



SWAN HILLS TREATMENT CENTRE

2026 ENVIRONMENTAL MONITORING PROGRAM

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1. Introduction

The Swan Hills Treatment Centre (SHTC) (*Appendix A - Figure 1*) is owned by the Alberta Government and operated on their behalf by Veolia Canada Waste Services Inc. (Veolia) under an operating contract with Alberta Infrastructure. The SHTC is located approximately 17 kilometers northeast of the town of Swan Hills (*Appendix A - Figure 2*) and provides comprehensive treatment and disposal for hazardous waste.

The SHTC employs several methods to destroy waste. These include high-temperature incineration, physical and chemical treatments for inorganic liquids like acids and bases, and stabilization/solidification processes to prepare treatment residues before their placement in the facility's engineered landfill.

In accordance with the Alberta Environmental Protection and Enhancement Act Approval (EPEA) No. 1744-03-00, as amended, specifically section 4.10, the SHTC conducts a comprehensive environmental monitoring program to identify, track, and mitigate potential environmental impacts associated with the SHTC operations. The approval, issued on December 19, 2019, to SUEZ Canada Waste Services Inc., now operated by Veolia, is valid until December 14, 2029. Baseline data collection began in 1985, two years before the facility commenced operation in 1987 and has evolved over the years to include both onsite and offsite monitoring for:

- Air Quality
- Soils
- Sediments
- Groundwater
- Surface Water
- Vegetation
- Wildlife
- Fish

Unfortunately, due to unforeseen circumstances the fish toxicology and the human health assessment are unavailable prior to the annual technical review meeting.

The scope of the 2026 Environmental Monitoring Program (EMP) is based on the annual program that has been in place since 2000. The annual monitoring program was rationalized in 2000 to consolidate sampling locations among program components and expand the analytical

scope to provide consistent detailed analysis of contaminants of concern in all receptors. The program introduced the concept of “Triggers” at that time which specify additional monitoring requirements in response to events or potential emerging issues.

The SHTC has been in operation for over 30 years and significant changes have been observed in both the quantity and types of wastes processed over that time. In particular, the quantity of PCB wastes has decreased significantly as the inventory of these materials continues to decline in Canada. Under current regulations, the phase-out of any remaining in-service PCBs is to be completed in 2025. As a result; beginning in 2021, operations at SHTC had been scaled back in accordance with a reduced operating model as directed by Alberta Infrastructure. The facility no longer accepted historic waste streams and continued to focus on waste products that had no alternative treatment options. SHTC continued to accept PCB, biomedical, and other selected waste streams when deemed appropriate until December 31, 2025. Effective January 1, 2026 waste is no longer accepted at the Swan Hills Treatment Centre. Operations will continue to process inventoried waste or waste from decommissioning projects.

2. Summary of Proposed Changes for 2026

The results of the 2025 monitoring program were reviewed at the technical meeting which was held virtually on March 5, 2026. Participants include members of the Veolia staff, external consultants, representatives from Alberta Infrastructure, Alberta Health, and Alberta Environment and Protected Areas. Based on the findings of the 2025 monitoring year, several scope changes were recommended for future expanded monitoring years and the standard annual monitoring programs. These recommendations were presented and discussed during the meeting and have been incorporated into the proposed 2026 and future monitoring programs.

Overall objectives for the 2026 monitoring program include:

1. Continue with the overall monitoring programs, reducing or expanding where necessary based on objectives and effectiveness.
2. Continue to review and monitor triggers to optimize the effectiveness of the current scope for sampling and analysis.

Table 1. Overview of 2026 standard monitoring year and proposed changes.

Monitoring Program	Existing	Recommended Changes
Air	Program as specified in EPEA Approval No. 1744-03-00	Mercury CEMS code variance request
Groundwater	- Routine water analysis, PCB's, metals and Dissolved Organic Carbons on all wells - BTEX, F1, AOX, analyzed on shallow wells - Well replacements and maintenance as needed	2026 results at 01(R)-SH will be closely monitored to confirm odd exceedances and detections. - Sampling frequency for Dioxins and Furans reduced to once every 5 years, next event is scheduled for 2029 - Investigate the potential source of elevated chloride concentrations in 07-SH
Soils and Vegetation	- Labrador Tea and Live Moss at 9 sites - Moss Bags at 15 sites 15 Lichen monitoring sites (coincides with moss bag sites)	Current Scope
Wildlife	3 Population monitoring plots 6 Snap trapping plots	Reduce the monitoring frequency to once every five years (or in the event of a major facility incident)
Surface Water and Sediments	- Annual surface water sampling at 3 locations - Biennial sediment sampling at 4 locations	Current Scope

3. Air Quality Monitoring

3.1. Standard Monitoring Program

The location of monitoring plots employed in the program is presented in Appendix A – Figure 3. The air monitoring program is developed in accordance with EPEA Approval No. 1744-03-00 and complies with specific requirements outlined in Section 4.3, which include the following components:

- Meteorological parameters Site 11
- Ambient PCB monitoring at fence line sites (1, 2a, 5a), process area (E1) and offsite location (11)
- VOCs and THC at process area (E1)
- TSP at site 1 and site 9
- PM_{2.5} at sites 1, 5a and 9
- Mercury CEMS installed and functioning
 - Mercury levels continue to be evaluated

3.2. 2026 Program Changes

A mercury CEMS code variance request will be submitted to offer an alternative way of meeting the CEMS code using statistical evidence. The Air Quality Monitoring program will continue to adhere to conditions outlined in the EPEA Approval.

3.3. Triggers

Table 2. Air Quality Monitoring Triggers.

Trigger	Response
PCB concentration exceeds 150 ng/m ³ at fence line monitoring locations	• Verify result and investigate potential sources of fugitive emissions. Increase frequency of PCB air monitoring to NAPS cycle – once every 6 days if warranted.
VOC exceeds a level of 3 ppm or THC exceeds 5 ppm	• Report individual VOC compounds and compare with appropriate air quality and occupational health and safety guidelines and review trends over the period of record. • If deemed significant, the OTF fugitive emission survey would be triggered if not already conducted
A facility upset resulting in an off-site release of significant magnitude to	• Review meteorological data and conduct dispersion modeling (if appropriate) to support initial assessment

Trigger	Response
warrant immediate assessment	and guidance for environmental monitoring response. • Conduct additional air monitoring as recommended • Implement Emergency Response Plan and compile relevant data regarding the incident to facilitate development of an effective Environmental Monitoring Program response

4. Groundwater Monitoring

4.1. 2026 Standard Monitoring Program

The location of monitoring plots employed in the program is presented in Appendix A – Figure 4. The scope of the groundwater monitoring program complies with the requirements of Section 4.8 and Table 4.8-A in Approval No. 1744-03-00, which includes the following components:

- All wells sampled for (*Appendix B – Table 8*):
 - Routine Water Analysis (pH, EC, major ions)
 - PCB's
 - Dissolved Metals
 - Dissolved Organic Carbon
- Shallow wells sampled for (*Appendix B – Table 8*):
 - BTEX, F1
 - Adsorbable Organic Halide (AOX) on select wells
 - Use as a monitoring tool to screen for chlorinated compounds
- Well replacement and maintenance as needed

4.2. 2026 Program Changes

The newly replaced well 01(R)-SH, will be closely monitored in the next program year due to several above guideline exceedances in BTEX, PHC F1, and Iron. These exceedances are expected to be caused by the stabilization of the well. The well will be monitored in 2026 to confirm. All other newly installed wells are functioning as expected.

Chlorine levels at shallow well (07-SH) and intermediate well (07-IN) have been increasing in recent years. It is suspected that surface runoff, potentially from road salt in the parking lot and surrounding roads, may be contributing to this increase. As part of the 2025 monitoring

program, samples were collected during runoff periods near the Swan Hills Treatment Center parking lot and in the ditch near well 07. In 2026, the monitoring program will continue to focus on surface runoff during these periods to determine if elevated chlorine levels can be attributed to road salt. Furthermore, sampling will be extended to areas farther from the treatment center to investigate the source of elevated chlorine.

The 2024 expanded program served as the final baseline year for monitoring dioxins/furans in select shallow wells. The frequency of monitoring has been adjusted to every five years, during the expanded monitoring program. The next scheduled sampling will occur in 2029. In the event of any disturbances caused by SHTC operations, any further adjustments to the scope can be done to address potential emerging concerns.

4.3. Triggers

Table 3. Groundwater Monitoring Triggers.

Trigger	Response
Statistically significant increase in key parameter (e.g. PCBs).	• Implement Response Plan and conduct follow up sampling to verify and assess results
A significant facility upset resulting in on-site spill of significant magnitude to warrant immediate assessment	• Incorporate additional monitoring as recommended by the Response Plan

5. Soils and Vegetation Monitoring

5.1. 2026 Standard Monitoring Program

The 2026 annual monitoring program will continue with standard monitoring program locations. The location of monitoring plots employed in the program is presented in Appendix A – Figure 5. The standard program includes the following components:

- Labrador Tea sampled and analyzed annually at 9 sites
- Live moss sampled and analyzed biennially in years 1, 3 and 5 at 9 sites
- Moss bags deployed at 15 standard and 3 fence line sites for a 1-year exposure
- Lichen site monitoring at 15 sites
- Analytical includes routine parameters, metals, PCB's, Dioxins and Furans

5.2. 2026 Program Changes

In the event of any disturbances caused by SHTC operations, any further adjustments to the scope can be done to address potential emerging concerns. Historical PCB concentrations at the site have steadily decreased over the past decade with no significant concerns. No program changes were recommended during the annual technical review meeting.

5.3. Triggers

Table 4. Soil and Vegetation Monitoring Triggers.

Trigger	Response
A facility upset resulting in off-site emissions of significant magnitude to warrant immediate assessment	• Soil and vegetation monitoring to proceed at selected sites immediately following the incident. • The number/location of sites and analytical scope would be based on meteorological conditions and the nature of the release.

6. Wildlife Monitoring

6.1. 2026 Standard Monitoring Program

The location of monitoring plots employed in the program is presented in Appendix A – Figure 6.

- 3 live trapping plots for population monitoring
- 6 snap trapping plots to collect vole tissue for contaminant analysis

Analytical parameters to the “standard” program scope are outlined in Appendix B – Table 9.

6.2. 2026 Program Changes

It is recommended that the wildlife program reduce the frequency of vole demographic monitoring from annual to once every five years under the expanded monitoring program. This recommendation is supported by the 39-year continuous demographic dataset, the well-established 3–5 year population cycle of red-backed voles, the high mortality associated with sampling, the absence of population-level effects despite historically elevated contaminant exposures, and the availability of a robust trigger-based adaptive monitoring framework. In the event of any disturbances caused by SHTC operations, any further adjustments to the scope can be done to address potential emerging concerns.

6.3. Triggers

Table 5. Wildlife Monitoring Triggers.

Trigger	Response
Statistically significant change in June vole population levels correlated with the April/May tissue contaminant levels	• Collect and analyze September vole tissue from population monitoring plots (11, 114 and 70) for PCBs, dioxins and furans
Elevated Total TEQ in live moss and Labrador tea is observed	• Expand vole tissue collection to 10 plots consistent with the Soil and Vegetation program
A facility upset resulting in off-site emissions of significant magnitude to warrant immediate assessment	• Additional sampling of vole tissue. Timing, sample locations and analytical scope would be determined based on meteorological conditions and the nature of the release.

7. Surface Water, Sediments and Fish Monitoring

7.1. 2026 Standard Monitoring Program

- Annual surface water sampling
 - 3 Sample Locations: S5A Coutts River, S12 Chrystina Lake, Edith Lake (Appendix A – Figure 7)
 - Parameters (Appendix A – Table 10): Routine Water analysis (dissolved solids and ions), Nutrients (total and dissolved), Metals
- Biennial (next monitoring period – 2028) sediment sampling
 - 4 Sample Locations: S5A Coutts River, S12 Chrystina Lake, Edith Lake, S6 Unnamed tributary (Appendix A – Figure 7)
 - Parameters (Appendix A – Table 10): Metals, Organics (PCB's, dioxins and furans)
- Annual fish tissue analysis from Edith and Chrystina Lake was not able to be analyzed before the technical review meeting due to complications with the laboratory.

7.2. 2026 Program Changes

No program changes were recommended during the annual technical review meeting.

In the event of any disturbances caused by SHTC operations, any further adjustments to the scope can be done to address potential emerging concerns.

7.3. Triggers

Table 6. Surface Water, Sediment, and Fish Monitoring Triggers.

Trigger	Response
Contaminant levels exceed the 95 th percentile value in Chrystina Lake sediments	• Verify result and include sediment sampling in both Chrystina and Edith lakes during the next annual program if warranted
Contaminant levels exceed 95 th percentile value and/or the Interim Sediment Quality Guidelines (ISQG) in stream sediment samples	• Verify results and initiate additional downstream sampling in following sampling period if warranted

Trigger	Response
Organic contaminant levels in Chrystina Lake brook trout exceed the recommended toxicity trigger	• Analyze any archived samples to verify results • Sample Edith Lake brook trout in the following year
A facility upset resulting in off-site emissions of significant magnitude to warrant immediate assessment	• Initiate immediate water quality, sediment and fish tissue sampling as recommended.

8. References

(AECOM) 2025 Groundwater Monitoring Report – Swan Hills Treatment Centre. March 2026.

(MONTROSE) 2025 SOIL AND VEGETATION MONITORING PROGRAM REPORT – Swan Hills Treatment Centre. Montrose Environmental Inc. March 2026.

(CPP) 2025 Surface Water Quality Monitoring. Charette Pell Poscente (CPP) Environmental. March 2026.

(WILDLAND) 2025 Wildlife Monitoring Report. Wildland Management Consultants Ltd. March 2026.

APPENDIX A

Figure 1. Swan Hills Treatment Centre Facility



Figure 2. Swan Hills Treatment Centre Location

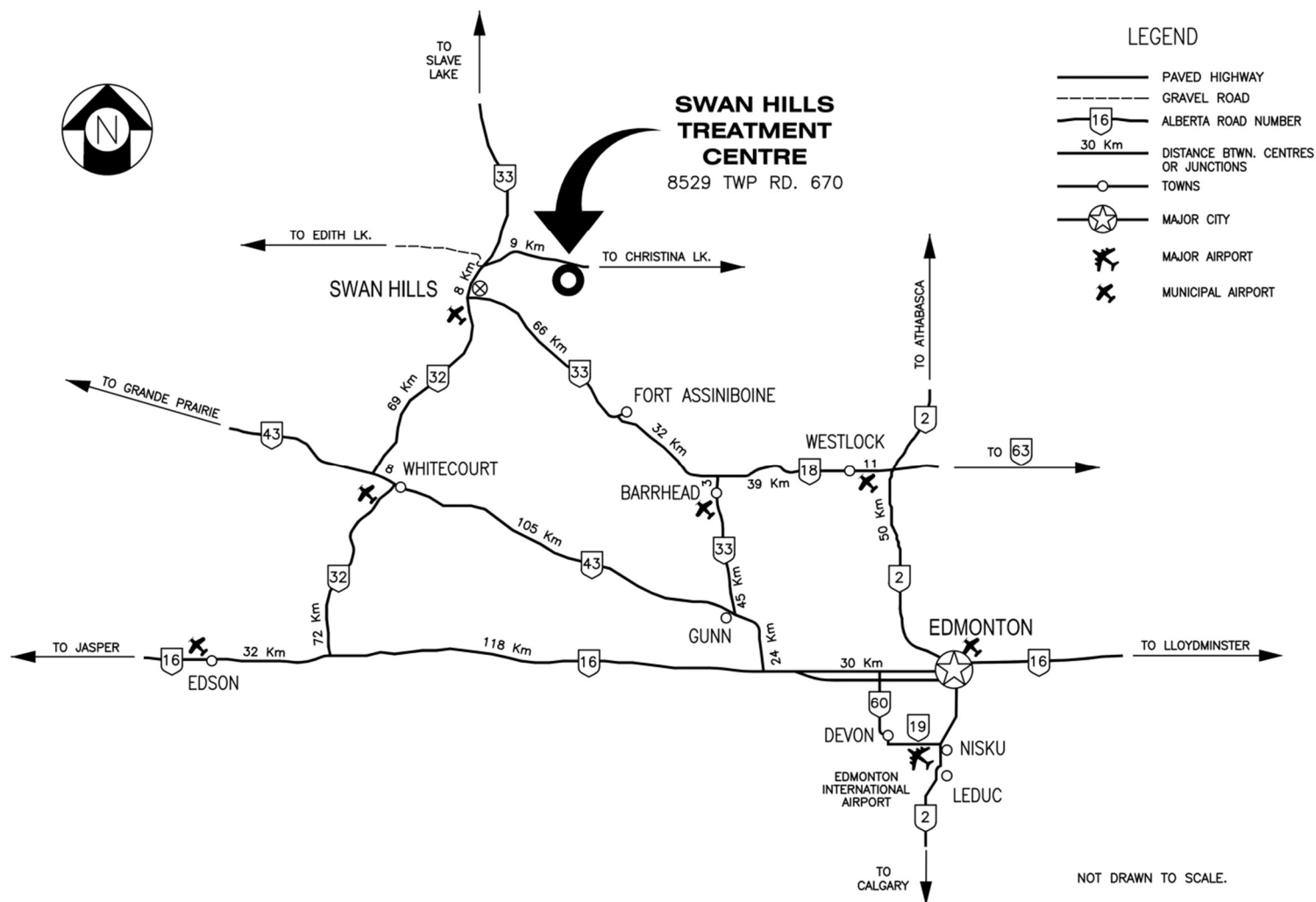
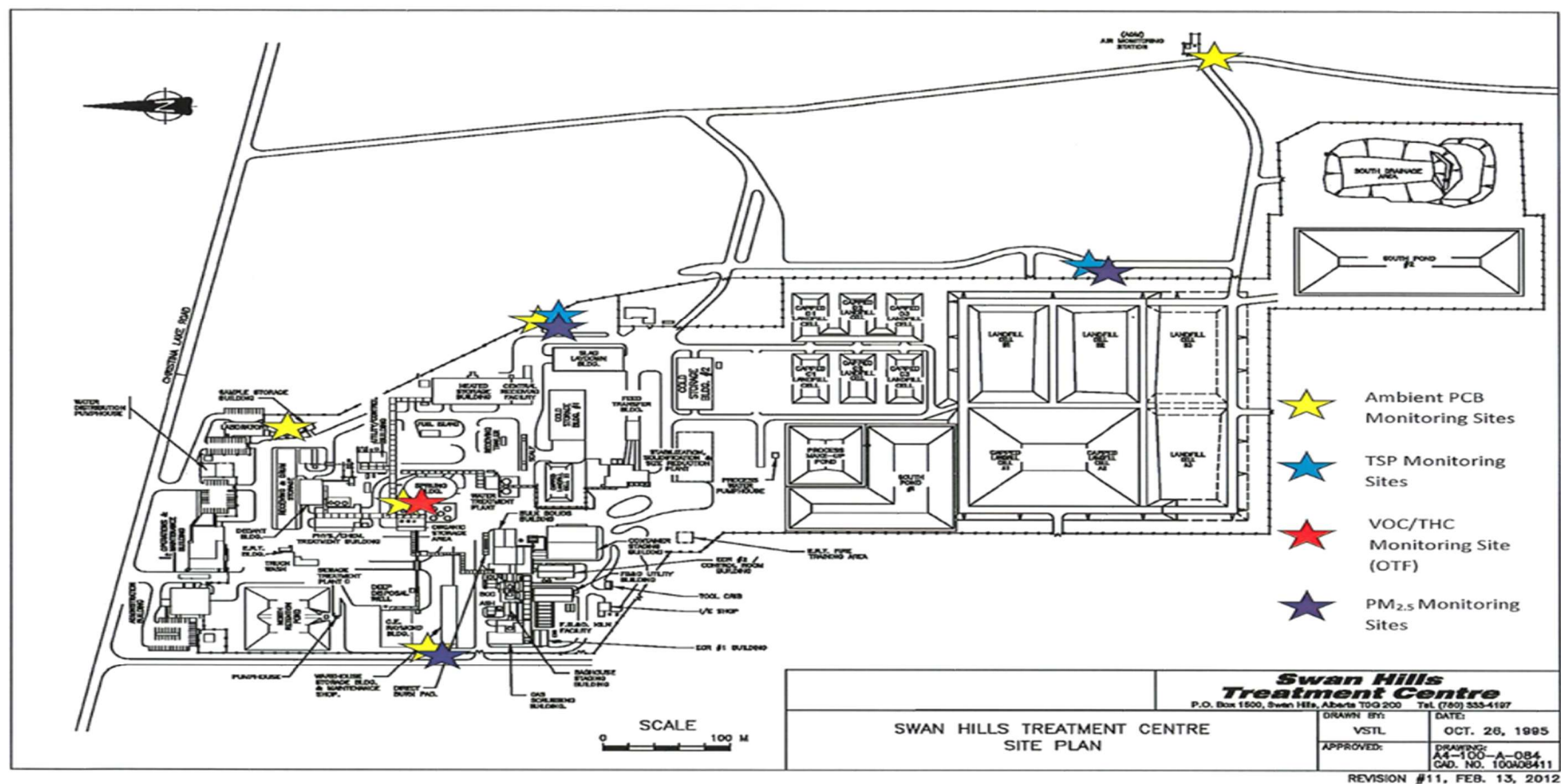


Figure 3. Air Quality Monitoring Sites.



LEGEND

- ▲ WATER WELLS
- ▲ DECOMMISSIONED WATER WELLS
- ◆ DECOMMISSIONED MONITORING WELL LOCATION
- ◆ DECOMMISSIONED PIEZOMETER LOCATION
- ◆ MONITORING WELL LOCATION
- ◆ PIEZOMETER LOCATION
- ◆ DAMAGED MONITORING WELL LOCATION
- ◆ DAMAGED PIEZOMETER LOCATION
- ◆ DECOMMISSIONED UNKNOWN MONITORING WELL LOCATION

0 75 150 m
1:3000

Issue Status: FINAL

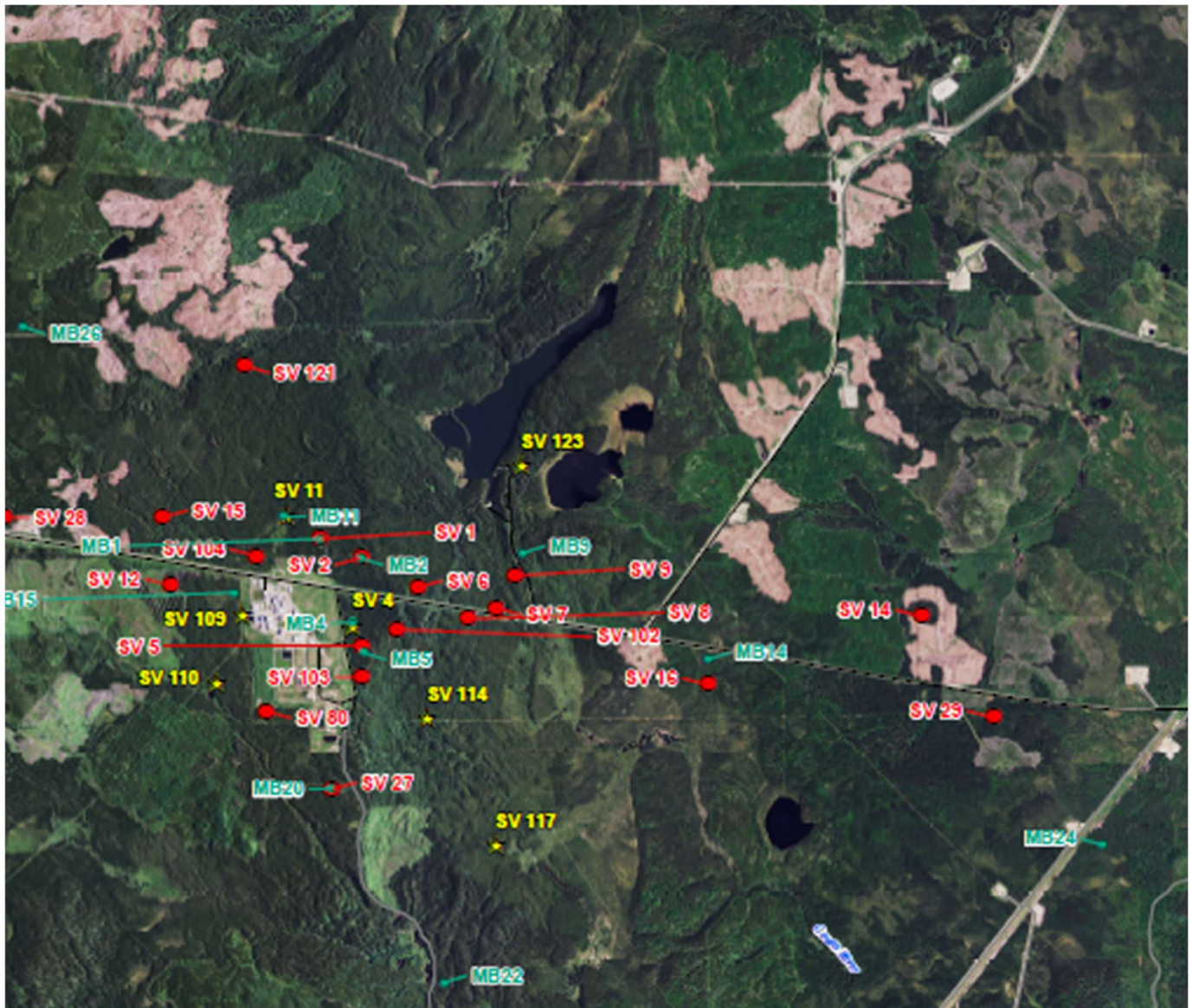


Figure 5. Soil and Vegetation Monitoring Sites.

Figure 6. Wildlife Monitoring Sites.

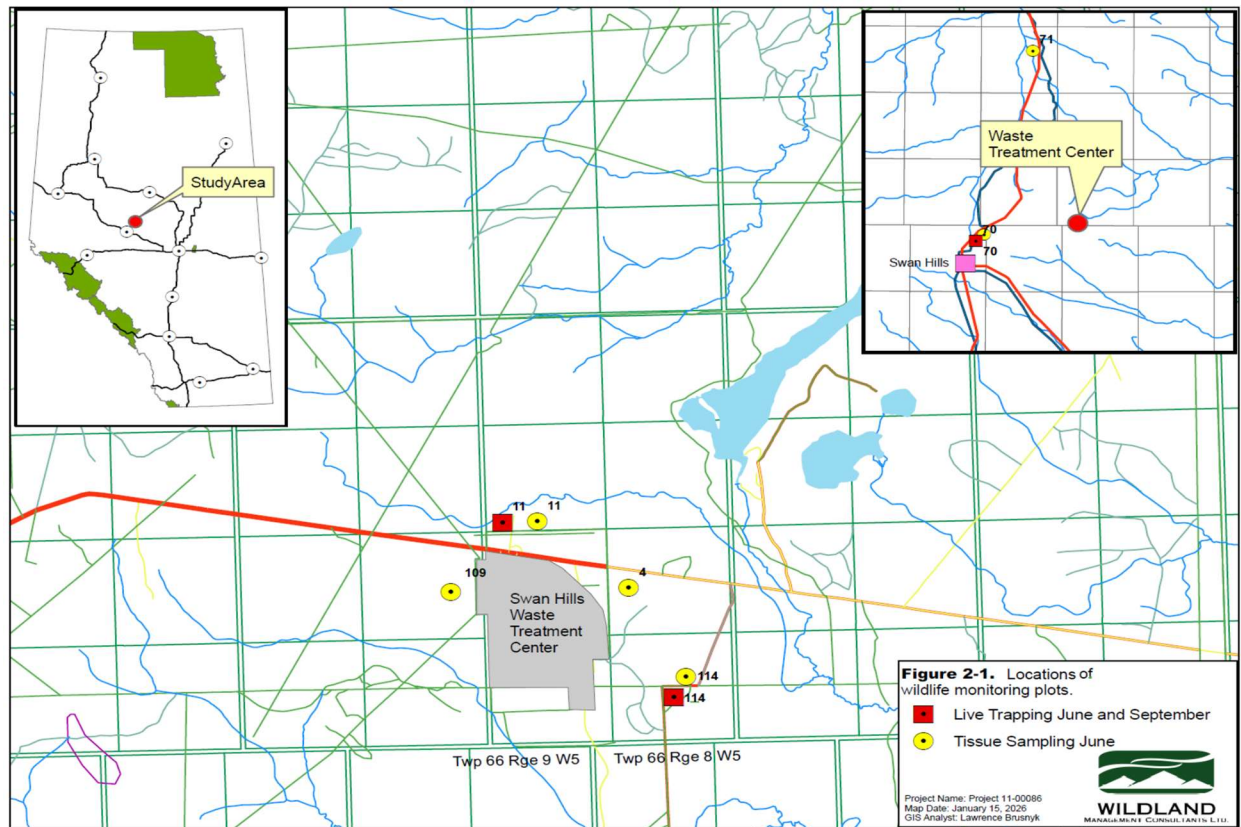
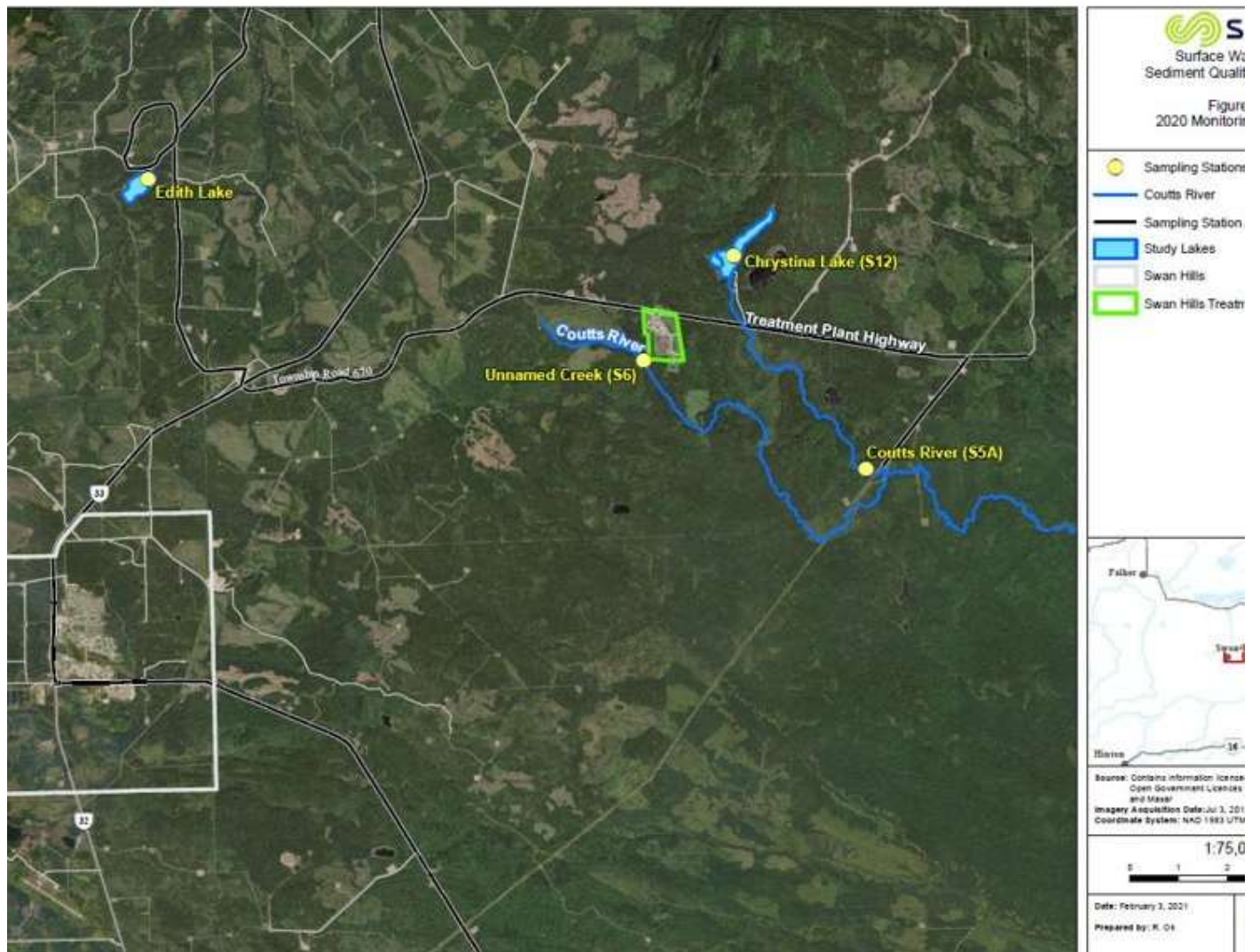


Figure 7. Surface Water, Sediment and Fish Monitoring Sites.



APPENDIX B

Table 7. Groundwater Analytical Scope.

Parameter	Shallow Till	Intermediate Till	Sandstone Aquifer
General parameters			
pH	✓	✓	✓
Electrical Conductivity	✓	✓	✓
Calcium	✓	✓	✓
Magnesium	✓	✓	✓
Sodium	✓	✓	✓
Potassium	✓	✓	✓
Chloride	✓	✓	✓
Sulphate	✓	✓	✓
Sulphide	✓	✓	✓
Bicarbonate	✓	✓	✓
Nitrate – nitrogen	✓	✓	✓
Nitrite – nitrogen		✓	
Cyanide	✓		
Total Alkalinity		✓	✓
Total Hardness		✓	✓
Total Dissolved Solids (TDS)	✓	✓	✓
Ion Balance	✓		
Metals			
Antimony	✓	✓	✓
Arsenic	✓	✓	✓
Barium	✓	✓	✓
Beryllium	✓	✓	✓
Cadmium	✓	✓	✓
Chromium	✓	✓	✓
Cobalt	✓	✓	✓
Copper	✓	✓	✓
Lead	✓	✓	✓
Mercury	✓	✓	✓
Molybdenum	✓	✓	✓
Nickel	✓	✓	✓
Selenium	✓	✓	✓
Silver	✓	✓	✓
Thallium	✓	✓	✓
Vanadium	✓	✓	✓
Zinc	✓	✓	✓
Organic Parameters			
Dissolved Organic Carbon	✓	✓	✓
BTEX	✓		
Total PCBs	✓	✓	✓

Table 8. Soil and Vegetation Analytical Scope.

Parameter	Vegetation	Soils	Moss Bag
General parameters			
Electrical Conductivity		✓	
pH		✓	
Macronutrients	✓		
Non-Routine			
Aluminum	✓	✓	
Antimony	✓	✓	✓
Arsenic	✓	✓	✓
Barium	✓	✓	
Beryllium	✓	✓	✓
Boron	✓	✓	✓
Cadmium	✓	✓	✓
Calcium	✓	✓	
Chromium	✓	✓	✓
Cobalt	✓	✓	
Copper	✓	✓	✓
Iron	✓	✓	✓
Lead	✓	✓	✓
Lithium	✓	✓	
Magnesium	✓	✓	
Manganese	✓	✓	✓
Mercury	✓	✓	✓
Molybdenum	✓	✓	✓
Nickel	✓	✓	✓
Potassium	✓	✓	
Selenium	✓	✓	✓
Silver	✓	✓	
Sodium	✓	✓	
Strontium	✓	✓	
Sulphur	✓	✓	✓
Thallium	✓	✓	
Tin	✓	✓	✓
Titanium	✓	✓	
Uranium	✓	✓	
Vanadium	✓	✓	✓
Zinc	✓	✓	✓
Zirconium	✓	✓	
Organic Parameters			
Total & Congener PCB	✓	✓	
Dioxin/Furans	✓	✓	

Table 9. Wildlife Analytical Scope.

Parameter	Standard Program	Expanded Program (every 5 years)
Routine Parameters		
Calcium	✓	✓
Magnesium	✓	✓
Potassium	✓	✓
Sodium	✓	✓
Fluoride	✓	✓
Metals¹		
Antimony		✓
Arsenic		✓
Barium		✓
Beryllium		✓
Cadmium		✓
Chromium		✓
Cobalt		✓
Copper		✓
Lead		✓
Mercury		✓
Molybdenum		✓
Nickel		✓
Selenium		✓
Silver		✓
Thallium		✓
Vanadium		✓
Zinc		✓
Organic Parameters		
Aroclor PCB		✓
Total & Congener PCBs (by HRMS)	✓	✓ ²
Dioxins/Furans/TEQ	✓	✓ ²

¹ Metals analysis in the expanded program, is conducted on samples from the 10 standard program sites only

² The organic parameters specified will be included for samples from the 10 standard program sites only

Table 10. Surface Water and Sediment Analytical Scope.

Parameter	Surface Water	Sediment ¹	Fish
General Parameters			
pH	✓		
Conductance	✓		
Calcium	✓		
Magnesium	✓		
Potassium	✓		
Sodium	✓		
Chloride	✓		
Sulphate	✓		
Bicarbonate	✓		
Nitrate – nitrogen	✓		
Total Dissolved Solids	✓		
Metals			
Antimony	✓	✓	✓
Arsenic	✓	✓	✓
Barium	✓	✓	✓
Beryllium	✓	✓	✓
Cadmium	✓	✓	✓
Chromium	✓	✓	✓
Cobalt	✓	✓	✓
Copper	✓	✓	✓
Lead	✓	✓	✓
Mercury	✓	✓	✓
Molybdenum	✓	✓	✓
Nickel	✓	✓	✓
Selenium	✓	✓	✓
Silver	✓	✓	✓
Thallium	✓	✓	✓
Vanadium	✓	✓	✓
Zinc	✓	✓	✓
Selected Dissolved Metals (e.g. Al)	✓		
Organic Parameters			
Total Organic Carbon	✓	✓	
Total & Congener PCBs (by HRMS)		✓	✓
Dioxins/Furans		✓	✓
Total Inorganic Carbon	✓		
Dissolved Organic Carbon	✓		
Dissolved Inorganic Carbon	✓		

¹ Sampling collected biannually; next sampling program scheduled for 2026.