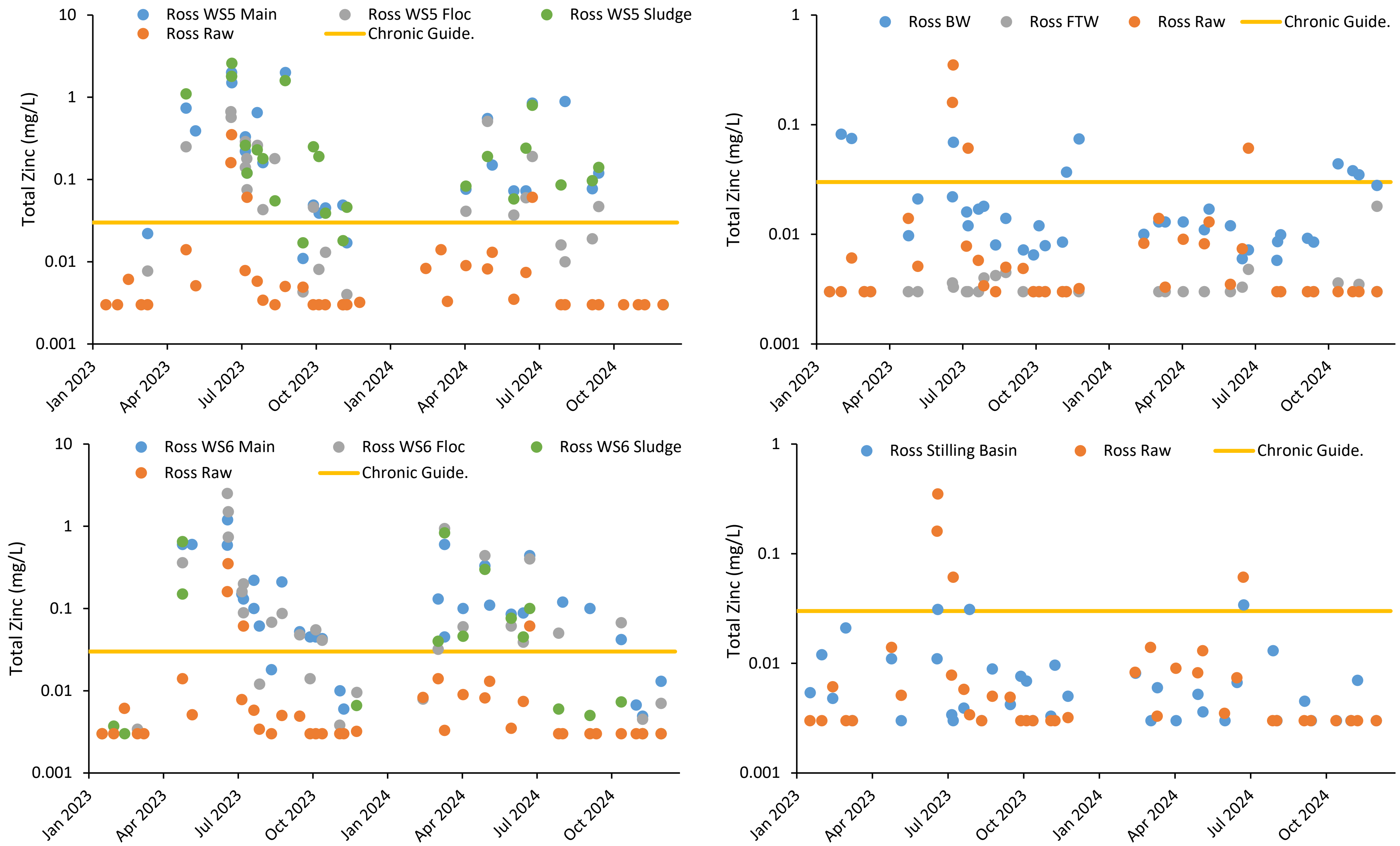


Figure E.17. Concentrations of total zinc from raw water and wastestream samples, Rossdale 2023 - 2024.

Appendix F – Edge of Mixing Zone and Time of Guideline Exceedance Graphs

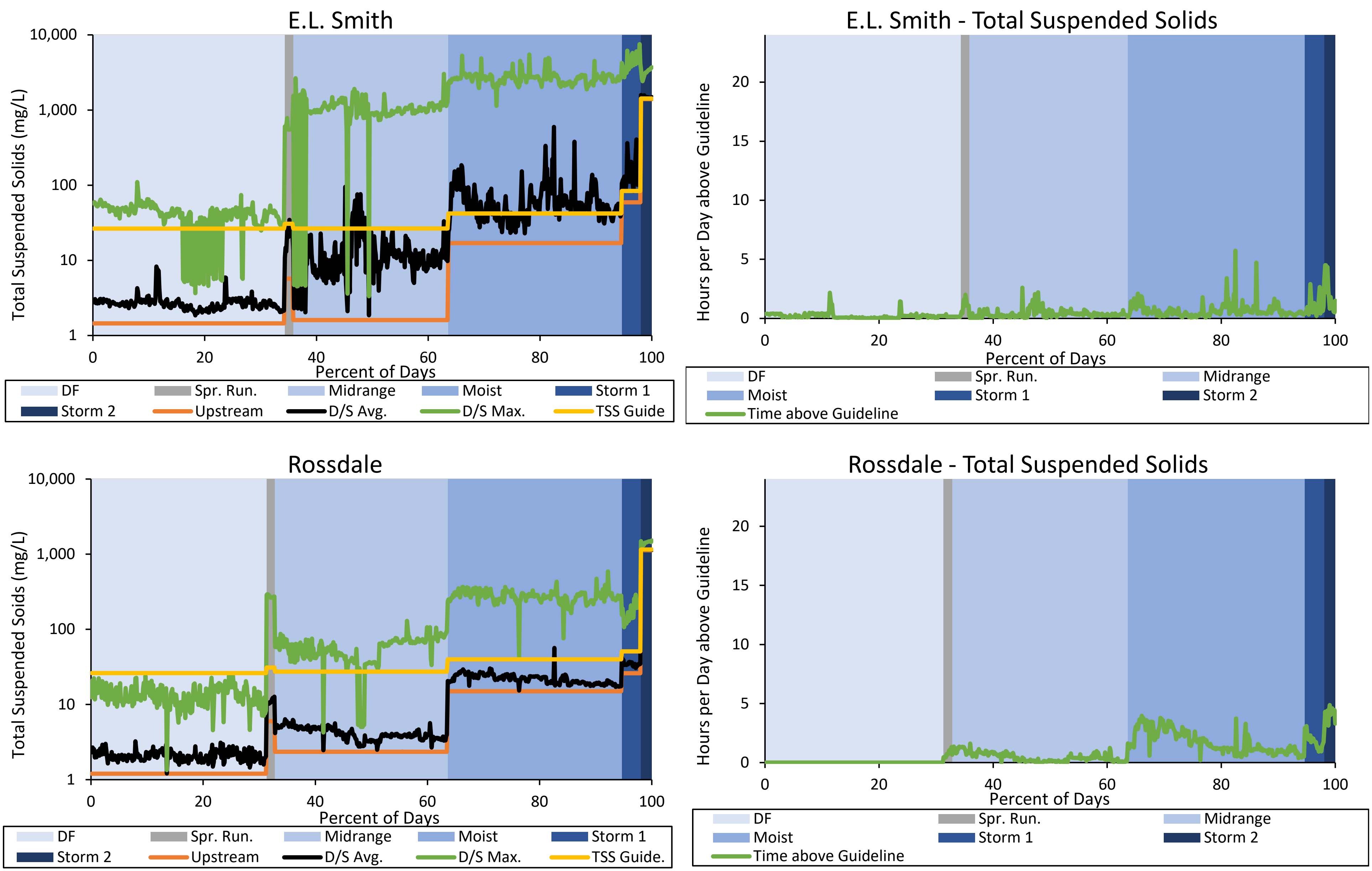


Figure F.1. Concentrations of total suspended solids at the edge of the chronic mixing zone (left) and time exceeding guidelines (right) at both WTPs, 2023 – 2024.

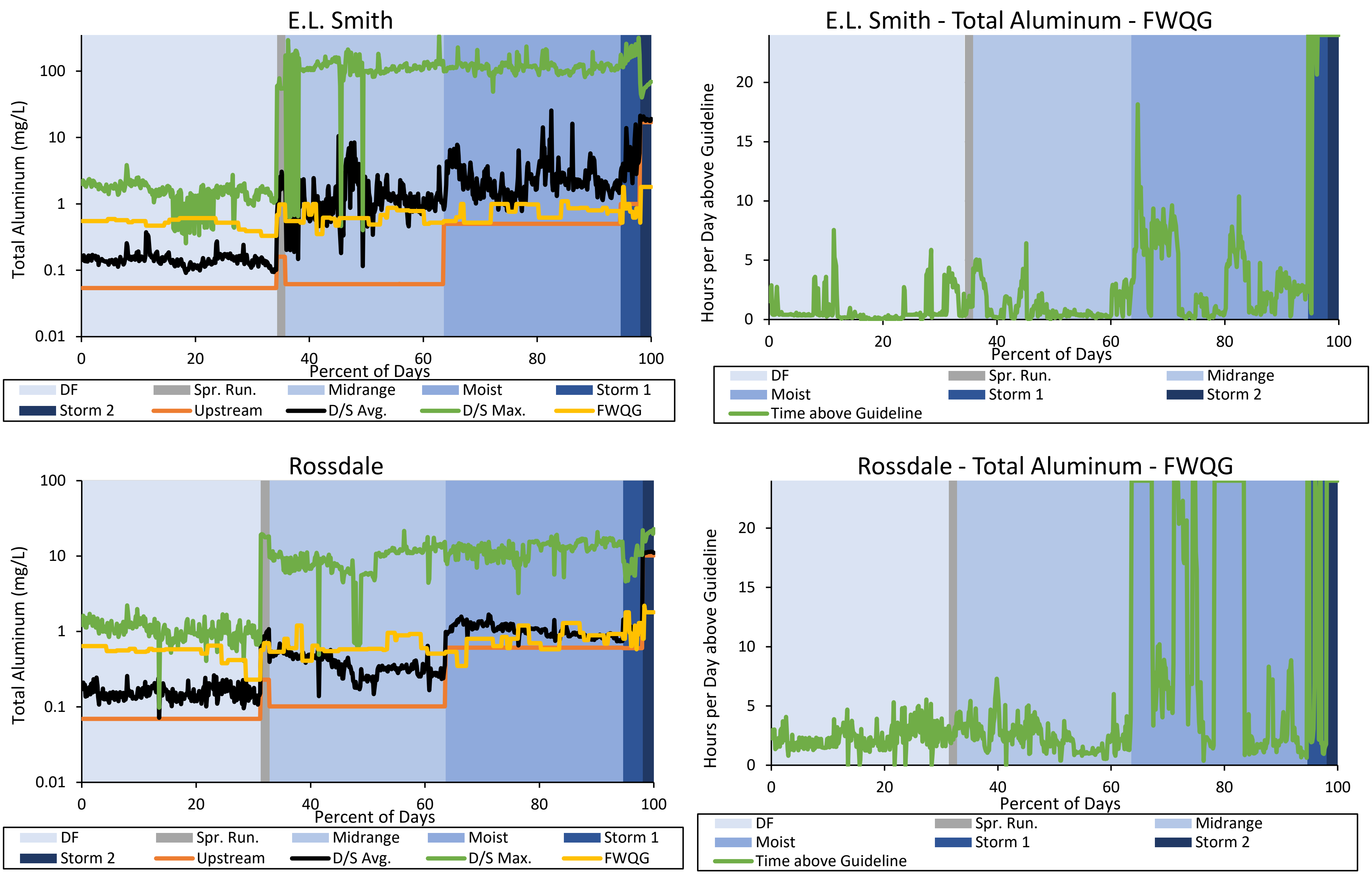


Figure F.2. Concentrations of total aluminum at the edge of the chronic mixing zone at both WTPs, 2023 – 2024.

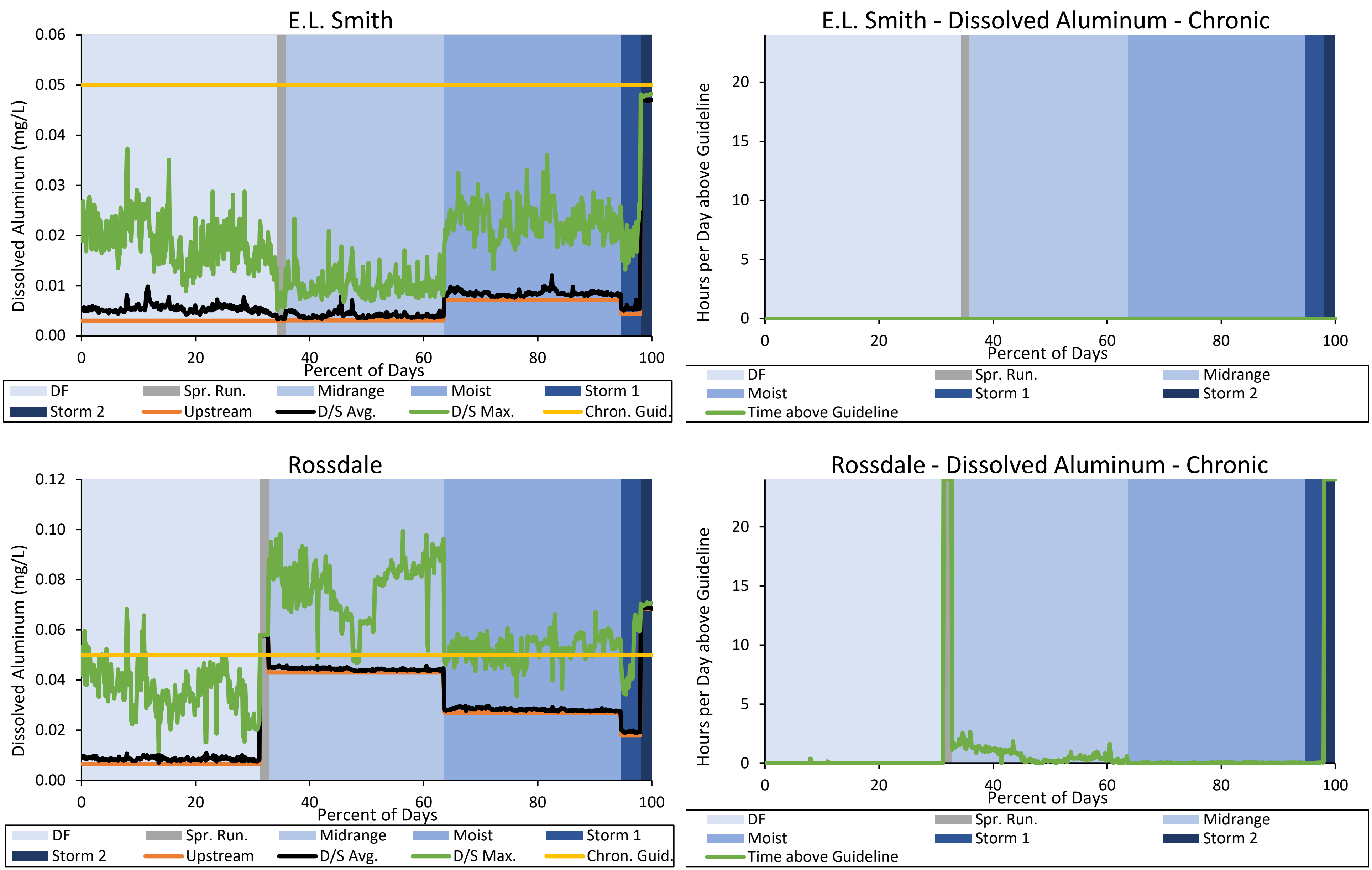


Figure F.3. Concentrations of dissolved aluminum at the edge of the chronic mixing zone (left) and time exceeding guidelines (right) at both WTPs, 2023 – 2024.

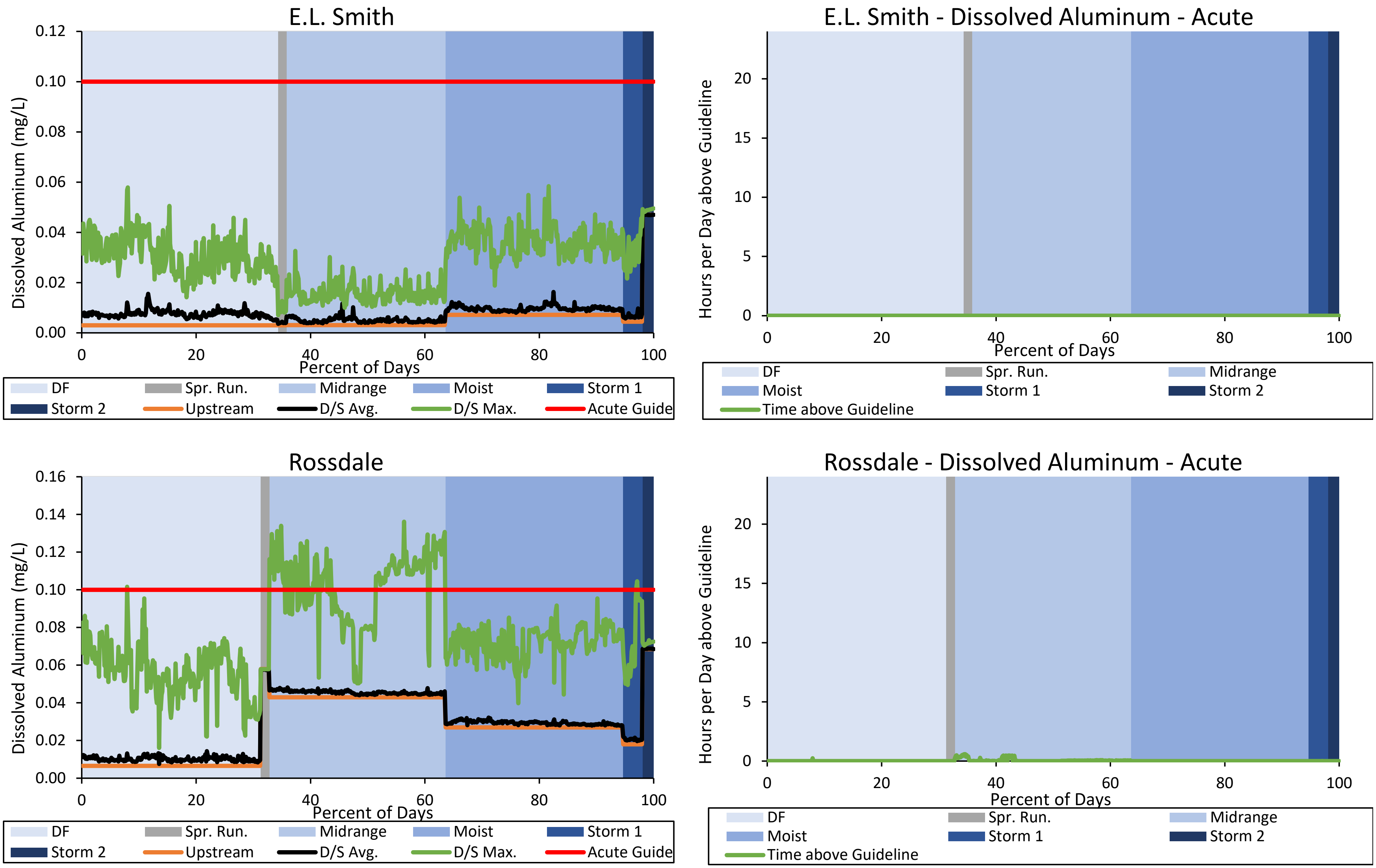


Figure F.4. Concentrations of dissolved aluminum at the edge of the acute mixing zone (left) and time exceeding guidelines (right) at both WTPs, 2023 – 2024.

Appendix C – Distribution Main Extensions

10065 Jasper Avenue, Edmonton, Alberta
T5J 3B1 Canada
epcor.ca

Alberta Environment and Protected Areas
Red Deer-North Saskatchewan Region
Main Floor, Twin Atria Building
4999-98 Ave
Edmonton, Alberta
T6B 2X3

February 10, 2025

Attention: **Mohammad Rahman, P.Eng**
EPEA Team Lead

Subject: **2025 Notification of Distribution Main Extensions – Edmonton Waterworks 638-03-02**

Dear Sir,

EPCOR Water Services (EWS) is formally notifying Alberta Environment and Protected Areas of the potable water distribution system extensions in 2024. This letter indicates our commitment to ensure the projects for 2025 will be constructed to meet the design standards in the Alberta Standards & Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems (revised March 2021).

Private Development Consultants and Contractors will undertake the design and construction of new potable water distribution main extensions in 2025; with the supervision and approval of EWS. The project listing and neighbourhood locations can be referenced in the enclosed figures. Some of these projects may carry over construction into 2026. Additional projects may be added during the 2025 construction season and will be represented as either completed or planned construction as appropriate in the February 2026 Distribution Main Extension Notification.

Also enclosed is the Environmental Protection and Enhancement Act (EPEA) Sign-off Sheet as requested (EPEA Application).

If there are any questions, please contact me at 780-722-4383 or stran@epcor.com.

Sincerely,

Digitally signed
by Tran, Steven

Steven Tran, P.Eng
Manager, Private Development

Enclosure (4)

1. EPEA Application Sign-off Sheet
2. 2024 Completed - 2025 Anticipated Development Areas
3. Neighbourhood Map
4. Neighbourhood Listing

cc: Jamie Gingrich, Ian MacNeill, Jeff Hunter, David Slubik, Josh Foster

EPEA APPLICATION

WATERWORKS, WASTEWATER, OR STORM DRAINAGE SYSTEM

Project Name/Type **Private Development**

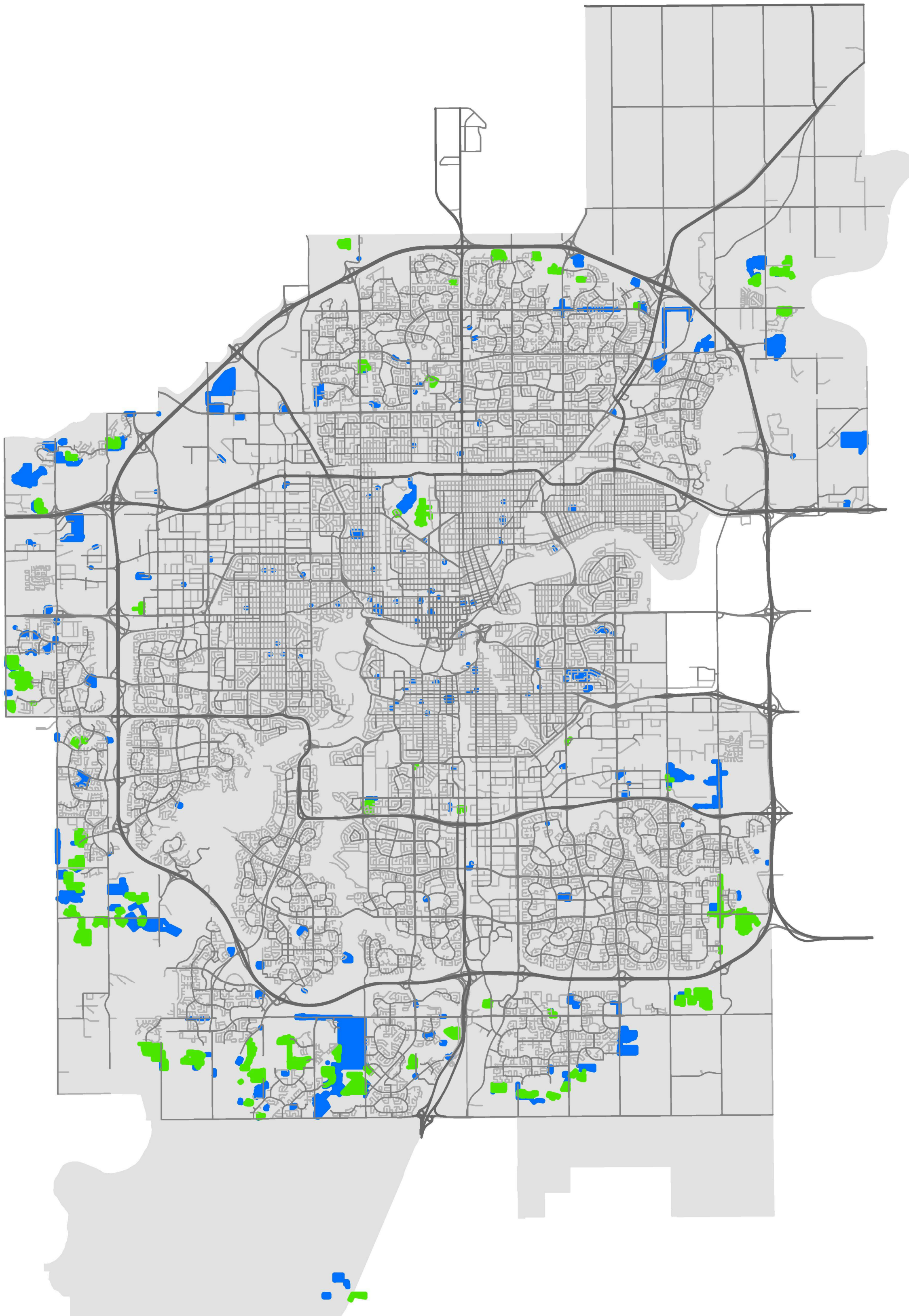
Location **Various throughout the City**

Municipality **Edmonton, Alberta**

I acknowledge that I have reviewed the *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, April 2012, and certify that the designs of the above noted projects comply with all of the requirements specified for the construction of the water distribution, wastewater collection and storm water collection systems.

	EWS PERMIT TO PRACTICE
PROFESSIONAL ENGINEER ALBERTA STEVEN TRAN ID 249796 FEB 10, 2025	PERMIT TO PRACTICE EPCOR WATER SERVICES INC. RM SIGNATURE: [signature] RM APEGA ID #: 70040 DATE: Feb 10, 2025 PERMIT NUMBER: P006368 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Steven Tran, P.Eng. Manager, Private Development	David Hoeksema, P.Eng. Senior Manager, Linear Projects

Submissions that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGA.
For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is necessary.



Main Roads
Arterial
Local
Projects Completed in 2024
Projects Anticipated in 2025
Edmonton City Boundary

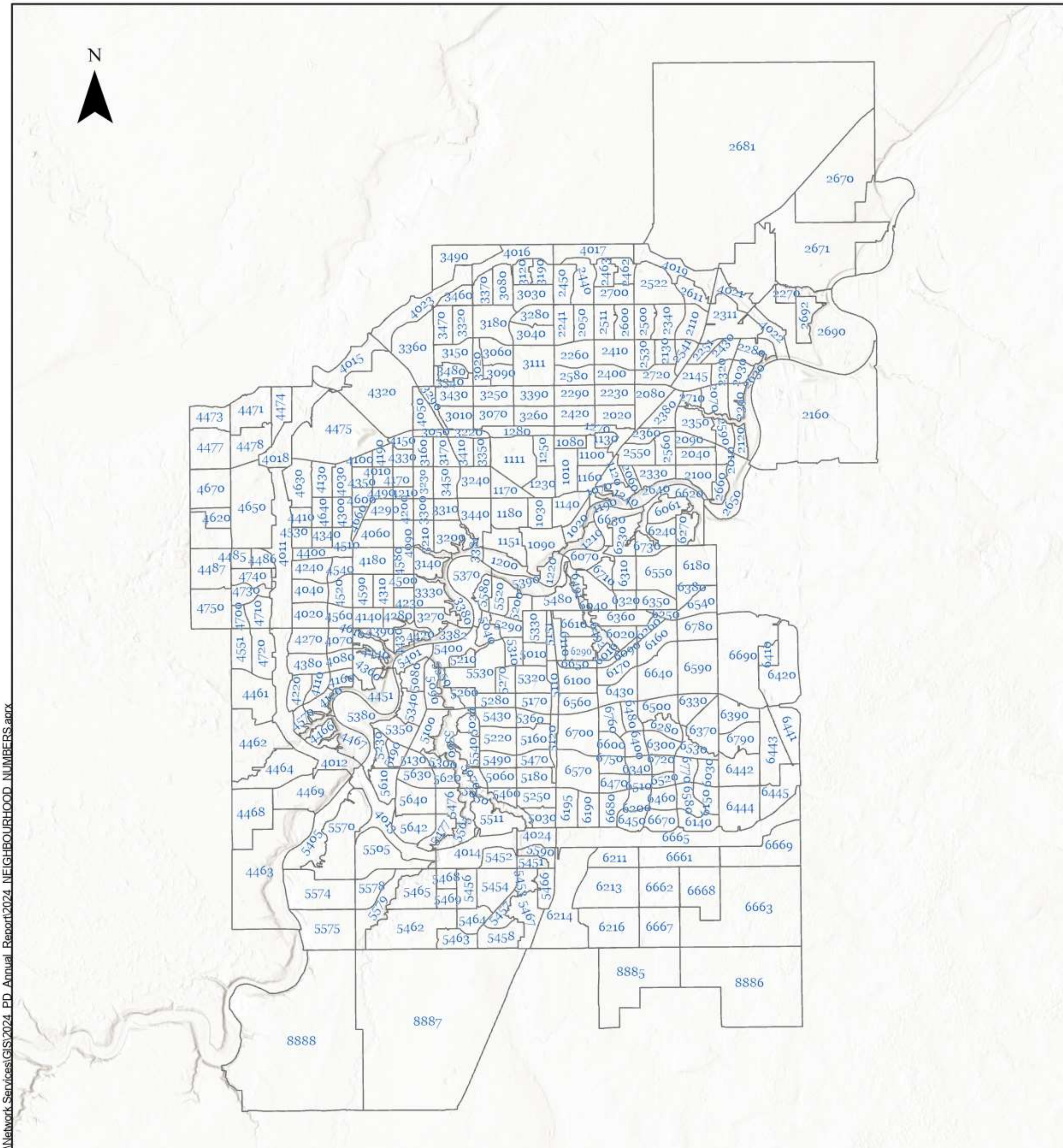
N

EPCOR PROVIDING MORE

Edmonton Private Development Projects

Produced By:	SG
Date:	2/6/2025

NEIGHBOURHOOD



PROVIDING MORE

EPCOR

Legend

NEIGHBOURHOOD NUMBER (403)

CITY OF EDMONTON

PREPARED BY:	DI TEAM
PUBLISH DATE:	05 FEBRUARY 2025

City of Edmonton - Neighbourhood Listing

Neighbourhood Name	Neighbourhood Number	2024 Completed Projects	2025 Anticipated Projects
Alces	6669	Yes	Yes
Ambleside	5505	Yes	No
Anthony Henday Big Lake	4018	Yes	No
Anthony Henday Mistatim	4015	Yes	No
Anthony Henday South	4014	Yes	No
Aster	6445	No	Yes
Baranow	3020	Yes	No
Blackmud Creek	5453	Yes	No
Blatchford Area	1111	Yes	Yes
Bonnie Doon	6040	Yes	No
Britannia Youngstown	4060	Yes	No
Caernarvon	3060	Yes	No
Calgary Trail North	5110	Yes	No
Cashman	5466	Yes	No
Cavanagh	5467	Yes	Yes
Central McDougall	1030	Yes	No
Chappelle	5462	Yes	Yes
Charlesworth	6661	Yes	No
Clareview Town Centre	2145	Yes	No
Clover Bar Area	2160	Yes	No
Crystallina Nera East	2462	No	Yes
Cumberland	3150	Yes	No
Cy Becker	2611	Yes	No
Davies Industrial East	6160	No	Yes
Desrochers Area	5463	Yes	No
Dominion Industrial	3160	Yes	No
Donsdale	4120	Yes	No
Downtown	1090	Yes	No
Dunluce	3180	Yes	No
Eastwood	1100	Yes	No
Eaux Claires	2241	Yes	No
Ebbers	2251	Yes	No
Edgemont	4462	Yes	Yes
Edmonton South Central	8887	Yes	No
Ellerslie	6211	Yes	Yes
Ellerslie Industrial	6214	Yes	Yes
Empire Park	5170	Yes	No
Ermineskin	5180	Yes	No
Gagnon Estate Industrial	4150	Yes	No
Garneau	5200	Yes	No
Glastonbury	4720	Yes	No
Glengarry	2290	Yes	No
Glenora	3200	Yes	No
Glenridding Ravine	5579	Yes	Yes
Goodridge Corners	3490	Yes	No
Gorman	2311	Yes	No
Granville	4551	Yes	Yes
Griesbach	3111	Yes	Yes
Hawks Ridge	4473	Yes	No
Hays Ridge Area	5465	No	Yes

Neighbourhood Name	Neighbourhood Number	2024 Completed Projects	2025 Anticipated Projects
Heritage Valley Area	5456	Yes	No
Heritage Valley Town Centre	5464	Yes	Yes
High Park	4200	Yes	No
Holyrood	6310	Yes	No
Hudson	3480	Yes	No
Inglewood	3240	Yes	No
Kameyosek	6340	Yes	No
Kenilworth	6350	Yes	No
Keswick	5574	Yes	Yes
King Edward Park	6360	Yes	No
Kinglet Gardens	4477	Yes	Yes
Kinokamau Plains Area	4475	Yes	No
Larkspur	6390	Yes	No
Lauderdale	3260	Yes	No
Lewis Farms Industrial	4485	Yes	No
Mactaggart	5477	Yes	No
Magrath Heights	5476	Yes	No
Malmo Plains	5280	Yes	Yes
Maple	6441	Yes	No
Maple Ridge Industrial	6420	Yes	No
Marquis	2671	Yes	Yes
Mattson	6667	Yes	Yes
McConachie	2522	Yes	No
McIntyre Industrial	6430	Yes	No
McKernan	5290	Yes	No
McNamara Industrial	4300	Yes	No
McQueen	3300	Yes	No
Meltwater	6668	Yes	No
Michaels Park	6480	Yes	No
Mistatim Industrial	4320	Yes	No
Montrose	2550	Yes	No
Ottewell	6550	Yes	No
Paisley	5469	Yes	No
Parkdale	1160	Yes	No
Parkview	3330	Yes	No
Potter Greens	4710	Yes	No
Poundmaker Industrial	4410	Yes	No
Prince Charles	3350	Yes	No
Prince Rupert	1170	Yes	No
Pylypow Industrial	6590	Yes	No
Quarry Ridge	2692	Yes	No
Queen Alexandra	5330	Yes	No
Richford	5451	Yes	No
River's Edge	4469	Yes	Yes
Rosenthal	4750	Yes	Yes
Rossdale	1220	Yes	No
Secord	4487	Yes	Yes
Sherwood	4500	Yes	No
Silver Berry	6442	Yes	No
South Terwillegar	5642	Yes	No
Southeast Industrial	6690	Yes	Yes
Spruce Avenue	1230	Yes	No

Neighbourhood Name	Neighbourhood Number	2024 Completed Projects	2025 Anticipated Projects
Starling	4474	Yes	No
Stillwater	4468	No	Yes
Strathcona	5480	Yes	No
Strathcona Industrial Park	6700	Yes	No
Tamarack	6443	Yes	Yes
Terwillegar Towne	5640	Yes	No
The Hamptons	4461	Yes	No
The Orchards At Ellerslie	6216	Yes	Yes
The Uplands	4464	Yes	Yes
Trumpeter Area	4471	Yes	Yes
Virginia Park	1240	Yes	No
West Jasper Place	4580	Yes	No
West Sheffield Industrial	4600	Yes	No
Westmount	3440	Yes	No
Wîhkwêntôwin	1151	Yes	No
Windermere	5570	Yes	No
Windsor Park	5580	Yes	No
Winterburn Industrial Area East	4650	Yes	No
Winterburn Industrial Area West	4670	Yes	No