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ENVIROSOIL LIMITED

Environmental Assessment Registration Document – Additional Information Addendum

Waste Oil Recycling and Water Treatment Facility

November 21, 2022 – 19-1742

November 21, 2022

Nova Scotia Environment and Climate Change
1903 Barrington Street, Suite 2085
Halifax, Nova Scotia
B3J 2P8

Attention: Candace Quinn
Environmental Assessment Officer

Waste Oil Recycling and Water Treatment Facility
Environmental Assessment Registration Document – Additional Information Addendum

We respectfully submit the following Environmental Assessment Registration Document – Additional Information Addendum, in accordance with requirements for the Nova Scotia Environmental Assessment Regulations for a Class 1 project, regarding the proposed Waste Oil Recycling and Water Treatment Facility for Envirosoil Limited, located at 750 Pleasant Street, Dartmouth, Nova Scotia.

The Additional Information Addendum responds directly to the items identified in the Minister of Environment and Climate Change's request for additional information (letter dated February 18, 2022) and describes any amendments to the project description and identifies proposed approaches for installation of facility components and operational activities. It presents a balanced approach to achieving a defensible environmental assessment while considering environmental sustainability, community values, legislative requirements, business operations, and economic impact.

We look forward to your timely review of the documentation. Please contact the undersigned if you have any questions or require additional information.

Sincerely,

DILLON CONSULTING LIMITED

Paul Koke, M.A.
Project Manager

PEK:jes
Enclosure(s): Three (3) copies of EA Registration Document – Additional Information Addendum

Our File: 19-1742-6000

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Project Update & Overview

This Addendum document provides additional information to the Environmental Assessment (EA) Registration for the Waste Oil Recycling and Water Treatment Facility Project registered with the Nova Scotia Environmental Assessment Branch of Nova Scotia Environment and Climate Change (NSECC) on April 8, 2021, and an Additional Information Addendum submitted in December 2021. The project consists of the construction and operation of a facility that will be used for receiving, processing and recycling of waste oil and the treatment of wastewater located at 750 Pleasant Street in Dartmouth, NS. Several notable amendments to the proposed project approach, as well as important project highlights are briefly discussed in this initial Project Update & Overview.

In the April 2021 EA Registration, it was proposed that liquid wastes would be treated to meet the required regulatory criteria and discharged to Halifax Water's local sanitary sewer via a new 4" discharge line. An Additional Information Addendum submitted by Envirosoil in December 2021, outlined changes to proposed undertaking shifting the discharge directly to the Halifax Harbour. The decision to discharge directly to the Harbour was arrived at after extensive discussions with Halifax Water that identified that this discharge would be identified as "extraneous flow", and that the an onsite marine discharge is a preferred option. It was considered that wastewater would have already been treated at Pleasant Street, and the municipal treatment plant is not expected to provide meaningful levels of additional refinement. In the case of either discharge scenario, the ultimate fate of the treated water is the same as they are within a very similar Halifax Harbour receiving environment.

The December 2021 Additional Information Addendum proposed discharge to the Halifax Harbour through a new 150-200 mm (6-8") discharge line, to be located adjacent the existing and currently operating site stormwater discharge system, which also employs a 8" discharge line. The majority of wastewaters that will be treated at the proposed facility are anticipated to be associated with the marine industry, particularly bilge and other oily liquid wastes. Naturally occurring chlorides from marine or salt water are generally present in these types of liquid wastes; these are not organic chlorides typically associated with chemicals or contaminants. Removing chlorides from wastewater requires considerable amounts of energy to separate the ions, which generates unnecessary greenhouse gases, since the end point release of the chlorides is back to its originating source (i.e., the ocean environment).

Through the proposed treatment process, regulatory agency approved effluent discharge quality limits will be met and the treated effluent will require discharge to a suitable receiving environment. Envirosoil has carried out a Receiving Water Study, and has developed site specific environmental discharge criteria for the release of treated effluent from the facility. By only releasing treated effluent that is at or below the discharge criteria developed, the protection of aquatic life in the receiving water environment is ensured.

The proposed discharge point from the wastewater treatment facility is located at the upper extent of the heavily protected (by armour stone) harbour shoreline of the property. Consistent with the discharge from the stormwater treatment system, discharge will occur several metres above the ordinary high water mark and the discharge line will be accessible at all times. The discharge location allows for ease of accessibility for required routine visual inspections and maintenance, compliance monitoring, and importantly, does not require construction and installation of discharge infrastructure (e.g., underwater pipe and new outfall) below the high water mark. Where no physical works are required in aquatic habitat, there is no risk of a harmful alteration, disturbance or destruction of the natural environment. With the ability to monitor and control all liquid discharges from the treatment system, and confirm that regulatory agency approved discharge criteria are met in all effluent from the facility, the risk to existing marine life due to the project is significantly reduced. This is consistent with the originally proposed option and potential effects of discharging to Halifax Water's local sewerage system and ultimately through the Eastern Passage WWTP.

As previously presented in the EA documentation, the proposed project is strategically located adjacent to marine shipping routes and other commercial/industrial activities, and to Nova Scotia's most populated and fastest growing region. Wastewater and waste oil are common by-products from domestic, industrial and commercial markets. Marine shipping, in particular, has a requirement for effective treatment of wastewater and waste oil, as it is a common constituent of bilges and fuel transfer areas. The proposed location minimizes the environmental impacts (particularly, the carbon footprint reduction associated with removing hundreds of tanker trucks annually from Nova Scotia highways) and safety risks associated with secondary trucking of wastewater and waste oil over considerable distances through environmentally sensitive areas. Currently, the nearest two similar facilities are located in Goffs and Debert, NS, and wastewater is also routinely trucked to a facility in the Cape Breton Regional Municipality for treatment and discharge to the marine environment. Halifax is a world class shipping hub and there is significant local demand for effective treatment of these liquid wastes, and this demand is best met by a local service provider rather than long-haul trucking to distant similar facilities.

Establishing this facility close to existing industrial facilities, a large and growing population, and a nationally significant marine economic sector, combined with a well-established treatment technology proposed for the system, provides HRM with an important option for treating this common effluent.

1.0 Introduction

This Additional Information Addendum document provides additional information to the Environmental Assessment (EA) Registration for the Waste Oil Recycling and Water Treatment Facility Project registered with the Nova Scotia Environmental Assessment Branch of Nova Scotia Environment and Climate Change (NSECC) on April 8, 2021, and a previous Additional Information Addendum submitted in December 2021. The project consists of the construction and operation of a facility that will be used for receiving, processing and recycling of waste oil and the treatment of waste water, and is located at a portion of 750 Pleasant Street in Dartmouth, Nova Scotia. A request for additional information regarding the proposed undertaking was provided to Envirosoil Limited (the Proponent) by the Minister of Environment and Climate Change on February 18, 2022, in order to evaluate potential environmental effects related to the undertaking (provided in Appendix A). The potential impacts of the project to the marine environment and proposed measures and monitoring programs to mitigate these effects are the key focus of this Additional Information Addendum. This Addendum should be reviewed in conjunction with the April and December 2021 EA documents, since it focuses on the additional information requested by the Minister in February 2022, and does not include all details of the proposed undertaking, and other environmental assessment components completed to date.

Between April 2022 and September 2022, Envirosoil engaged with representatives and technical experts from both NSECC and Environment and Climate Change Canada (ECCC) to discuss and solicit feedback on environmental assessment methodologies (April 2022) and preliminary study findings (September 2022), specifically associated with the additional information requirements identified and requested in the Minister's February 2022 letter.

It is anticipated that construction and installation of the waste oil recycling and water treatment system infrastructure will commence pending EA approval and subsequent permitting and approvals. Construction of project components is estimated to be completed within two to three months, with the facility operational within three to four months of the construction start (assumed in spring of 2023). The facility is anticipated to be in operation for at least 25 years.

The proposed undertaking is on a previously disturbed industrial site, where a portion of the property is currently being used as an operating liquid asphalt receiving, storage and transfer facility.

Note: To ensure clarity for the reader, references to appendices refer to Appendix A through G of this document, not those that form part of those individual appendices.

1.1 Proponent Information

Company Description:
Envirosoil Limited (Envirosoil) is based in the Halifax Regional Municipality, Nova Scotia. Envirosoil is a private Canadian company. It is incorporated under the laws of Nova Scotia and registered to do business in Nova Scotia under the Nova Scotia Corporations Registration Act.

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1.2 Principal Contact for Purpose of Environmental Assessment

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1.3 Concordance – Minister's Request for Additional Information and Responses to Key Reviewer Comments

Table 1 provides the key sections of this document where each item from the Minister's specific Request for Additional Information can be found. Comments from government reviewers are also provided in Table 1 and have been grouped according to the respective topics.

Table 1: Concordance with Minister's Request for Additional Information and Comments Received from Government Agency Reviewers

	Information Requested (Per Minister of Environment and Climate Change Letter, dated February 18, 2022, and *Comments Received from Government Agency Reviewers*)		Addendum Section/Appendix	Summary of Additional Information Provided
	Ministers Comment	Related Reviewer Comment		
Facility Operation	Additional information regarding the nature and scope of confirmatory waste and effluent sampling.		2.0 Facility Operations	Pre-acceptance Procedure for waste oil/wastewater with QAQC including: • Confirmation of the source • Nature of the waste • Additional testing requirements (Section 2.2) Specifications for all key treatment and testing equipment. (Section 2.3, Appendix C-1) Proposed commissioning activities. (Section 1.5) Commissioning and operational phase testing. (Section 2.3.3.1) Analytical regime for effluent prior to discharge. (Section 2.3.3.2)
		Additional information on how the Proponent will determine if incoming waste water meets, or does not meet, facility requirements.		In addition to the proposed QA/QC laboratory procedures, there is additional independent third-party support and overview, which is independent of formal laboratory audits. (Section 2.3.3.3)
		Specific list of contaminants approved for receipt in incoming waste water.		Detailed information on the waste oil/wastewater pre-acceptance procedure, and a wastewater classification guide which details the general sources for the types of wastewaters to be accepted by the facility, as well as general wastewater contaminants by industry has been provided. (Section 2.1)
		Specific metals contaminants proposed to be treated at the facility, treatment approach for this waste stream and capabilities.		The types of waste accepted by the Envirosoil's facility will generally be limited to metals, hydrocarbons and organics. Any wastewaters that are designated as Waste Dangerous Goods due to dissolved concentrations of the following contaminants will not be accepted at the facility: PCBs; Dioxins & Furans; Pesticides; Pharmaceuticals; PFOS/PFOA compounds; Explosives; Sewage; and Naturally Occurring Radioactive Materials (NORM). (Section 2.2) A wastewater classification guide is provided which details the specific metals that will be treated by the facility. (Section 2.2)
	Additional information regarding treatment system capabilities for all applicable contaminants and compounds.	*Additional information regarding the proposed treatment train, and supplemental information on physical/chemical separation processes, as well as select manufacturer specifications for applicable equipment.*	2.0 Facility Operations	All wastewater will be processed through a treatment process, formally referred to as the "advanced treatment train". Information provided includes: • final designed process flow (Section 2.3, Figure 2-1) • proposed treatment technologies and procedures (Sections 2.3.1 and 2.3.2) • detailed product specifications (Section 2.3.2, Appendix C-1) • description of known potential sources of wastewater and waste oil accepted by the facility (Table 2, Section 2.2)

	(Per Minister of Environment and Climate Change Letter, dated February 18, 2022, and *Comments Received from Government Agency Reviewers*)		Addendum Section/Appendix	Summary of Additional Information Provided
				contaminants not accepted at the facility. (Section 2.2) For each key technology, the following is provided: • Design capabilities (Section 2.3) • Operating parameters (Section 2.3) • Processes of the treatment equipment (Section 2.3 and Figure 2-1) • Manufacturer specifications (Appendix C-1) • Method selection rationale (Appendix C-2) • Operational considerations (Section 2.3.2)
		quality, quantities and the treatment system technologies.		a maximum daily volume of 100 m^3 will be treated per day, with estimated average daily volumes anticipated to be less. (Section 2.4)
		operation being proposed.		the operational phase of the Project. Following this period, the Proponent may implement continuous mode for select "routine/normal" wastewaters that the facility receives on a "regular" basis from a particular Customer/Owner. These wastewaters would be consistent in contaminant types and concentrations and the facility has proved it can easily treat the wastewaters to the required discharge criteria. Detailed operational parameters for the continuous mode are provided. (Appendix C-3)
		training and qualifications of on-site laboratory personnel.		Envirosoil's site and facility specific training program for operation of the facility was adapted from an industry leading and recognized program developed and led by the University of Sacramento. (Section 2.6) On-site laboratory management and personnel qualifications and training is detailed. (Section 2.6.1)
	commissioning and operation (e.g., pressure testing and maintenance cleaning).		1.5 Facility Commissioning 2.4 Treated Effluent Discharge 3.0 Surface Water Management	this phase, all used water from commissioning will be stored in a dirty water tank and subsequently treated through the system. During maintenance and cleaning activities, a pumper truck will be used to collect and dispose of the waste residuals either offsite at a licensed facility, or sent to the dirty water tank at the facility for treatment, depending on waste characteristics. More details on the five phases of commissioning provided in Section 1.5.5.1. A fully detailed commissioning plan is provided, and in general includes: • Construction checks

	Information Requested (Per Minister of Environment and Climate Change Letter, dated February 18, 2022, and *Comments Received from Government Agency Reviewers*)		Addendum Section/Appendix	Summary of Additional Information Provided
	Ministers Comment	Related Reviewer Comment		
				• Site acceptance testing • SCADA & PLC acceptance testing • Dry testing • Wet testing
		Additional information regarding facility commissioning plan.		The commissioning of the facility's treatment system and process will be conducted in five phases. Each phase will have varying levels of production and testing to ensure that all components of the facility are operating properly and that the facility can process wastewaters while achieving compliance with the final approved discharge criteria. (Section 1.5.5.1)
		Additional information on the daily, routine maintenance program to be undertaken at the facility.		The Preventative Maintenance and Inspection Program includes calibration and servicing of online sensors as well as inspections of tanks and transfer pipelines, and containment areas. The objective of the Program is to ensure equipment and process functionality and that effluent quality is maintained within the required limits. The Program also includes daily visual inspections of the loading/unloading area to be undertaken by the Operator. (Section 4.2.1)
		Confirmation that demulsifying agents that may contain hazardous ingredients will be contained in the recycled fuel.		In select applications, a chemical demulsifier may be added to the waste oil to aid in the demulsification process. The application of heat and/or demulsifier effectively breaks the emulsion and allows the remaining water to separate from the oil. The demulsifying agent is comprised of an acid and a hydrocarbon. The hydrocarbon will partition into the waste oil and any impacts to pH will be mitigated by the downstream pH adjustment system. (Section 2.3.1)
Marine Environment	Assessment of the potential effects of the project on the marine environment considering: • Baseline information, • Identification of impacts, • Mitigation measures • Monitoring programs		4.0 Marine Environment	Envirosoil commissioned a Receiving Water Study, including Underwater Benthic Habitat Survey, to support the evaluation of potential impacts from the project on the marine environment.
		Proposed Effluent Discharge Quality guidelines and criteria.		The Receiving Water Study provided: • Effluent Quality Objectives (EQOs) • Effluent Discharge Objectives (EDOs) for the protection of aquatic life in the receiving water environment (Halifax Harbour). (**Section 4.2.1**)
		Additional information regarding potential project implications on aquaculture sites in Eastern Passage.		A review of aquaculture operations in the area was completed as part of the marine fish and fish habitat impact assessment. The nearest known operation, with a license issued by Nova Scotia Department of Aquaculture and Fisheries (NSDAF), is located approximately 20 km to the east of the proposed project location. Based on the results of the Receiving Water Study, no interaction between the proposed project and existing aquaculture activities is anticipated.(Section 4.1.1.1)
Surface Water		*Additional information on surface water management in the vicinity of the loading/unloading racks and liquid transfer points.*	3.0 Surface Water Management	The loading and unloading area is graded such that stormwater runoff and snowmelt is directed to an isolated catchbasin, and all water will be pumped inside the treatment facility to the dirty water storage tank for processing. (Section 4.2.2) Routine, daily loading/unloading area inspections (visual), as part of the daily maintenance program for the facility will be undertaken. (Section 2.1)
		Clarification on site surface water being discharged to local storm sewer.	3.0 Surface Water Management	Site surface water will not be discharged to the local storm sewer, but will be directed to the existing site stormwater management system (existing French drain and First Defence® FD-6HC stormwater separator). (Appendix D, Table 1)

	Information Requested (Per Minister of Environment and Climate Change Letter, dated February 18, 2022, and *Comments Received from Government Agency Reviewers*)		Addendum Section/Appendix	Summary of Additional Information Provided
	Ministers Comment	Related Reviewer Comment		
		Additional information on storage capacity for the proposed containment area for the six exterior multi-use storage tanks.	3.0 Surface Water Management	The containment system is designed to the requirements of the Nova Scotia Construction, Installation and Operation Standards for Petroleum Storage Tank Systems to 110% of the largest tank or 100% of the largest tank + 10% of the aggregate capacity of all other tanks (whichever is greater). (Appendix D, Table 1)
		Additional rationale for continuing the current regulated surface water monitoring program for the subject property.	3.0 Surface Water Management	Surface water management and conditions have not significantly changed since the current program was initiated in 2020/21. Envirosoil's proposed alterations to the site are not anticipated to significantly alter surface water flows or management at the site. (Appendix D, Section 3.1)
		Additional information regarding suitability of snow management practices at the site.	3.0 Surface Water Management	Information regarding snow management practices, including grading to direct runoff and snowmelt at the site has been detailed. (Appendix D, Section 4.2.2)
		Confirmation of suitability of existing shoreline protection at the site.	Appendix D Surface Water Management Plan	Armour stone was placed along the extent of the property boundary at the harbour above the surveyed ordinary high water mark in 2020. Scour and erosion related to the discharge of stormwater runoff and effluent discharge from the site is not considered a concern. (Appendix D)

1.4 Project Description Updates and Additional Studies Undertaken

As described in the April 2021 EARD, and December 2021 EARD - Additional Information Addendum for this undertaking, Envirosoil is proposing to install and operate a Waste Oil Recycling and Water Treatment Facility at an existing industrial site. In addition to receiving, treating and recycling waste oil, the proposed facility will be used for receipt and treatment of liquid waste waters. In the April 2021 EARD, it was proposed that liquid wastes would be treated to meet the required regulatory criteria and discharged to the local Halifax Regional Municipality sanitary sewer via a new 4" discharge line.

In consideration of the proposed facility's relative location to the Halifax Harbour, and at the request of Halifax Water following consultation and the development of a Wastewater Management Plan for the facility, reviewed by Halifax Water, Envirosoil revised its approach to the discharge of treated wastewater and proposed to discharge to the Halifax Harbour through a new 150 mm (6") discharge line, to be located immediately adjacent the existing and currently operating surface water discharge system (First-Defense® stormwater separator), which employs a 200 mm (8") discharge line (refer to associated photo below). The Halifax Harbour preferred alternative for discharge of treated effluent was outlined in detail in the December 2021 EARD – Additional Information Addendum.

Another significant change from the wastewater process train initially proposed is that there will no longer be two levels of treatment systems, but rather a single wastewater system. All wastewater, regardless of the constituent contaminants, will pass through the full advanced treatment train, as opposed to the Basic train with optional advanced train that was previously presented. Envirosoil has progressed beyond the preliminary design phase since the original EARD was initially registered and the December 2021 Additional Information Addendum was submitted, and has completed the final design of the facility, and specifically the wastewater treatment system and operational components of the facility. These updates are detailed in this Addendum. It is noted that the changes incorporated into the final facility design do not impact the results of the Air Assessment, as presented in the December 2021 EA Addendum document.

Proposed treated effluent discharge location, adjacent existing discharge point from on-site storm water separator (First Defence®) system (photo date: September 2021).

As a result of the proposed change in the location of the treated discharge from the Halifax Water sanitary sewer to the Halifax Harbour through a new 6'' (150 mm) discharge line, and based on comments received from provincial and federal regulatory agencies as part of their reviews of the amended Project Description provided in the December 2021 EARD - Additional Information Addendum, a stand-alone Receiving Water Study and supporting Underwater Benthic Habitat Study (Appendix F) was commissioned by the Proponent in order to address the Surface Water Resources (Marine) Project Valued Environmental Component (VEC). Surface water (marine) is considered from the perspective of water quality. The potential effects to surface water resources, described in this Addendum, were determined and considered using knowledge of the existing infrastructure at the site, the specific proposed project activities, treatment system and testing/monitoring, the receiving water environment for both stormwater and treated effluent discharge, and Dillon's professional judgment. Mitigation measures to ensure the protection of surface water resources are described in considerable detail throughout this document, and specifically within the project Wastewater Management Plan (Appendix E). Potential effects are also assessed in this project Addendum document. It is highlighted that no

installation of infrastructure is being proposed below the ordinary high water mark (OHWM), and impacts to fish and fish habitat are not anticipated from either construction or operations, including from the discharge of treated effluent from the facility.

1.5 Facility Commissioning

Prior to Envirosoil initiating operations, the entire plant will be commissioned to ensure that the facility and all components have been properly installed and are working within design specifications.

The goal of the commissioning is to:

- Identify and resolve design and construction issues that impact facility operations and maintenance;
- Document compliance of the constructed facility with the design intent and update documents to include as-built changes;
- Verify operation of packaged systems, process equipment and instruments;
- Provide for classroom and on-site "hands-off" training of operators;
- Allow operators to become familiar with system packages and process equipment through "hands-on" training; and
- Integrate programmable logic controllers (PLC) of sub-systems with the main PLC and Supervisory Control and Data Acquisition System (SCADA) as well confirm main PLC and SCADA communications with sub-systems in the entire process.

The commissioning will include:

- Construction Checks;
- Site Acceptance Testing;
- SCADA & PLC Acceptance Testing;
- Dry Testing; and
- Wet Testing.

The commissioning testing will be implemented to verify the correct operation of equipment under the following conditions:

- Manual mode operation;
- Automatic mode operation;
- Fault/failure shut down of main elements of the plant including PLC failure; and
- Simulation of power failure with all systems in normal operation, and subsequent restart in auto mode (to demonstrate equipment re-start/availability, alarms and resets required).

1.5.1 Construction Checks

The construction checks will consist of the following (note that the following list is indicative only and not exhaustive):

- Verify construction/civil works is complete as per the approved drawings;
- Installation checks as per approved P&ID drawings;
- Verify electrical is complete as per the approved drawings and that regulatory inspections, permits and approvals have been completed; and
- Verify that all mechanical systems (i.e., HVAC, etc.) is complete as per the approved drawings.

1.5.2 Site Acceptance Testing (SAT)

Once delivered to site and installed, all critical items will be subject to a Site Acceptance Test (SAT). SAT testing will be completed for major items that were supplied and installed by third party manufacturers. This will include the electrocoagulation unit and the multi-disk screw press.

The SAT test will include (note that the following list is indicative only and not exhaustive):

- Manufacturing and installation are complete as per the design drawings and PIDs;
- Drawings and manuals are up to date;
- Electrical and mechanical subsystems are fully functional;
- PLC and SCADA systems are fully functional;
- Alarms, levels sensors, safety controls, etc. are fully functional;
- Operator training is complete; and
- The unit is ready for operation.

1.5.3 SCADA & PLC Acceptance Testing

A supervisory control and data acquisition system is a computer-monitored alarm, response, control, and data acquisition process that is used to monitor and adjust treatment processes and operate treatment facilities. SCADA systems have become essential to operating wastewater treatment facilities, and is designed to help operators monitor and control treatment processes. The SCADA/PLC system will be tested to demonstrate the sequence, functionality and interface of the software with the various treatment components, alarms, sensors, etc. This testing will be completed by performing simulation routines whereby field devices are simulated to operate as commanded and represent various operational conditions.

The aim of the SCADA/PLC software tests will be to verify/prove the following (note that the following list is indicative only and not exhaustive):

- Network communications verification;
- Verify PLC and SCADA communications;
- Start-up sequence/routine;
- Shut-down sequence/routine;

- Simulate fault condition tests;
- Verify interlocks and SCADA logic;
- Verify fault routines;
- Verify alarm functionality and handling;
- SCADA/HMI Interface;
- Verify recovery from power loss;
- Verify initial configuration and calibration of process instrumentation;
- Verify instrument configuration in accordance with the IO list, units, ranges etc.;
- Verify initial configuration of operator set points and alarm values;
- SCADA picture testing and screen navigation;
- Verify equipment operation and remote lockout from LCS; and
- Verify calibrate and test all instruments and analyzers.

1.5.4 Dry Testing

A series of functional tests will be undertaken as part of the commissioning procedure. The first of these tests will be the dry tests whereby a series of initial tests of the equipment shall be completed prior to undertaking "Wet" testing.

Typical tests would include (note that the following list is indicative only and not exhaustive):

- Electrical wiring checks;
- Instrumentation and control checks;
- Rotation, alignment and vibrational checks ;
- Proper valve operation and seating (stroking, limits, position feedback);
- Ensure all safety guards and controls are in place;
- Safety system checks (i.e., E-Stops, overload setting, interlocks);
- Confirmation of correct lubrication systems of all equipment;
- Checks on serviceability and access to equipment; and
- Check that all plant signage and safety signs have been installed.

1.5.5 Wet Testing

Wet testing will be undertaken to verify correct operation of all plant and equipment. Wet testing will include test of components such as tanks, pipes and vessel for leaks. Where possible, air will be used for leak and pressure testing. If water is required, municipal water will be used. Any water used during the commissioning process will be stored in the dirty water storage tank and subsequently treated through the system. In the unlikely scenario that the water cannot be stored and/or treated onsite, it will be sent to an offsite treatment facility.

Typical tests would include (note that the following list is indicative only and not exhaustive):

- Complete pipeline water and/or air test;

- Complete pipework pressure tests;
- Complete structure/tank water tightness tests;
- Operate all pumps under load and check for leaks;
- Operated all mechanical devices under loads;
- Check that all level monitoring and probes are installed at the correct levels;
- Inspect all flow meters, temperatures and pressure indicators and other sensors under varying flow and level conditions. Correct operation of the level control system shall be demonstrated throughout its proposed operating range;
- All alarms and trips shall be tested by operation of the primary initiating device;
- Verification that the plant control system operates correctly and provides the correct information on operator's display equipment; and
- Verification of SCADA alarms and status signals.

Upon completion of the commissioning phase testing, Envirosoil will have the necessary confidence that the plant has demonstrated that all plant and equipment is ready to receive flows and that the plant control systems are ready to be put into service.

1.5.5.1 Treatment System and Process – Commissioning Phase Schedule

The commissioning of the facility's treatment system and process will be conducted in five phases. Each phase will have varying levels of production and testing to ensure that all components of the facility are operating properly and that the facility can process wastewaters while achieving compliance with the discharge criteria.

Phase I

Phase I of the commissioning plan will involve the treatment of a minimum of 500 m^3 of wastewater. This phase will be defined by the following parameters:

1. The system will be operated in batch mode.
2. A batch is defined as being >50 m^3 and <100 m^3.
3. Duplicate samples of each batch of untreated wastewater will be collected.
4. The treatment system will be operated at 50% nominal flow capacity.
5. Duplicate samples of each batch of treated water will be collected using the automatic, online water sampler.
6. 100% of the untreated and treated water samples will be analyzed in-house.
7. 100% of the duplicate untreated and treated water samples will be sent to an accredited third-party commercial laboratory for analysis.
8. Microtox testing of all treated water samples will be performed in the in-house laboratory.
9. All analytical data will be analyzed for compliance to the discharge criteria.

Phase II

Phase II of the commissioning plan will occur after the completion of Phase I and will involve the treatment of a minimum of 500 m^3 of wastewater. Phase II is identical to Phase I with the exception that the plant will operate at 100% of its nominal design flow rate. This phase will be defined by the following parameters:

1. The system will be operated in batch mode.
2. A batch is defined as being >50 m^3 and <100 m^3.
3. Duplicate samples of each batch of untreated wastewater will be collected.
4. The treatment system will be operated at 100% nominal flow capacity.
5. Duplicate samples of each batch of treated water will be collected using the automatic, online water sampler.
6. 100% of the untreated and treated water samples will be analyzed in-house.
7. 100% of the duplicate untreated and treated water samples will be sent to an accredited third-party commercial laboratory for testing.
8. Microtox testing of all treated water samples will be performed in the in-house laboratory.
9. All analytical data will be analyzed for compliance to the discharge criteria.

Phase III

Phase III of the commissioning plan will start at the completion of Phase II. Phase III will involve the treatment of a minimum of 1,000 m^3 of wastewater. This phase will be defined by the following parameters:

1. The system will be operated in batch mode.
2. A batch is defined as being >50 m^3 and <100 m^3.
3. Duplicate samples of each batch of untreated wastewater will be collected.
4. The treatment system will be operated at 100% of its nominal flow capacity.
5. Duplicate samples of each batch of treated water will be collected using the automatic, online water sampler.
6. 100% of the untreated and treated water samples will be analyzed in-house.
7. 50% of the duplicate untreated and treated water samples will be sent to an accredited third-party commercial laboratory for analysis.
8. Microtox testing of all treated water samples will be performed in the in-house laboratory.
9. One sample of treated water will be sent for LC50 testing at an accredited third-party commercial laboratory.
10. All analytical data will be analyzed for compliance to the discharge criteria.

Phase IV

Phase IV of the commissioning plan will start at the completion of Phase III. Phase IV will involve the treatment of a minimum of 1,000 m^3 of wastewater. During Phase III the facility will operate at flow rates between 50% - 150% of its nominal design flow rate. This phase will be defined by the following parameters:

1. The system will be operated in batch mode.
2. A batch is defined as being >50 m^3 and <100 m^3.
3. Duplicate samples of each batch of untreated wastewater will be collected.
4. The treatment system will be operated at 50% - 150% of its nominal flow capacity.
5. Duplicate samples of each batch of treated water will be collected using the automatic, online water sampler.
6. 100% of the untreated and treated water samples will be analyzed in-house.
7. 25% of the duplicate treated water samples will be sent to an accredited third-party commercial laboratory for analysis.
8. Microtox testing of all treated water samples will be performed in the in-house laboratory.
9. All analytical data will be analyzed for compliance to the discharge criteria.

Phase V

Phase V of the commissioning plan will start at the completion of Phase IV. Phase V will involve the treatment of a minimum of 2,000 m^3 of wastewater. This phase will be defined by the following parameters:

1. The system will be operated in batch mode.
2. A batch is defined as being >50 m^3 and <150 m^3.
3. Duplicate samples of each batch of untreated wastewater will be collected.
4. The treatment system will be operated at 50% - 150% of its nominal flow capacity.
5. Duplicate samples of each batch of treated water will be collected using the automatic, online water sampler.
6. 50% of the untreated water samples will be analyzed in-house.
7. 100% of the treated water samples will be analyzed in-house.
8. 10% of the duplicate treated water samples will be sent to an accredited third-party commercial laboratory for analysis.
9. Microtox testing of all treated water samples will be performed in the in-house laboratory.
10. One sample of treated water will be sent for LC50 testing at an accredited third-party commercial laboratory.
11. All analytical data will be analyzed for compliance to the discharge criteria.

Following the five commissioning stages, and after one year of operations, Envirosoil may choose to treat select types of wastewaters in a continuous discharge mode versus batch mode. These wastewaters would represent “routine/normal” wastewaters that the facility receives on a “regular” basis from a particular Customer/Owner. They are consistent in contaminant types and concentrations and the facility has proved it can easily treat the wastewaters to the required discharge criteria. Detailed operational parameters for this mode are provided in Appendix C-3.

The detailed and phased approach to commissioning the treatment system and process has been developed to provide confirmation that the system will operate as designed and that any treated effluent from the facility will meet regulatory agency approved discharge criteria, which will be will protective of aquatic life in the receiving environment and its designated water uses.

2.0 Facility Operation

The following sections provide the additional information requested regarding facility operations, as well as details not previously provided pertaining to how waste oil and wastewater will be accepted, identification of and quality assurance for the sources of materials, treatment methods, and discharge parameters.

2.1 Waste Oil/Wastewater Acceptance

In this section we provide additional information on the quality assurance and quality control (QA/QC) programs, in the form of sampling and analysis that will be undertaken in advance of material acceptance to ensure it can be treated at the facility. The shipper will need to provide a pre-acceptance form (or Waste Profile Sheet; refer to Appendix C-3 for details) outlining the source and nature of the waste, with lab data (if available). The in-house lab will complete separate testing as needed to process the waste through the treatment process to ensure that the system is capable of treating the water while complying with the regulatory agency approved discharge criteria.

No material will be accepted before it passes the pre-acceptance QA/QC. Measures to manage off-spec materials that may inadvertently be accepted at the facility are detailed in this section. Additional information on the sampling and analysis to be conducted for receiving contaminated water or used oil (as defined under Nova Scotia's Used Oil Regulations); including the methods and criteria to be applied are presented.

Wastewater and waste oil will enter the facility by truck via the existing Pleasant Street entrance to Envirosoil's facility. Truck arrivals on site will be by appointment only and deliveries will only be received after completion and acceptance of the Waste Profile Sheet (see Draft in Appendix C-3) by Envirosoil.

In order to ensure that material accepted at the facility can be effectively treated, all materials entering the proposed treatment system will require a pre-delivery product review from the shipper before they are received. In the event that materials are received that do not meet specifications appropriate for treatment and recycling through the facility's process (i.e., off-spec), those materials will be returned to the shipper within 72 hours of receipt. Please refer to Section 3.0 of the Wastewater Management Plan, located in Appendix E, for additional details.

Delivery trucks will connect to the external loading connection on the treatment facility, and product will be pumped into unheated wastewater/waste oil storage tanks. During transfer, trucks will be parked on a containment pad that has an isolated sump, allowing for collection of any potential minor spills/drips. All loading will be metered and volumes will be recorded. All piping will be separate from the existing asphalt operations at the site, and therefore no potential exists for crossover during movement of liquids. A site-specific and detailed Wastewater and Waste Oil Offloading Procedure has

been developed by Envirosoil for the new facility. Refer to Appendix C-3 for step-by-step details regarding this procedure, including components to mitigate risks to human health and the natural environment.

Routine, daily loading/unloading area visual inspections, as part of the daily routine maintenance program for the facility will be undertaken.

The treatment facility will be outfitted with a state of the art laboratory for testing both the incoming wastewater and the final treated effluent. Incoming wastewater will be tested in discrete batches to avoid mixing samples from separate sources. The facility's in-house laboratory will utilize industry standard laboratory instruments, and in-house lab work will conform to the USEPA published documents and Ontario's *Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater* (MOECC, 2016) for its daily testing regime. Please refer to Section 3.4 of the Wastewater Management Plan for further detail.

2.2 Waste Oil/Wastewater Sources

This section provides a description of all known potential sources of wastewater and waste oil that may be accepted at the facility. It is noted, however, that the market for this type of disposal and treatment facility does not currently exist in the Halifax Regional Municipality, and therefore it is not necessarily possible to identify all potential sources of wastewater/waste oil at this time. Importantly, it is highlighted that the target market includes bilge waters, surface water oil spills, and used oil. Other sources may be accepted at the Owner's discretion, provided that the produced effluent meets regulatory requirements.

When classifying the wastewater types that the facility will accept and treat, Envirosoil relied on information provided in the United States Environmental Protection Agency's (USEPA) Centralized Waste Treatment (CWT) Effluent Guidelines and Standards. This document covers facilities that treat or recover metal-bearing, oily, and organic wastewater received from off-site sources. This document was not used in its entirety or verbatim, but as a general guideline for the development of various aspects of the facility operations.

It is important to note that at the current time, the facility is planning to only accept wastewaters that are currently being sent for treatment/disposal in one of Nova Scotia's existing, privately operated, wastewater treatment facilities. Most of the wastewaters to be accepted at the facility are therefore currently being treated within Nova Scotia and are being actively discharged to either the environment, municipal sewer and/or storm sewer.

In the future Envirosoil may accept "new" wastewater (i.e., from new industries/sources) but only after a fully evaluation of the wastewater and/or treatability program has been completed on the "new" wastewaters.

The types of waste accepted by the Envirosoil's facility will generally be limited to metals, hydrocarbons and organics. Any wastewaters that are designated as *Waste Dangerous Goods* due to dissolved concentrations of the following contaminants will not be accepted at the facility:

- PCBs;
- Dioxins & Furans;
- Pesticides;
- Pharmaceuticals;
- PFOS/PFOA compounds;
- Explosives;
- Sewage; and
- Naturally Occurring Radioactive Materials (NORM).

Table 2 below presents a summary of the general sources for the types of wastewaters to be accepted at the facility. Table 3 presents a general summary of the wastewater contaminants generated by various industries. Please note that these tables are not all inclusive and that not all of these industry/waste types are currently present/generated within Nova Scotia.

Table 2: Wastewater Classification Guide

Wastewater Classification	Typical Source
Metals	• Spent electroplating baths and/or sludges • Metal finishing rinse water and sludges • Chromate wastes • Air pollution control blow down waters • Spent anodizing solutions • Waste acids and bases with or without metals • Cleaning, rinsing, and surface preparation solutions from electroplating operations • Vibratory deburring wastewater • Alkaline and acid solutions used to clean metal parts or equipment • Ship fabrication and repair • Metals fabrication waters • Metals coating & finishing • General manufacturing such as wind turbines, rail cars, structural steel, etc. • Electronics manufacturing waters • Mining & exploration • Ore processing • Photography development • Brick & cement manufacturing

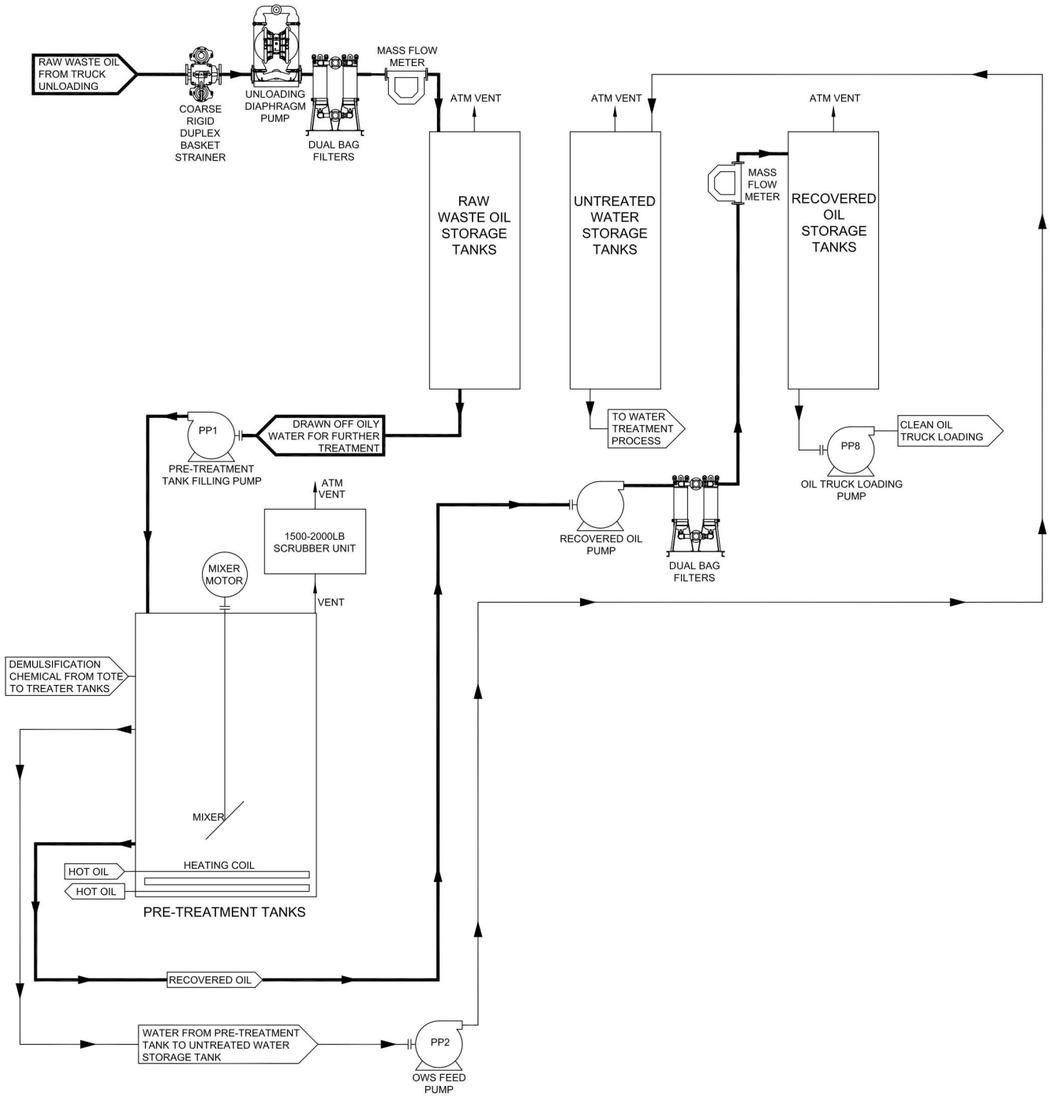
Wastewater Classification	Typical Source
	• Construction, heavy civil, residential, etc.
Hydrocarbons	• Used oils • Oil-water emulsions or mixtures • Lubricants • Coolants • Contaminated groundwater clean-up from petroleum sources • Used petroleum products • Oil spill clean-up • Bilge water • Rinse/wash waters from petroleum sources • Interceptor wastes • Off-specification fuels • Underground storage remediation waste • Tank clean-out from petroleum or oily sources • Non-contact used glycols • Aqueous and oil mixtures from parts cleaning operations • Wastewater from oil bearing paint washes • Oil & gas exploration • Petroleum product refining and manufacturing • Automotive garages
Organics	• Landfill and C&D leachate • Contaminated groundwater clean-up from non-petroleum sources • Solvent-bearing wastes • Off-specification organic products • Still bottoms • By-product waste glycol • Wastewater from paint washes • Wastewater from adhesives and/or epoxies formulation • Wastewater from organic chemical product operations • Tank clean-out from organic, non-petroleum sources • Food, meat and seafood processing • Dairy, soft drink and alcohol manufacturing
Mixed	• Any combination of the above

Table 3: General Wastewater Contaminants by Industry

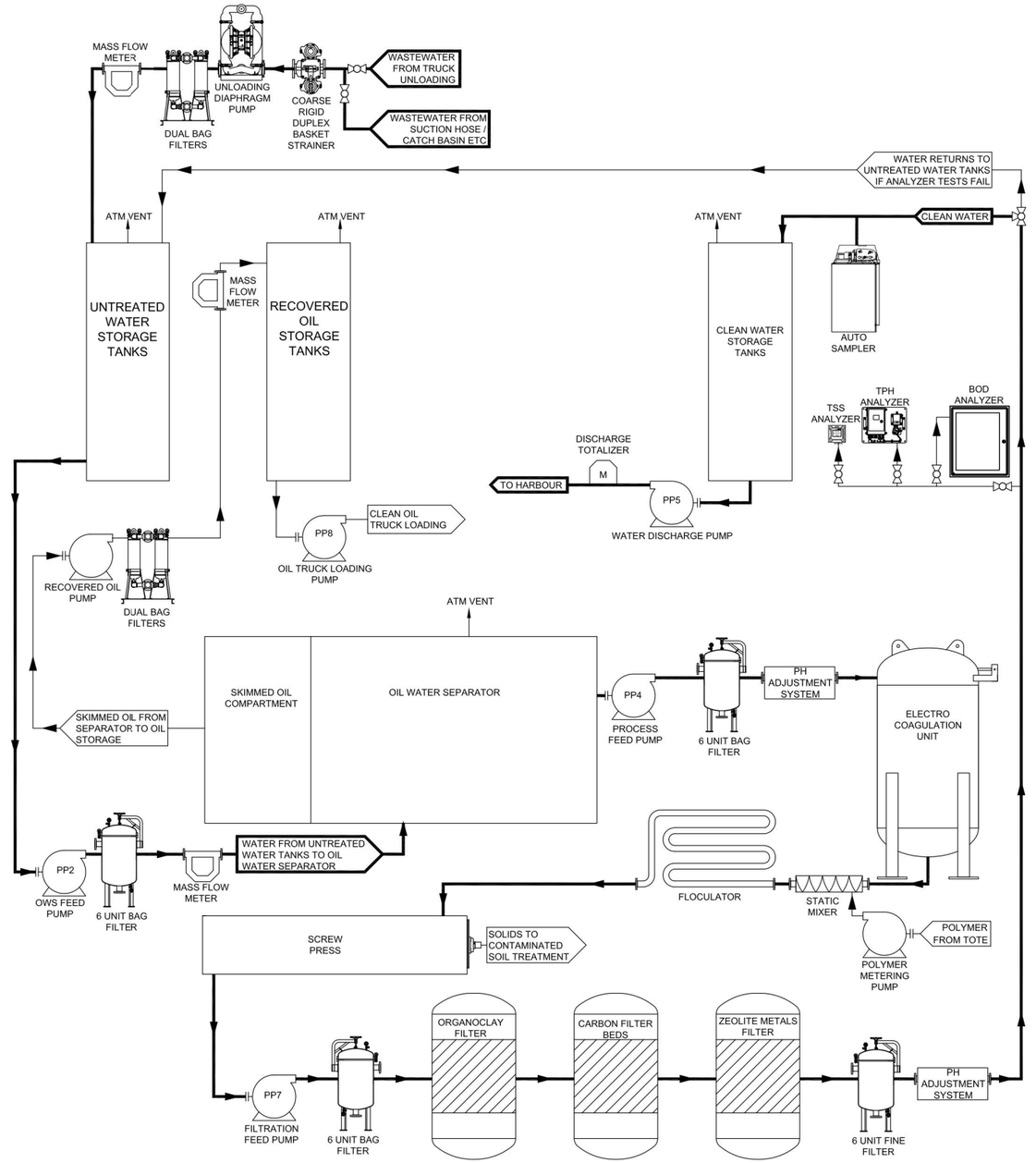
Business/Industry Type	Typical Contaminants
Breweries	solids, organics, pH, BOD/COD
Chemical Manufacturing	pH, metals, solvents
Food Processing	fats, oil and grease, solids, organics, BOD/COD
Groundwater Remediation	hydrocarbons, metals, organics, solids
Landfills, C&D Operations	hydrocarbons, organics, metals, solids, ammonia, BOD/COD
Hospitals	fats, oil and grease, solids, organics, solvents, pH
Industrial Laundries	fats (and mineral) oil and grease, solids, organics
Metal Platers	metals, solvents, pH
Organic Waste Treatment	fats, oil and grease, metals, solids, pH
Ship Repair	mineral oil and grease, solvents, metals, organics, solids
Street Waste, Manhole Cleaning	fuel, metals, mineral oil and grease, organics, solids
Transportation	mineral oil and grease, fuel, solids, de-icing fluid
Wet-Cutting	Hydrocarbons, suspended solids

2.3 Waste Oil/Wastewater Treatment

This section details the design capabilities, operating parameters and processes of the treatment equipment and the contaminants each is intended to remove from its respective media. Refer to Appendix E for a revised Wastewater Management Plan reflecting updates to the planned facility which includes additional tables, plans and a drawing package relating to the waste oil and wastewater treatment process. Refer to the final Process Flow Diagram presented in Figure 2-1 below for process details highlighted throughout this report section.



WASTE OIL TREATMENT PROCESS FLOW DIAGRAM



WASTE WATER TREATMENT PROCESS FLOW DIAGRAM

ISSUE

	FOR	BY	DATE
■	– FOR REVIEW ONLY	TJG	OCT 2022
□	– FOR APPROVAL		
□	– FOR TENDER		
□	– FOR CONSTRUCTION		
□	– FOR AS BUILT		

NOTES:

- INSTALLER TO VERIFY LOCATION OF BUILDING AND PROPERTY LINES BEFORE BEGINNING WORK
- INSTALLER TO CHECK SITE FOR EXISTING SITE SERVICES SUCH AS: WATER AND SEWER LINES, ELECTRICAL LINES, ETC... PRIOR TO ANY EXCAVATION.
- ALL EQUIPMENT TO BE INSTALLED AND TESTED AS PER MANUFACTURES RECOMMENDATIONS
- INSTALLATION WORK TO BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE CODES.
- THIS PETROLEUM STORAGE SYSTEM CONFORMS TO ALL APPLICABLE ULC REQUIREMENTS AND STANDARDS INCLUDING ULC–S601, "SHOP FABRICATED STEEL ABOVEGROUND VERTICAL TANKS FOR PETROLEUM PRODUCTS," AND API 650 "WELDED STEEL TANKS FOR OIL STORAGE", LATEST EDITION.
- THIS DESIGN HAS ADDRESSED THE ISSUE OF POSSIBLE COLLECTION OF FLAMMABLE VAPOUR AND/OR LIQUID IN UNDERGROUND SUMPS.
- ALL WORK TO BE COMPLETED BY A PETROLEUM INSTALLER LICENSED BY THE PROVINCE OF NOVA SCOTIA.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO COMMENCING WORK.
- ALL TANKS TO BE INSTALLED LEVEL

CONCRETE SPEC:

32MPa
5%–8% AIR
400MPa REBAR YIELD STRENGTH
80mm SLUMP

No.	DESCRIPTION	BY	DATE

REVISIONS

Logo: envirosoil ISO 14001 • ISO 9001

Client: ENVIROSOIL

Address: PLEASANT STREET DARTMOUTH, NS

Project: NEW WASTE OIL RECYCLING & WASTE WATER TREATMENT FACILITY

Title: SIMPLIFIED PROCESS FLOW DIAGRAM

GALLAGHER TECHNICAL SERVICES LIMITED
22 DOUGLAS DRIVE
QUISPAMSIS, NB
E2G 1Y3
PHONE: 506 849 4116
FAX: 506 847 1070

Stamp:

DESIGN:
DRAWN:
CHECKED:
DATE: OCT 2022
SCALE: 1/2" = 1'–0"
REV.: A

PROJECT NUMBER: GTS–1645

FIGURE 2–1

When designing its treatment system, Envirosoil's goal was to have a system that was proven, highly efficient, state of the art, have low energy requirements, be highly adaptive and that could treat a wide variety of contaminants at varying concentrations. In keeping with this goal, the following factors formed the basis of the system design:

- Treatment components should be "*non-contaminant specific"* and should be able to treat a variety of contaminants;
- Treatment components should be "*passive*" in nature, have minimal moving parts and be energy efficient;
- Treatment components should have a wide "*turn-down ratio*" to allow for the treatment of fluctuating contaminant concentrations and flowrates;
- Where possible, treatment components should provide redundant treatment capabilities (i.e., a contaminant can be removed/treated by more than one component);
- System components should have a minimum factor of safety of 2 for nominal operations;
- System components should have a minimum factor of safety of 1.5 for peak operations;
- Individual treatment components should have an established history of synergistic effects when working together in a complete system;
- The system should require minimal/no auxiliary chemicals;
- The system should be capable of fully automatic operations;
- The system should have a high degree of intrinsic safety; and
- System should minimize the generation of waste that requires disposal (i.e., recycling/reuse options should be emphasized).

In addition to the above, the main treatment components were to be recognized as a *Best Available Technology (BATs)* for at least one of the anticipated contaminants. The use of BAT components can help industries, decision-makers, and regulators feel confident that Envirosoil's facility utilizes proven, established, technological solutions that can reliably provide highly treated effluent for discharge to the environment.

Table 4 presents a summary of the main treatment components and capabilities for Envirosoil's treatment system.

Table 4: Major Contaminants and Their Respective Treatment Technologies

Contaminant[A]	Treatment Component				
	Pressure Filtration (Bag Filter)[B]	Oil Water Separation[B,C]	Electro-coagulation	Dewatering[B]	Adsorption
Solids (TSS)	X	X	X	X	
Dissolved Solids (TDS)			X		
BTEX		X	X		X
Hydrocarbons	X	X	X		X
BOD/COD/TOC	X	X	X	X	X
Ammonia/Nitrate/Nitrite	X	X	X	X	X
Metals	X		X	X	X
Phenols			X		X
PAHs		X	X	X	X
Phosphates	X		X	X	
Sulfates	X		X	X	
Bacteria, Viruses & Cysts	X		X	X	
Complex Organic Molecules			X		X
Dyes, Color, Turbidity	X		X	X	
TKN			X		X

Notes: A – The list of contaminants is representative only and is not an exhaustive list of contaminants that can be effectively removed/treated by the various components
B – Removed contaminants associated with suspended solids (i.e., non-dissolved)
C – Removes contaminants associated with suspended solids and/or that dissolved into hydrocarbons

2.3.1 Waste Oil Treatment Process

The waste oil recycling system will be able to accept and treat all waste oils as defined by the Nova Scotia Used Oil Regulations. The system can treat, recover and recycle waste oil using a two-stage process:

1. Gravity Separation; and
2. Demulsification.

In the gravity separation treatment process, waste oil is placed in a dedicated storage tank and any free water is allowed to naturally decant via gravity separation. After the gravity separation process, the separated water is drawn off and sent to the wastewater treatment system. The remaining waste oil is then sampled and analyzed for basic sediment and water (BS&W). If the BS&W exceeds 3% then the waste oil contains too much emulsified water to be recycled as fuel. The oil is then sent to the secondary treatment process (demulsification) for further refinement. If the BS&W content is below 3% then the oil is deemed "good quality" and trucked off-site for use at an approved facility for beneficial reuse, following criteria outlined in Nova Scotia's Used Oil Regulations. In the demulsification treatment stage, the waste oil is heated via a closed loop heat exchanger from the on-site boilers and a demulsification chemical is added (if needed) in order to break the oil/water emulsion. Once the emulsion is broken, the free water separates via gravity as a separate phase and is removed and treated via the wastewater treatment process described in this section.

The demulsification process begins by transferring the waste oil into a 'Treater Tank', which consists of a vertical tank with a heating coil at the bottom. Once the Treater Tank is filled with waste oil, heating fluid (from the existing hot oil heaters) is allowed to pass through the coils and the waste oil is heated to 50 – 85˚C (depending on the type of hydrocarbon in the waste oil). Paratherm NF Heat Transfer Fluid will be used. It is a food grade, mineral-oil based heat transfer fluid designed for extended service in closed-loop liquid-phase systems. If needed, a chemical demulsifier is added to the waste oil to aid in the demulsification process.

The application of heat and/or demulsifier effectively breaks the emulsion and allows the remaining water to separate from the oil. The separated water is drawn off and sent to the wastewater treatment system for treatment while the remaining waste oil is then sampled and analyzed for BS&W. If the BS&W exceeds 3% then the treatment process is repeated. If the BS&W is <3% then the waste oil is transferred to an appropriate tank and shipped off-site for beneficial reuse, following criteria outlined in Nova Scotia's Used Oil Regulations.

The demulsifying agent is comprised of an acid and a hydrocarbon. The hydrocarbon will partition into the waste oil and any impacts to pH will be mitigated by the downstream pH adjustment system.

2.3.2 Wastewater Treatment Process

The main EARD submission (April 2021) indicated that approved liquid wastes will be treated at the facility through up to two systems: basic and advanced, the advanced process described as an add-on/ addition to the basic process and used for higher strength contaminants that cannot be treated to acceptable limits with the basic process alone. As noted previously, an important and notable change from the treatment process train initially proposed is that there will no longer be two levels of treatment systems, but rather a single and continuous system – what was previously described as the Advanced system which includes the Basic and Advanced trains, as previously described. All wastewater will be treated through the entire system and therefore treated by all components, rather than selecting

treatment components to be employed based on the analysis of incoming wastewaters. This single system helps ensure that incoming wastewater is treated to levels at or below the applicable and regulatory agency approved criteria.

Wastewater enters the facility from truck unloading, and via piped connection to the untreated water storage tanks. Wastewater can also enter the system as wastewater from the waste oil treatment process.

From the untreated water storage tanks, wastewater is pumped through a staged 6-unit bag filter consisting of decreasing pore sizes to remove solids. The bag filters are staged in series through the treatment train with pore sizes ranging from 50 microns to 1 micron and can be changed to optimize treatment depending on the wastewater characteristics. The solids separated from the process are sampled, tested, and trucked to an approved facilities for further processing, depending on solids sampling results. The used bag filters are sent to an approved facility for disposal. A detailed rationale for the selection of this method, including operating information, as well as details regarding waste generation and maintenance has been developed by Envirosoil for this project. Please refer to Appendix C-2 for detailed information regarding bag filtration.

The wastewater that passes through the multi-staged bag filter is then passed through the oil-water separator (OWS). Oil drains by gravity from the top of the separator and is stored in an oil day tank to be pumped back to the waste oil treatment system. A detailed rationale for the selection of this method, including design and operational details, as well as inspection and maintenance plans has been developed for this project. Please refer to Appendix C-2 for detailed information regarding the oil-water separator.

Wastewater is pumped from the oil-water separator through another 6-unit bag filter to a succession of units which enhances the removal of metals and other contaminants. These units are the pH adjustment unit, electrocoagulation (EC) unit, and flocculator unit.

The pH adjustment unit applies either an acid or alkaline reagent to the wastewater to ensure the pH is within the desired range prior to further treatment in the EC and Flocculation units and the final polishing stage. Mixing time in the unit varies depending upon the composition and complexity of the wastewater, but generally ranges from 10 to 30 minutes.

Electrocoagulation is a non-selective treatment process that can remove a wide range of contaminants including emulsified hydrocarbons, complex organics, BOD/COD, nitrogen, microbiological (i.e., bacteria, virus and cysts), PAHs, VOCs, phenols, pesticides, suspended/dissolved solids, and heavy metals in a single treatment unit.

Flocculation is the process which uses gentle stirring to bring suspended particles together so they will form larger aggregate particles, called flocs. Organic polymers are often utilized at this stage to provide bridging of floc particles, which tends to form even larger floc agglomerates. If required, a standard organic flocculant that is traditionally used in drinking water systems will be used to promote floc growth. In the rare event that a chemical flocculent is required to facilitate floc growth, an automatic flocculant dosing system will automatically add the desired quantity of flocculant.

Wastewater is pumped from the flocculator unit to the final polishing stage (the adsorption train) via a multi-disk screw press to dewater the sludge generated from the EC treatment. A multi-disk screw press is an enclosed high performance sludge dewatering system. It utilizes a central screw auger and a slowly oscillating multi-disc filter to gradually increase pressure on flocculated sludge to produce an exceptionally dry sludge cake. The resulting sludge will be taken to an approved facility for treatment. Preliminary design of the MD screw press indicates that a flocculant will not be required. Please refer to Appendix C-2 for detailed information regarding the EC, flocculator and screw press units

In many industrial wastewater treatment facilities, the entire treatment system is comprised mainly of an oil/water separator and an adsorption train. The integration of an adsorption system into the main component of Envirosoil's treatment process will provide the following benefits:

- Greatly enhance the capabilities and efficiency of the overall treatment system;
- Provide "redundant/backup" components capable of handling all anticipated waste streams;
- Add a significant factor of safety for any upset conditions or unanticipated contaminant concentrations; and
- Provide a continuous "polishing" system for all treated water to ensure that discharge criteria are achieved.

The adsorption treatment section consists of the following components:

- *Organoclay* (OC) for the removal of dissolved hydrocarbons;
- ***Granular activated carbon*** (GAC) for the removal of a wide range of organic contaminants; and
- *Zeolite media* for the removal of heavy metals, ammonia, etc.

Organoclay

When used as a pre-treatment for GAC, organoclay will effectively remove the majority of hydrocarbons, allowing the GAC to remove other soluble organic compounds more efficiently. The use of OC before GAC treatment can increase the life of the GAC media by a factor of 7 to 9 times. In addition, organoclays, which are natural ion exchange resins, will remove ammonia, nitrates, phosphates and small amounts of heavy metals from industrial wastewaters.

Organoclays consist of bentonite that is modified with quaternary amines. Bentonite is a volcanic rock whose main constituent is the clay mineral montmorillonite. This gives the bentonite an ion exchange capacity of 70-90 meq/gram. By exchanging the nitrogen end of a quaternary amine onto the surface of

the clay platelets, the bentonite becomes organically modified and thus organophilic (i.e., attractive to hydrocarbons and organics).

The clay is arranged in a layered structure, platelets stacked on top of each other. When these platelets are placed into water, the amine chains are activated and stand up like dry hair causing pillaring of the platelets, and allowing the end of the amine chains to stand or dangle into the water, reacting with organics that pass by. The chains will then dissolve or partition into large organic compounds, such as hydrocarbons and chlorinated organics. This makes OC media extremely efficient and in granular form it can remove 60% to 70% of its dry weight in hydrocarbons and other large, soluble, chlorinated hydrocarbons with a removal efficiency approaching 99%.

Granular-Activated Carbon

One of the major attributes of activated carbon treatment is its ability to remove a wide variety of toxic organic compounds to non-detectable levels (99.99% removal efficiency). In general, organic contaminants with a higher molecular weight are adsorbed more effectively by GAC. Also, organic contaminants with low water solubility are adsorbed more effectively. Many of the toxic contaminants typically encountered in industrial wastewaters have either a high molecular weight or a low water solubility – and a significant number have both.

As a contaminated water stream passes through a bed of GAC, a dynamic condition develops which establishes a mass transfer zone (MTZ). This “mass transfer zone” is defined as the carbon bed depth required, at a given flow rate, to reduce the contaminant from its initial concentration to the desired treatment criteria concentration.

As the MTZ moves through the GAC, contamination concentrations above the desired treatment criteria begins to show in the effluent. This condition is classified as “breakthrough” and the amount of contaminant adsorbed is considered the breakthrough capacity. If the bed continues to be exposed to the water stream, the MTZ will pass completely through the bed and the effluent contaminant level will equal the influent. At that point, saturation capacity is reached.

Zeolite

Zeolites are hydrated aluminosilicate materials having cage-like structures with internal and external surface areas of >200 m^2/gram and cation exchange capacities (CEC) of up to several meq/kg. At least 41 types of natural zeolites are known to exist, and many others have been manufactured. Both natural and synthetic zeolites are widely used in industry as adsorbents, soil modifiers, ion exchangers, and molecular sieves.

During operations the wastewater will enter the zeolite adsorber from the top and flows down through the media. The treated water is collected in the underdrain system and discharged through the effluent piping to the downstream treatment component.

Water samples are collected at the discharge of the zeolite vessel on a weekly basis to monitor zeolite media usage and breakthrough of contaminants. As the zeolite media becomes exhausted/spent the concentration of contaminants leaving the unit will begin to increase. Once full breakthrough of the contaminant is reached the zeolite unit is taken offline and the media changed out.

Following the adsorption train, water is then passed through another pH adjustment system before sampling by TSS, TPH and BOD analyzers. Water that passes the analyzer tests is auto-sampled by a commercial sampling device before being stored in the clean water storage tank before being released into Halifax Harbour. Detailed product specification documents are presented in Appendix C-1, and refer to Appendix C-2 for detailed information regarding the components of the adsorption train.

Refer to Appendix E for a more detailed description of the wastewater treatment process.

2.3.3 Analytical and Testing Equipment and Process

Additional details regarding the analytical and testing equipment included in the Project Description presented in the original April 2021 EARD for the proposed facility are outlined in this section.

As described in Section 2.3.2, the proposed treatment facility will utilize robust water treatment technologies prior to marine discharge, including:

- Coarse and fine filtration;
- Oil/water separator;
- pH adjustment and electrocoagulation;
- Dewatering screw press; and
- Multi-train mixed media filtration (organoclay, activated carbon and zeolite/media).

These technologies have been designed to remove or greatly reduce the majority of potential petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs; particularly those in colloidal or sediment form) and low solubility metals (particularly those in colloidal or sediment form). As such the final water to be discharged will be high in clarity, low in organic content, low in sediment content and, as a result, will be low in PHCs, PAHs and nutrients with only measurable amounts of soluble metals and salts remaining as the dominant chemical parameters still in solution. The finished water would, therefore, be ideally suited for operational monitoring with Microtox technology and a gas chromatography (GC) 8610C model unit (or equivalent) equipped with multi-detector analysis, as planned for the facility. Refer to Appendix C-1 for detailed information regarding equipment and analyzers.

Microtox testing is particularly sensitive to many parameters, especially to fines and inorganic contaminants. The Microtox sensitivity is non-specific, but highly sensitive meaning that, it is not particular to any contaminants. The presence of contaminants including, but not limited to, individual metals (or suspended particulates composed primarily of metals), individual PAH (or sediments composed of or with PAHs bound to), or particular types of PHC will be effectively screened using

Microtox testing. This method has been selected, as it has advantages compared to simply testing for any one parameter or even specific groups of parameters as it is not expected to miss something that was analyzed in the lab.

The GC multi-detector analyzer will be set up with a Photo Ionization Detector (PID), Flame Ionization Detector (FID), Dry Electrolytic Conductivity Detector (DELCD) and Aromatic Selective Detector (ASD). Additionally, the Hach DR6000 spectrophotometer with UV and visible spectrum capabilities will be employed. These types of analyzers are widely used in local, national and international wastewater treatment facilities, including in Halifax for drinking water and municipal water treatment. Detailed product specification documents are presented in Appendix C-1. These detectors are capable of analyzing metals, general water quality parameters, PHCs, PAHs and VOCs to the parts per million (ppm) and parts per billion (ppb) levels (i.e., ppb for BTEX and PCE/TCE, ppm for PAHs, and tens of ppb for other chlorinated VOCs). The completion of these analyses in house will be used to confirm operational effectiveness of the treatment train for removal of metals, general water quality parameters, PHCs, PAHs and VOCs. This will provide confirmation of acceptability prior to treated effluent discharge as each treatment batch is completed with real time turnaround (also referred to as live on site monitoring; this not instantaneous but rather same day and a quicker turnaround time than multi-day or week long delays typical of off-site laboratory confirmation).

It is noted that during the commissioning phase, including initial start-up and system optimization, the effectiveness of the treatment and testing program will be confirmed. Once confirmed, the operational monitoring would use the Microtox, GC multi-detector analyzer, and Hach DR6000 spectrophotometer for analysis of various parameters and surrogates, as well as online analyzers for BOD/COD, TPH and TSS. Details of the proposed commissioning and standard testing and analytical regime for both the commissioning and operational phases are presented below.

2.3.3.1 Facility Commissioning Phase – Testing and Analytical Regime

During the commissioning phase of the project, which includes initial start-up and system optimization, water quality and effectiveness of monitoring will be confirmed through sampling and analysis at an external accredited laboratory for the parameters being treated. The Canadian Environmental Protection Act, 1999 (CEPA) maintains and actively updates the list of Toxic Substances (Schedule 1), and this list will generally inform the list of substances to be analyzed for during the commissioning phase (see Figure 2-2 below).

Figure 2-2: Substance for Commissioning Phase Confirmation Lab Analysis

Metals			PAHs[1]			
As	Cu	Sn	Naph	Anth	Phen	Cry
Cd	Pb	V	MeNapth	Flu	Pyr	
Cr	Hg	Zn	Ace	Flt	B(a)P	
Co	Ni					
Gen Chem			VOCs			
NH_3	NO_3	Na	PCE	TCE	VC	Glycols
$CBOD_5$	NO^-_2	SO^{-2}_4	Phenol			
Cl	P	TSS				
F	pH	TDS	PHCs			
			BTEX		m. TPH	

[1] Abbreviations: Naph (Naphthalene), Anth (Anthracene), Phen (Phenanthrene), Cry (Chrysene, MeNapth (Methylnaphthalene), Flu (Fluorene), Pyr (Pyrene), Ace (Acenaphthene), Flt (Fluoranthene), B(a)P (Benzo[a]pyrene), PCE (Tetrachloroethylene), TCE (Trichloroethylene), VC (Vinyl Chloride), BTEX (Benzene, Toluene, Ethylbenzene, Xylene, m.TPH (Modified Total Petroleum Hydrocarbons)

2.3.3.2 Facility Operational Phase – Standard Testing and Analytical Regime

From CEPA's Toxic Substances list, and upon completion of the commissioning phase which will confirm operational effectiveness of the treatment system, the following are the substances which are proposed to be analysed during the facility's operational phase. The sub-set of the substances to be analyzed during the operational phase has been selected based on substance characteristics and commonalities, wastewater sources, treatment system design, and project feasibility considerations. This is consistent with industry standard approaches to wastewater analysis during operations. Analysis will be completed either in real time (in-house) or through external accredited laboratory confirmation monitoring (as required) with a commercial auto-sampler device:

- Metals - real time screening via the Hach DR6000 spectrophotometer and Microtox, and autosampler collection for confirmation with accredited laboratory (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, zinc);
- Petroleum Hydrocarbons (PHCs) – online TPH analyzer, real time screening via Microtox, and in-house analysis with GC multi-detector unit for BTEX/TPH (1 ppb to 1 ppm), and autosampler collection for confirmation with accredited laboratory;
- Polycyclic Aromatic Hydrocarbons (PAHs) - real time screening via Microtox, analysis in house with GC multi-detector unit for Naphthalene and Benzo(a)pyrene and autosampler collection for confirmation with accredited laboratory; and
- Volatile Organic Compounds (VOCs) - real time screening via Microtox, and in-house analysis with GC multi-detector unit for Tetrachloroethylene, Trichloroethylene, Vinyl Chloride (1 to 50 ppb), glycols and phenol, and autosampler collection for confirmation with accredited laboratory.

It is expected that operation testing will be primarily completed in-house, with approximately 10% of samples sent to an external accredited laboratory for confirmation and QA/QC purposes.

2.3.3.3 In-House Laboratory QA/QC and Audit Program

Envirosoil will establish its in-house analytical laboratory in accordance with all industry standard guidelines, standards and requirements. The setup and operations of its in-house lab will follow the general guidelines and recommendations outlined in the *British Columbia Environmental Laboratory Manual* (BCELM), as well as other industry documents. The goal of Envirosoil's in-house laboratory is to ensure that it consistently produces accurate, precise, reliable data that is scientifically defendable and traceable. This will ensure that all decisions related to the interpretation of laboratory data can be made with the highest degree of confidence.

To ensure that the in-house laboratory is operating in strict accordance with all relevant procedures, and at the highest level of quality assurance, a series of audits will be performed within the first year of operations. These audits will be conducted by an independent, third-party consultant and the lead auditor will have significant knowledge and experience in the operation and management of commercial environmental analytical laboratories and a detailed understanding of various laboratory accreditation programs such as the *Standards Council of Canada* (SCC) and the *Canadian Association for Laboratory Accreditation (CALA).*

The emphasis of the audits will be on documentation and other evidence demonstrating that the laboratory is following all standard, recommended procedures and is producing accurate and defensible data. Auditors will examine documents to verify that all information and operational aspects of the laboratory are being performed in accordance with recognized standards and procedures. The audit will examine the full range of laboratory operations and include the following:

- Safety procedures;
- Environmental management procedures;
- Personnel training and experience;
- Facility features and equipment;
- Equipment maintenance and calibration procedures;
- Sample handling procedures;
- QA/QC procedures;
- Analytical procedures and testing methods;
- Data management procedures and document control; and
- Reporting procedures.

The QA/QC procedures will include the tracking of internal duplicates, blanks, spikes and standards, as well as external duplicates with comparisons to the same performance standards as the external laboratories (i.e., RPDs, Blank thresholds, and standards performance). Performance will be reviewed to ensure comparable performance (within the analytical performance specs for the methods/instruments) and development of staff with the identification of potential optimization methods and confirmation of

manufacturer performance specifications. The procedures will follow CCME and US EPA guidance on QA/QC.

In the first year of operations, the following audits will be completed:

1. Pre-start-up Audit - Completed prior to initiating operations.
2. Mid-Year Audit - Completed at the 6-month anniversary of starting operations.
3. Year-End Audit - Completed at the 12-month anniversary of starting operations.

Any deficiencies or recommendations for improvements discovered by the audits will be immediately rectified and/or implemented.

After the initial first year of operations, both internal and external audits will be scheduled in accordance with the requirements of Envirosoil's ISO procedures. The laboratory audits will ensure that the laboratory has quality systems in place, follows good laboratory practices, and generates data of high integrity and quality.

It is noted that Envirosoil) has been an ISO 9000 and 14000 registered company since 2006 and all of its operations are conducted under the requirements of its ISO guidelines. As part of its operations at the new Pleasant Street facility, Envirosoil will ensure that its operations continue to meet the requirements of its ISO commitments.

2.4 Treated Effluent Discharge

At the request of Halifax Water, and in consideration of the proposed facility's relative location to the ocean environment, final treated effluent from the proposed Pleasant Street facility is proposed to be directly discharged to the ocean environment, immediately adjacent the existing site discharge (storm water) location, rather than through the municipal sewer. The proposed discharge volume is estimated to be 16,000 to 20,000 m^3 per year, and the plant will run in batch operations depending on the delivery schedule for truck haulers. It is anticipated that a maximum daily volume of 100m^3 will be treated per day, with estimated average daily volumes anticipated to be less. For details regarding sampling and analysis programs, please refer to Section 3.4 of the Wastewater Management Plan (refer to Appendix E). For additional information regarding proposed effluent quality, please refer to Section 3.0 (Table 4-1) in the Wastewater Management Plan.

As described in Section 1.5, clean water will be used for pressure testing and wet commissioning of facility components. During this phase, all used water from commissioning will be stored in a dirty water tank and subsequently treated through the system. For more information, please refer to Section 3.4 and 3.6 of the Wastewater Management Plan (Appendix E). During maintenance and cleaning activities, a pumper truck will be used to collect and dispose of the waste residuals either offsite at a licensed facility, or sent to the dirty water tank at the facility for treatment, depending on waste characteristics.

While there are protocols in place to prevent accidental discharges, the Proponent has developed contingency plans to support additional scenarios. In the event of a system upset resulting in the release of untreated water to the marine environment, the operator will initiate emergency protocols. Depending on the nature of the release, including amount, location, time since discovery and contaminant levels, a floating fence boom and associated equipment stored at the site may be utilized. For more information on emergency protocols, please refer to Section 5.0 of the Wastewater Management Plan, as well as details outlined throughout the updated Emergency Response and Contingency Plan (Draft) included in Appendix G.

Refer to the Wastewater Management Plan and the Receiving Water Study in Appendix E and Appendix F, respectively, for details regarding discharge parameters, including rationale, volume, frequency, sampling and analysis methods and proposed criteria. Management of discharges during maintenance and testing, as well as emergency protocols in the event of an accidental untreated release to the municipal wastewater system or Halifax Harbour is also described.

2.5 Supervisory Control and Data Acquisition System (SCADA)

As identified in Section 1.5.3, Envirosoil's new facility will be equipped with the latest in automation and process controls. A supervisory control and data acquisition system (or SCADA) is a computer-monitored alarm, response, control, and data acquisition process that is used to monitor and adjust treatment processes and operate treatment facilities. SCADA systems have become essential to operating wastewater treatment facilities, and is designed to help operators monitor and control treatment processes.

The planned SCADA system will utilize PLCs networked together with multiple operator interfaces. PLCs are control devices that act as replacements for hardwired relay panels that were used in the early years of process automation.

The SCADA system will allow the plant operators to control Envirosoil's entire Pleasant Street facility from a central computer located in the main control room. The operator can control tank levels, pump sequences, pump speeds, dosing, electrocoagulation operations, dewatering screw press operations, etc., all from the main computer control room.

The SCADA system will provide the operator with an effective visual interface, with animated graphic depictions of the processes combined with individual process values. The display will inform the operator of the status of the process being monitored, including alerting the operator to any problems in the system and providing the means to make any necessary adjustments to the process. Small displays may also be mounted directly on process equipment to allow process changes to be made directly at the equipment location.

Data Logging Functions

In addition to process control, the SCADA system will perform automated monitoring, data logging, alarm, and diagnostic functions that will allow the treatment facility to be run safely and efficiently. As the PLC receives information from the equipment and water treatment processes and subsystems, the data is transferred to the SCADA system.

The SCADA system will electronically archive the data to be able to recall and review it as needed. These files can be used in other applications for further analysis or formatting into reports. Hard copies of status and alarm data can be printed and retained for plant recordkeeping. These records include date, time, and changes made. Changes to the processes can be tracked through an archive of set-point changes, alarms, and equipment adjustments. This historical data assists operators with investigating process upsets and equipment failures, and it provides well-documented data for reporting purposes.

Alarm Functions

SCADA alarm functions are important tools for operators. The alarm functions are integrated into the SCADA system, alerting operators to process upsets by pinpointing the precise area where the upset occurs. Operators can respond quickly and accurately, reducing the chance that a process upset will result in having to retreat any wastewaters.

Process Computer Control Systems

The SCADA system collects, stores, and analyzes information concerning all aspects of operation and maintenance, transmits alarm signals, and allows fingertip control of alarms, equipment, and processes. The SCADA system provides the information that operators need to resolve minor problems before they become major incidents. As the nerve center at the treatment plant, the system allows operators to enhance the efficiency of their facility by keeping them fully informed and fully in control.

The SCADA system will monitor levels, pressures, and flows and operate pumps, valves, and alarms. It will monitor temperatures, speeds, motor currents, online analyzers (i.e., pH, TPH, TSS, BOD/COD) and other operating parameters. The SCADA system will provide a log of historical data for events, analog signal trends, and equipment operating time for maintenance purposes. The information collected may be read by an operator on computer screen readouts or analyzed and plotted by the computer as trend charts.

The SCADA system will provide a picture of the plant's overall status on a computer screen. In addition, detailed pictures of specific portions of the system can be examined by the operator through the computer workstation. The graphical displays on the computer screens can include current operating information, which the operator can use to determine if the system is operating within acceptable ranges or if any adjustments are necessary.

Emergency response procedures can also be programmed into a computer control system. Operator responses can be provided for different operational scenarios that might be encountered as a result of adverse weather changes, fires, earthquakes, or other emergency situations.

Typical SCADA System Functions
SCADA control systems are being continually improved to help operators do a more effective job. Operators can create display screens the show graphics and whatever operating characteristics that are wished to be displayed. The main screen could be a flow diagram from influent to effluent showing the main treatment and auxiliary process areas. Critical operating information could be displayed for the main treatment flow path and process area, with navigation capabilities to easily access detailed screens for each piece of equipment.

Information on the screen would be colour-coded to indicate if a pump is running, ready, unavailable, or failed, or if a valve is open, closed, moving, unavailable, or failed. The system uses a failed signal to inform the operator that something is wrong with the information or the signal it is receiving or is being instructed to display.

The operator can request a computer to display a summary of all alarm conditions in a plant, a particular plant area, or a process system. For example, a blinking alarm signal may indicate that the alarm condition has not yet been acknowledged by the operator. A steady alarm signal, one that is not blinking, indicates that the alarm has been acknowledged but the condition causing it has not yet been fixed. Also, the screen could be set up to automatically designate certain alarm conditions as priority alarms, requiring immediate operator attention.

The SCADA system and associated tools provide the operator with the ability to monitor the treatment plant systems effectively and to catch process upsets, often before they occur.

2.6 Facility Operator Training and Qualifications

Envirosoil's new water treatment facility will involve the treatment of various types of non-municipal wastewater. Since most common wastewater treatment courses and programs are focused primarily with the operations of a municipal water treatment facility or drinking water treatment facilities, they are not directly applicable to Envirosoil's operations. In order to ensure that Envirosoil's operators are fully trained and capable of operating the facility, operators will undergo a series of in-house training, hands-on vendor/supplier training programs and online vendor training courses. Overall management and oversight for the facility, including its operators, will be led by a Nova Scotia licensed Professional Engineer with close to three decades of experience, and specialized in environmental engineering and industrial wastewater treatment systems.

Envirosoil will adopt a program from the University of Sacramento to develop a custom in-house training program specifically designed for its treatment operations. The training program will be based on the

standard *Industrial Waste Treatment* Volumes I and II program offered by the University. This program is designed to train operators in the practical aspects of operating and maintaining industrial wastewater treatment plants, emphasizing safe practices and procedures. The core program will be augmented/supplemented by information that relates to the specifics of the treatment process to be utilized at the Envirosoil facility.

Operators will learn to operate and maintain flow measurement equipment, preliminary treatment processes (filtration, oil/water separation screening, pH adjustment, etc.), physical-chemical treatment processes (coagulation, flocculation, emulsion breaking), pressure filters, physical treatment processes (carbon adsorption, organoclay adsorption, etc.), and processes for the treatment of metals contaminated wastewater streams. Operators will also learn to operate and maintain treatment plant instrumentation, pumps, monitoring equipment and various other systems. Additional program emphasis will be placed on detailed safety procedures and plant maintenance.

For additional information and details regarding Envirosoil's planned operator training program, specific to the proposed Pleasant Street facility, please refer to Appendix C-3.

2.6.1 Laboratory Management

The onsite laboratory will be operated and supervised by experienced laboratory personnel. The onsite Laboratory Manager will have a B.Sc. and over 10 years of experience working in CALA accredited, commercial analytical labs with the last 8 years spent as a Team Lead/Analyst at one of the largest ecotoxicity laboratories in Canada. This ecotoxicity laboratory has focused on providing ecotoxicity testing to government and industries, such as mining, pulp and paper, municipal wastewater, iron and steel, electrical power, chemical manufacturing, food and beverage, and petrochemical sectors.

In addition to laboratory management experience, the Laboratory Manager will have practical hands-on experience with the operation of various types of analytical equipment, such as UV/VIS spectrometry units, GC/FID/PID, GC/MS, toxicity testing, etc.

As support to the operations of the onsite laboratory, vendors of major pieces of analytical equipment will provide detailed training for all major lab components such as the Hach DR6000, GC unit, Microtox unit, etc. This training will be delivered in a variety of settings such as onsite, online and at training facilities in the United States.

General support for the operation of the onsite laboratory will be provided by a local CALA accredited analytical laboratory. This third-party assistance, which is independent of formal laboratory audits, will cover all aspects of analytical laboratory operations. This support will provide an independent third-party overview of the laboratory operations to ensure that it is operating in accordance with all industry best practices.

2.7 Mitigation

Mitigation measures to prevent adverse environmental effects from wastewater and waste oil processing and the resulting effluent discharge include:

- Only accepting products that can be treated at the facility;
- Verifying the source of products prior to acceptance;
- In-house laboratory testing of wastewater;
- QA/QC, and routine external confirmatory laboratory analysis (10% of samples) of wastewater;
- Providing treatment as required depending upon the results of laboratory testing;
- Treating effluent to meet or exceed applicable guidelines for discharge to Halifax Harbour. Proposed Effluent Discharge Objectives presented in the Receiving Water Study, presented in Appendix F; and
- Only discharging effluent with concentrations at or below the proposed discharge criteria.

3.0 Surface Water Management

3.1 Surface Water Management Plan

In response the Minister's letter requesting that additional information be provided regarding potential impacts of the project to the marine environment, and specific comments from regulatory agency reviewers (NSECC) received following the review of the December 2021 Addendum report, the site-specific Surface Water Management Plan (SWMP) for the Project was revised to include additional information. The updated SWMP is presented in full in Appendix D. This report section summarizes key aspects of the Surface Water Management Plan.

In particular, the following information has been incorporated into the updated SWMP for the proposed facility:

- Additional information regarding suitability of snow management practices, including daily inspection and site maintenance procedures at the site to ensure protection of the marine environment;
- Additional information on surface water management in the vicinity of the loading/unloading racks and liquid transfer points;
- Clarification on select site surface water being discharged to the local municipal sewer, specifying that only surface water from the OWS at the proposed containment area for the six exterior multi-use storage tanks will be discharged to the local municipal sewer, as per standard industry practice;
- Additional information on storage capacity for the proposed containment area for the six exterior multi-use storage tanks;
- Additional rationale for continuing the current regulated surface water monitoring program for the subject property, including a summary of results of past surface water quality monitoring at the site; and
- Confirmation of suitability of existing shoreline protection at the site to meet the proposed Project, specifically the new 6" (150 mm) discharge line.

As detailed in the updated SWMP, post-development site runoff is not expected to have an impact on the receiving body (Halifax Harbour) nor cause adverse stormwater effects to adjacent properties. Runoff is contained on-site by an existing earthen perimeter berm and ditching. Site grading and ditching directs runoff from all areas towards the French drain (consisting of a stone-filled infiltration trench and perforated pipe) to promote infiltration and intercept and remove suspended solids (TSS) from runoff. A First-Defense® FD-6HC stormwater separator is installed downstream of the perforated pipe to allow for separation of oils and hydrocarbons, coarse particles, fine particles, and trash and floatables prior to discharge. Consistent with current regulatory requirements for ongoing activities at the project site, the stormwater collected at the project site will be monitored for both quality and quantity.

The reporting required for this project, as outlined in the Surface Water Management Plan, will provide updates to plans and engineered drawings of containment features and environmental controls. This will inform the ongoing monitoring and maintenance of stormwater features and erosion and sedimentation control measures as the site is developed. Through the implementation of mitigation measures, monitoring and best management practices related to surface water management throughout construction and operation, environmental effects associated with site surface water are not significant with a high level of confidence.

4.0 Marine Environment

In response to the Minister of Environment and Climate Change's February 18th letter requesting additional information, this report section discusses the existing marine environment and provides an evaluation of the potential impacts on the receiving marine environment from the Project. This section presents and considers baseline information, and provides identification of impacts, mitigation measures, and monitoring programs. An Underwater Benthic Habitat Study, as well as a Receiving Water Study was commissioned by the Proponent to support the evaluation of potential impacts from the project on the marine environment. These studies are presented in full in Appendix F. Section 3.0 and the Surface Water Management Plan presented in Appendix D is also relevant to the marine environment, given its potential interaction with surface water runoff at the site.

4.1 Existing Marine Environment

This section describes marine invertebrates, habitats, mammal, reptile, and fish species with the potential to occur in the Halifax Harbour, including Species at Risk (SAR). The description of existing conditions is based on the results of existing scientific literature and an Underwater Benthic Habitat Study conducted by Dillon from 2020-2022 in the harbour area immediately adjacent the Site.

4.1.1.1 Marine Fish and Fish Habitat

The existing shoreline within the vicinity of the Project is within an industrial area and is anthropogenic in nature. Similarly, there are no natural intertidal zones in the area and the seabed within the Project site was found to be relatively featureless, consisting of marine silt and coarse-grained soils. Refer to the Underwater Benthic Habitat Study presented in Appendix F.

While hundreds of species of fish have been recorded in the marine waters surrounding Nova Scotia, only 69 have been recorded in the nearshore marine environment (<40 m water depth) (Hardy Associates Ltd. 1984; Stantec 2015). Given the observed benthic conditions within the Study Area, known historic impacts, and the industrial nature of the Halifax Harbour, many nearshore marine fish species are not anticipated to enter or occupy the Halifax Harbour. As such, a shorter list of 45 species was compiled of fish that may inhabit the area of the Project during some time of the year (see Table 3) based on specific habitat, life history requirements, and known commercial fisheries landings (JWEL 1999, Rozee 2000). 8 of the 45 species are either listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or pursuant to the federal *Species at Risk Act* (SARA).

Regarding aquaculture operations in the area, the nearest operation, with a license issued by NSDAF for experimental shellfish aquaculture, is approximately 20 km to the east of the proposed project, located near Three Fathom Harbour. There will be no interaction between the proposed project and existing aquaculture activities.

There are some species listed in Table 5 that are likely to congregate around anthropogenic structures (e.g., dolphins, wharf pilings, etc.) in the vicinity of the Project, such as cunner (*Tautogolabrus adspersus*), rock gunnel (*Pholis gunnellus*), and grubby (*Myoxocephalus aeneus*), among others. Information in Table 5 also includes the federal rankings of each species as to whether they are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or under the federal *Species at Risk Act* (SARA). Other species, such as American plaice (*Hippoglossoides platessoides*) and most species of flounder (*Pleuronectes* spp.), are also possible inhabitants of the Harbour floor in and around the Project. However, the distribution and movement of the vast majority of the species listed in Table 5 varies seasonally in response to a wide variety of changes in their environment such as water temperature, salinity, aquatic plant growth, or seasonal die-back, or as a result of seasonal habitat requirements such as spawning or foraging. Additionally, a number of these species are diadromous and undertake long annual migrations, such as Atlantic salmon (*Salmo salar*) (anadromous), striped bass (*Morone saxatilis*) (anadromous), and American eel (*Anguilla rostrata*) (catadromous). As such, the presence of many of these species within the vicinity of the Project is anticipated to be transient and migratory in nature.

Table 5: Fish Species That May Occur in the Vicinity of the Project and Related Federal Status

Common Name	Scientific Name	COSEWIC Status	SARA Status
American eel[1]	*Anguilla rostrata*	Threatened	-
American shad[1]	*Alosa sapidissima*	-	-
American plaice[1] (Maritime population)	*Hippoglossoides platessoides*	Threatened	-
Atlantic cod [1] (Maritimes population)	*Gadus morhua*	Non-active	-
Atlantic halibut[1]	*Hippoglossus hippoglossus*	-	-
Atlantic herring[1]	*Clupea harengus*	-	-
Atlantic mackerel[1]	*Scomber scombrus*	-	-
Atlantic salmon[1] (Nova Scotia Southern Upland population)	*Salmo salar*	Endangered	-
Atlantic saury[1]	*Scomberesox saurus*	-	-
Atlantic sea raven[1]	*Hemitripterus americanus*	-	-
Atlantic seasnail[1]	*Liparis atlanticus*	-	-
Atlantic tomcod[1]	*Microgadus tomcod*	-	-
Atlantic torpedo[1]	*Torpedo nobliana*	-	-
Atlantic wolffish[1]	*Anarhichas lupus*	Special Concern	Special Concern
Barndoor skate[1]	*Dipturus laevis*	-	-
Blueback herring[1]	*Alosa aestivalis*	-	-
Blue shark[1] (North Atlantic population)	*Prionace glauca*	-	-

Common Name	Scientific Name	COSEWIC Status	SARA Status
Cunner[1]	*Tautogolabrus adspersus*	-	-
Gaspereau[1]	*Alosa pseudoharengus*	-	-
Grubby[1]	*Myoxocephalus aeneus*	-	-
Haddock[1]	*Melanogrammus aeglefinus*	-	-
Long-horned sculpin[1]	*Myoxocephalus octodecemspinous*	-	-
Northern pipefish[1]	*Syngnathus fuscus*	-	-
Northern short-fin squi[1]d	*Illex illecebrosus*	-	-
Northern wolffish[2]	*Anarhichas denticulatus*	Threatened	Threatened
Ocean pout[1]	*Macrozoarces americanus*	-	-
Pollock[1]	*Pollachius virens*	-	-
Porbeagle[1]	*Lamna nasus*	Endangered	-
Radiated shanny[1]	*Ulvaria subbifurcata*	-	-
Rainbow smelt[1]	*Osmerus mordax*	-	-
Red hake[1]	*Urophycis chuss*	-	-
Rock gunnel[1]	*Pholis gunnellus*	-	-
Sea lamprey[1]	*Petromyzon marinus*	-	-
Short-horned sculpin[1]	*Myoxocephalus scorpius*	-	-
Silver hake[1]	*Merluccius bilinearis*	-	-
Smooth flounder[1]	*Pleronectes putnami*	-	-
Spiny Dogfish[1] (Atlantic population)	*Squalus acanthias*	Special Concern	-
Striped bass[1] (Bay of Fundy population)	*Morone saxatilis*	Endangered	-
Striped bass[3] (Southern Gulf of St. Lawrence population)[1]	*Morone saxatilis*	Special Concern	-
Striped seasnail[1]	*Liparis liparis*	-	-
Thorny skate[1]	*Amblyraja radiata*	Special Concern	-
Turbot[1]	*Scophthalmus maximus*	-	-
White hake[1]	*Urophycis tenuis*	Threatened	-
White shark[1] (Atlantic population)	*Carcharodon carcharias*	Endangered	Endangered
Winter flounder[1]	*Pleuronectes americans*	-	-
Witch flounder[1]	*Glyptocephalus cynoglossus*	-	-
Yellowtail flounder[1]	*Pleuronectes ferrugineus*	-	-

Footnotes: Table modified and adapted from Stantec (2012) with input from Hebda and Gilhen (2000), [1]indicates SAR/SOCC record from Stantec (2012) , [2]indicates SAR/SOCC record from AC CDC (2022) [3]SAR/SOCC record from DFO SAR mapping (DFO 2022b)

4.1.1.2 Benthic Habitat

On December 10, 2020, qualitative and quantitative observations were obtained from the area of Halifax Harbour immediately adjacent the site in the area of the proposed treated effluent discharge from the Project. Underwater video survey techniques completed by a diving team were used to map substrate type and to document macrofaunal and macrofloral species presence and abundance. Dominion Diving of Dartmouth, NS, was contracted by Dillon to perform the diving and video services required for the UBHS. A Dillon field personnel was on site to assist and direct the divers throughout the field program and to document the findings and diver observations.

A total of five lead-line transects marked at every five meters (m) were laid on the harbour bottom. The survey was divided into five transects, which ranged in length from 70m to 210m. The transect locations were visually referenced in the field and coordinates were recorded using a handheld Global Positioning System (GPS) to mark the start and end points of each transect. The coordinates are listed below in Table 6.

Table 6: USHS Transect Coordinates, 750 Pleasant Street

Transect	Start (UTM NAD 83 Zone 20)		End (UTM NAD 83 Zone 20)	
	Easting	Northing	Easting	Northing
T-1	-63.52924	44.63441	-63.52693	44.63284
T-2	-63.52863	44.63443	-63.52655	44.63310
T-3	-63.52809	44.63443	-63.52630	44.63331
T-4	-63.52770	44.63434	-63.52843	44.63386
T-5	-63.52799	44.63442	-63.52864	44.63401

A Canadian Standards Association (CSA)-certified diver using SCUBA was equipped with an underwater video camera and swam the length of each transect to record the substrate, macrofloral and macrofaunal communities along these transects. Where possible, the underwater video surveillance covered approximately 1m on either side of the transect line. Seabed characterization included field observations made by the field crew and a review of the video footage by a Dillon biologist. Observations were recorded for every 10m segment along each transect. Specific observations made by Dillon personnel during the UBHS included the following:

- Interpretation of site specific information on the substrate type and marine macrofaunal/faunal species present;
- Detailed descriptions of biological presence (especially fish) and/or habitat that are related to commercial, recreational or indigenous fisheries;
- Examination of the proposed project area for shellfish presence and abundance, including siphon holes; and,
- General characterization and delineation of substrate types (i.e., rippled sand/rock/gravel) and a general characterization (i.e., what percentage of area is sand).

The survey found a benthic substrate consisting primarily of silty-sand. The observed benthic fauna community was modest and was composed of species commonly observed in maritime harbours throughout Nova Scotia. This included motile organisms such as Atlantic rock crabs (*Cancer irroratus*) and hermit crabs (*Paguroidea sp.*) as well as sea stars (*Asterias sp*). Blue mussels (*Mytilus edulis*) were observed in a single transect. No SAR or SOCC species were noted in the surveys. The results of the investigations are presented in the full UBHS in Appendix F.

4.1.1.3 Marine Mammals

Historically, many species of marine mammals have been observed within the Halifax Harbour and its approaches. However, the Halifax Harbour is not often regarded as a body of water frequented by marine mammals. When present, marine mammals are thought to be attracted into the Harbour by the abundance of aquatic prey which can include planktonic crustaceans, mackerel, herring, and even squid, among others (HHTF 1990).

The most commonly observed marine mammal within the Halifax Harbour is the harbour seal (*Phoca vitulina*). They are typically observed in larger numbers during the winter months, along with the occasional grey seal (*Halichoerus grypus*). As many as 30 individuals may occupy the Harbour waters at any given time (Brodie 2000), with numbers declining during the mating season, between May and July, when most seals move to breeding sites along the coast or possibly to Sable Island.

Short-beaked common dolphins (*Delphinus delphis*), Atlantic white-sided dolphins (*Lagenorhynchus acutus*), and harbour porpoise (*Phocoena phocoena*) are relatively uncommon, but are observed more frequently in the summer and fall.

Many species of whale are either listed by COSEWIC or SARA, including four that are regularly observed at the approaches to the harbour and harbour mouth, but not the Inner harbour or Bedford Basin (Brodie 2000). See Table 7 below for a summary of these species and their statuses. The most commonly reported large whale is the fin whale (*Balaenoptera physalus*), which has been reported in numbers of up to 40 off Chebucto Head during winter months (HHTF 1990). Other whales periodically visiting the Outer Harbour include the humpback (*Megaptera novaeangliae*), North-Atlantic right (*Eubalaena glacialis*), sei (*Balaenoptera borealis*), common minke (*Balaenoptera acutorostrata*) and long-finned pilot (*Globicephala melas*) whales (HHTF 1990).

Table 7: Marine Mammal Species That May Occur Near the Project, and Related Federal Status

Common Name	Scientific Name	COSEWIC Status	SARA Status
Harbour seal[1] (Atlantic and Eastern Arctic subspecies)	*Phoca vitulina concolor*	-	-
Grey seal[1]	*Halichoerus grypus*	-	-
Harbour porpoise[1] (Northwest Atlantic population)	*Phocoena*	Special Concern	-
Atlantic white-sided dolphin[1]	*Lagenorhynchus acutus*	-	-
Blue whale[2]	*Balaenoptera musculus*	Endangered	Endangered
Short-beaked common dolphin[1]	*Delphinus delphis*	-	
Fin whale[1] (Atlantic population)*	*Balaenoptera physalus*	Special Concern	Special Concern
Humpback whale[1] (Western North Atlantic population)	*Megaptera novaeangliae*	-	-
North Atlantic right whale[1]	*Eubalaena glacialis*	Endangered	Endangered
Sei whale[1] (Atlantic population)*	*Balaenoptera borealis*	Endangered	-
Common minke whale[1] (North Atlantic subspecies)	*Balaenoptera acutorostrata*	-	-
Long-finned pilot whale[1]	*Globicephala melas*	-	-

Note: [1] denotes SAR/SOCC, species list from Brodie (2000), status rankings from Species at Risk public registry: https://species-registry.canada.ca/

Note:[2] denotes record from DFO SAR mapping (DFO 2022b)

Under the definitions previously presented for SAR and SOCC, the following SAR and SOCC may be found in the vicinity of the Project:

- SAR: fin whale (Atlantic population), North Atlantic right whale, and blue whale; and
- SOCC: harbour porpoise (Northwest Atlantic population) and sei whale (Atlantic population).

4.1.1.4 Fish SAR and SOCC

Fish Species at Risk are those species that are listed as Extirpated, Endangered, Threatened, or Special Concern on Schedule 1 of the Species at Risk Act (SARA). Species of Conservation Concern (SOCC) are those species that are not SAR but are listed in other parts of SARA, or COSEWIC, or are considered regionally rare or endangered by the Atlantic Canada Conservation Data Centre (AC CDC) (i.e., those species with AC CDC S-ranks of extremely rare [S1], rare [S2], or uncommon [S3]).

Under the above definition, the following SAR and SOCC may be found in the vicinity of the Project:

- SAR: Atlantic wolfish, northern wolfish, and white shark; and
- SOCC: American eel, American plaice, Atlantic salmon (Nova Scotia southern upland population), porbeagle, spiny dogfish, striped bass (Bay of Fundy population), striped bass (southern Gulf of St. Lawrence population), thorny skate, and white hake.

Information regarding the life cycle, habitat and foraging preferences for the SAR/SOCC identified above is provided below:

Atlantic Wolffish (*Anarhichas lupus)*
Atlantic wolffish is listed under COSEWIC and SARA as Special Concern. The Atlantic Wolffish is a large bottom-dwelling predatory marine fish which primarily inhabits the cold, deep waters of the continental shelf. It prefers rock or hard clay bottoms and uses areas with sandy or muddy bottoms only occasionally (COSEWIC 2012a).

Northern Wolffish (*Anarhichas denticulatus*)
Northern wolffish is an SAR that is listed as Threatened under COSEWIC and SARA. The Northern wolffish is found offshore in cold (below 5 degrees Celsius), continental shelf waters at depths varying between the surface to 900 m depth, but most often at depths greater than 100 m (COSEWIC 2012b).

White Shark (*Carcharodon carcharias*)
White shark is listed as Endangered by COSEWIC and under SARA. White sharks range widely in coastal and oceanic waters. Juveniles are common in coastal habitat but move off the continental shelf seasonally as adults (COSEWIC 2021).

American Eel (*Anguilla rostrata*)
The American eel is not listed federally, but COSEWIC lists the species as Threatened. This catadromous species spends its adult life in freshwater. In Canada, it is found in all fresh waterbodies, estuaries, and coastal marine waters that are accessible to the Atlantic Ocean. It is considered declining in some areas, while stable in others (COSEWIC 2012c).

American Plaice (*Hippoglossoides platessoides*)
The American plaice is not listed federally, but COSEWIC lists the species as Threatened. The Maritime designatable unit occurs in the Gulf of St. Lawrence, the Scotian shelf, the Bay of Fundy and Georges Bank. Juvenile and adults commonly burrow in the sediment. They prefer depths of 50 to 200 meters and water temperatures ranging from 0 to 1.5°C (DFO 2011).

Atlantic Salmon (*Salmo salar*)
The Nova Scotia Southern Upland Population of Atlantic salmon is listed by COSEWIC as Endangered but are not listed under SARA. This anadromous fish species has greatly declined over the decades. This

species requires rivers or streams that are generally clear, cool and well-oxygenated for reproduction and the first few years of rearing, but undertakes lengthy feeding migrations in the North Atlantic Ocean as older juveniles and adults. (DFO 2013).

Porbeagle (*Lamna nasus*)
The porbeagle is not listed on Schedule 1 of SARA but is classified as Endangered through COSEWIC. The porbeagle shark is a large coastal and oceanic shark that lives in cold to temperate waters. The porbeagle shark can be found from the coast to the open sea. While it is more commonly found on continental shelves, it is also found in ocean basins far from land and, occasionally, closer to shore (COSEWIC 2004a).

Spiny Dogfish (*Squalus acanthias*)
The spiny dogfish is not listed on Schedule 1 of SARA but is classified as Special Concern through COSEWIC. This small shark is widely distributed in temperate regions of the world's oceans and appears to be a habitat generalist. In Canadian waters the species is most abundant in southwest Nova Scotia (COSEWIC 2010).

Striped Bass (*Morone saxatilis*)
The Bay of Fundy and Southern Gulf of St. Lawrence Populations of striped bass are listed under COSEWIC as Endangered and Special Concern, respectively, but are not listed on Schedule 1 of SARA. This anadromous species is typically associated with estuaries and coastal waters. The species requires high quality spawning and nursery habitat in freshwater and abundant aquatic species for food (COSEWIC 2004b).

Thorny Skate (*Amblyraja radiata*)
The thorny skate is not listed on Schedule 1 of SARA but is classified as Special Concern by COSEWIC. This fish lives on the ocean bottom over a wide range of depths (18–1,200 m) and usually in water temperatures of 0–10 °C. They can be found on a variety of bottom types, such as sand, gravel, mud, and broken shells (COSEWIC 2012d).

White Hake (*Urophycis tenuis*)
Atlantic and Northern Gulf of St. Lawrence population of white hake are listed by COSEWIC as Threatened but are not listed under SARA. White hake is a cod-like bottom-dwelling groundfish found on the east coast of Canada. Depth, temperature, and salinity preferences of white hake vary with body size. Larger fish are generally found in deeper waters and juveniles usually occupy shallow areas close to shore or over shallow offshore banks (COSEWIC 2013a).

Due to habitat characteristics and the small size of the Project development area and the high frequency of industrial activities that normally occur in the area, it is unlikely that the fish species listed above would utilize the proposed area in the vicinity of the Project for habitat or feeding purposes during migration or other periods within their lifecycles, as described.

4.1.1.5 Marine Mammal SAR and SOCC

Information regarding the life cycle, habitat and foraging preferences for the marine mammal SAR/SOCC identified in Table 5.

Harbour Porpoise (*Phocoena phocoena*), Northwest Atlantic population
The harbour porpoise is not federally listed under SARA but is considered Special Concern by COSEWIC. Harbour Porpoises are found primarily over continental shelves, and occasionally in deeper waters. The species is well adapted to cold water and is seldom found in water warmer than 16°C. The Harbour Porpoise sometimes frequents bays and harbours, particularly during the summer (COSEWIC 2006).

Fin Whale (*Balaenoptera physalus*), Atlantic population
Fin whales are an SAR that are listed as Special Concern under COSEWIC and SARA. Atlantic fin whales are found associated with a wide variety of bathymetric features, from the continental shelf to deep canyons in the Gulf of St. Lawrence to shallow areas with high topographic relief in the Bay of Fundy where concentrations of euphausiids and herring (*Clupea harengus*) occur (COSEWIC 2019).

North Atlantic Right Whale (*Eubalaena glacialis*)
Right whales are an SAR that are listed as Endangered under COSEWIC and SARA. North Atlantic right whales occupy a wide range of depths and distances from shore—shallow coastal waters, deep coastal waters and offshore waters (COSEWIC 2013b).

Blue Whale (*Balaenoptera musculus*), Atlantic population
Blue whales are listed as Endangered under COSEWIC and SARA. Blue whales range widely, inhabiting both coastal waters and the open ocean. Individuals in the Atlantic region are frequently observed in estuaries and shallow coastal zones where the mixing of waters ensures high productivity of krill (COSEWIC 2012e).

Sei Whale (*Balaenoptera borealis*), Atlantic population
The sei whale is not federally listed under SARA but is considered Endangered by COSEWIC. Sei Whales inhabit pelagic waters in all oceans, most frequently temperate waters, and generally make seasonal migrations from low latitudes in the winter to higher latitudes in the summer (COSEWIC 2003).

Due to the small size of the Project development area, the high frequency of industrial activities that normally occur in the area, and the presence of preferred habitat elsewhere, it is unlikely that the marine mammal species at risk from DFO mapping would utilize the area of the Project.

4.1.1.6 Marine Reptile SAR

The leatherback sea turtle (*Dermochelys coriacea*; Atlantic Population) is not provincially listed but is federally listed (SARA and COSEWIC) as Endangered. DFO's Species at Risk mapping also lists the

leatherback sea turtle as potentially occurring near the Project (DFO 2022b). The leatherback sea turtle are mostly found in coastal, shelf, and offshore waters. They spend the majority of their time within the photic zone (sunlit depths; DFO 2011) when foraging and would be a rare occurrence for the area; therefore, they are not likely to depend on the Project site for their lifecycle purposes.

4.2 Impact Assessment and Effects Evaluation

As described throughout this Addendum document, and detailed in the Surface Water Management Plan (Appendix D) and Wastewater Management Plan (Appendix E), monitoring/analytical testing and process control, including in-line analysis of key parameters and automated controls, will ensure that discharges meet or exceed all relevant permit conditions and legislative requirements for treatment and product discharge.

In the event of an accident, malfunction or unplanned event that could adversely impact the marine environment, Envirosoil will have a robust set of emergency response and contingency plans, as required under a provincial Industrial Approval, and as presented (see Appendix G) in this Addendum document.

It is also noted that the selection of the new discharge location at the site, will not require construction and installation of discharge infrastructure (e.g., new outfall) below the high water mark. No physical works will be required in fish habitat, and therefore there is no risk of a harmful alteration, disturbance or destruction of fish habitat from infrastructure installation activities. Erosion and sediment controls will be installed and monitored for effectiveness during the installation of the discharge line. By meeting the proposed discharge limits for the various contaminants of concern associated with the facility, in all discharge from the facility it is also very unlikely that death to fish or any other marine life would occur as a result of project activities. This is consistent with the originally proposed option considered by Envirosoil and potential effects of discharging to Halifax Water's local sanitary sewer system and ultimately through the Eastern Passage Wastewater Treatment Plant.

A summary of wastewater, effluent and surface water monitoring and management as it relates to the marine environment is provided below.

4.2.1 Wastewater and Effluent Management

As described throughout Section 2.0, various sources of wastewater are expected to be accepted at the facility; however, all material accepted at the facility will require a pre-delivery product review, and must meet other acceptance criteria (Section 2.1). Approved liquid wastes will be treated at the facility through an Advanced Treatment process system. Treated wastewater effluent is proposed to then be discharged directly to the Halifax Harbour from a discharge location near the top of the protected (by armour stone) shoreline. The proposed discharge volume is estimated to be 16,000 to 20,000 m^3 per

year. It is anticipated that a maximum daily volume of 100m^3 will be treated per day, with estimated average daily volumes anticipated to be less.

A Receiving Water Study (Appendix F) has been completed to identify proposed Effluent Quality Objectives (EQOs) and estimate Effluent Discharge Objectives (EDOs) for the protection of aquatic life in the receiving water environment. EQOs are generated from established guidelines, such as the CCME Canadian Water Quality Guidelines (CWQGs), and jurisdiction specific guidelines, such as the Atlantic Risk-Based Corrective Action (RBCA). Where substances of potential concern are shown to have no regulatory guideline (NRG), levels in the receiving water were established through water sampling at the proposed discharge location adjacent the site. These background levels were set as the EQO. Additionally, for parameters in which the background levels exceed established environmental criteria levels, the EQO were set as the background level.

Site-specific EQOs are established by adjusting the generic EQOs based on the site-specific factors (i.e., ambient water quality). EDOs represent the effluent substance concentrations that will protect the receiving environment and its designated water uses. They describe the effluent quality necessary to allow the EQOs to be met at the edge of the mixing zone, in conditions where a mixing zone can be applied. Where effluent parameters have limits established by regulations (e.g., Wastewater Systems Effluent Regulations), the EDOs are set as the more stringent of the regulated value or the calculated value. The EDOs are established with guidelines, ambient water quality and our own detailed understanding of the receiving water in the vicinity of the project to prevent effluent impacts on the marine environment. As the effluent discharge pipe is proposed to discharge near the top of the protected (by armour stone) shoreline of the Halifax Harbour, a conservative assumption was made that flow will discharge from the proposed pipe and will flow down the riprap shore as a channel flow and into the Halifax Harbour. For this analysis, the proposed mixing regime assumes the flow is discharging overland from the shore as a small channel entering the receiving water and the calculated dilution ratio at the edge of the mixing zone was estimated to be 754:1. Based on this assumed dilution ratio at the edge of the mixing zone, EDOs were established for the parameters of concern identified for the facility.

As outlined in the Wastewater Management Plan (Appendix E), the plant will be equipped with a state of the art testing laboratory facility, where incoming wastewater and outgoing discharges of treated water will be representatively tested to ensure that effluent meets the set EDOs to ensure protection of aquatic life.

Trained facility operators will follow the operation and maintenance protocols, which include monitoring, process control and reporting. Additionally, preventative maintenance and daily inspections to ensure equipment functionality and effluent quality is maintained within the required limits. A detailed facility commissioning plan, including dry and wet commissioning is planned for completion prior to the introduction of wastewater to identify and repair any possible leaks. Waste management best practices pertaining to the handling of liquid and solid waste will be carefully followed by

operation's staff. Emergency response measures for accidents, malfunctions and unplanned events are addressed and cover the accidental release of hazardous materials, the accidental release of untreated wastewater, and the accidental release of excessive quantities of wastewater along with mitigation actions.

4.2.2 Surface Water Management

As outlined in the Surface Water Management Plan (Appendix D), post-development site runoff and snowmelt is not expected to have an impact on the marine environment. Runoff is contained on-site, including all loading and unloading areas, by an existing earthen perimeter berm and ditching. Site grading and ditching directs runoff and snowmelt from all areas towards the French drain (consisting of a stone-filled infiltration trench and perforated pipe) to promote infiltration and intercept and remove suspended solids (TSS) from runoff. A First-Defense® FD-6HC stormwater separator is installed downstream of the perforated pipe to allow for separation of oils and hydrocarbons, coarse particles, fine particles, and trash and floatables prior to discharge. The loading and unloading area is graded such that runoff and snowmelt is directed to an isolated catchbasin, and all water will be pumped inside the facility to the dirty water storage tank.

Surface water collected at the project site is to be monitored for both quality and quantity. Operational surface water sampling consisting of metered readings for temperature, pH, turbidity and conductivity and water sampling for Total Suspended Solids (TSS) and Total Petroleum Hydrocarbon/Benzene, Toluene, Ethylene, Xylene (TPH/BTEX) is expected to be undertaken on a monthly basis. If at any time a hydrocarbon sheen is observed, samples will be collected for TPH/BTEX for immediate TPH/BTEX analysis.

4.2.3 Hazardous Materials

An accidental release of fuel or other liquid hazardous materials (e.g., petroleum, oil, lubricants - POL) used in vehicles or equipment on-site may occur during refuelling of machinery or trucks as a result of human error or equipment malfunction during construction activities. During operation of the facility, there is potential for release of chemicals used in operations as well. Such a spill may contaminate soils and groundwater and, through runoff, contaminate surface water resources.

An accidental release of a hazardous material through a spill could affect primarily marine surface water resources (as well as groundwater, soils and air quality) on a temporary and localized basis. However, this is considered highly unlikely since the volume of chemicals onsite for treatment will be very minimal, consisting of potentially up to two totes of demulsifier and two totes of acids/base. These treatment chemicals would be stored indoors in the main treatment building. Untreated wastewater or fuel spills may enter a waterbody potentially affecting water quality and fish and their habitat, with the extent of effects depending upon the quantity released.

Key mitigation to prevent an accidental release of a hazardous material is described in the provincial Environmental Assessment Registration Document - Section 5.8 – Standard Mitigation Measures (refer to: https://novascotia.ca/nse/ea/Waste-Oil-Recycling-and-Water-Treatment-Facility/).

With spill containment provided during operation and maintenance, and careful implementation of best practices, the risk of spills resulting during both construction and operation and maintenance phases of the project is expected to be low. The risk of contamination from spills and leaks during the operation and maintenance phase will be reduced further by preventive measures, contingency planning and spill response and mitigation. Based on the project's design, and with the implementation of mitigation measures, contingency and emergency response procedures, and best practices, the potential residual environmental effects of an accidental release of a hazardous material during all phases of the project are not significant, with a high level of confidence.

4.2.4 Untreated Wastewater and/or Petroleum Hydrocarbons

An accidental release of waste oil, untreated wastewater and/or petroleum hydrocarbons could occur at the transfer locations or within the processing area, and/or during the operation and maintenance phase of the project. An accidental release may be the result of equipment failure, human error, or material failure. A release of untreated wastewater or petroleum hydrocarbons from the transfer area or process area could affect soil or water quality (groundwater or surface water) if not contained.

Key mitigation to prevent an accidental release of untreated wastewater and/or waste petroleum hydrocarbons includes:

- Transfer of waste water and waste oil will only occur on a containment pad;
- Trained operators will control the transfer of material form delivery trucks via pumps;
- Receiving tanks are all located inside a concrete containment area and will be equipped with high-level float that will sound an alarm and automatically terminate pumping if the high-level condition is reached to eliminate the potential for overfill;
- Operation of the facility will include regular inspection of all piping, hoses and tanks for leaks or potential points where a leak could occur, such as fractures and breaks;
- Storage tanks will be inspected, repaired and reconfigured in accordance with API 653 – Tank Inspection, Repair, Alteration and Reconstruction;
- External tanks have a dike capable of holding 100% of the largest tanks capacity + 10% of each additional tank, as per applicable regulations;
- The project area is fully secured by fencing reducing the risk of intentional vandalism to the facility and its components;
- Over 300 m of 18" fence boom (as well as all the necessary support equipment) will be located at the site (consistent with the contingency measure for the existing asphalt storage facility at the same site) and will be immediately available if required in the event of a spill. The pre-planned and expedient deployment of this boom would minimize the effects of any spills to the marine environment; and

- Routine influent and effluent testing for key parameters and indicator surrogates that will aid in quickly identifying a process failure.

Regular inspection of all components in industrial facilities is a standard component of a management system (e.g., SOPs) to prevent costly and potentially damaging leaks. Identifying potential issues early though an inspection plan allows for repairs or replacement of problem sections before a release occurs.

Through the implementation of an inspection plan, the potential residual environmental effects of an accidental release of wastewater and/or petroleum hydrocarbons to the environment during all phases of the project are not significant, with a high level of confidence.

4.2.5 Excessive Quantities of Wastewater

An accidental release of excessive quantities of wastewater to be discharged could occur during the operation or during a rain or heavy precipitation event. The majority of the system will be housed in-doors and any exterior tanks will be located within a lined containment dyke. An accidental release may be the result of equipment failure or human error. A release of excessive wastewater from the wastewater treatment facility could affect the water quality at the discharge location and/or water quality (marine surface water) if not contained.

Key mitigation to prevent an accidental release of excessive quantities of wastewater includes:

- Flow meters, pumps and control systems should be closely monitored and regularly inspected, repaired, and replaced, as required;
- Pump flow rates will be monitored to maintain an acceptable level of wastewater flow throughout the treatment system, and the system has a series of high level alarms and automatic shutdowns, as discussed in Section 2.5; and
- Trained operators will monitor outgoing wastewater volumes, and will have full control to start/stop discharge at any time.

Through the implementation of mitigation measures as well as containment for all processes on site, accidental release of excessive quantities of wastewater to the environment is not expected. Discharge from site is done on an as-required basis based on the incoming water quantities and does not allow for uncontrolled discharge, preventing unforeseen excess discharges.

4.2.6 Summary

No in-water work is proposed as part of this undertaking, and the facility's treatment system and the site's surface water management plan are both designed with all appropriate controls in place to ensure that effluent leaving the site either through the wastewater treatment system or the storm water discharge system meets environmental criteria (Environmental Discharge Objectives) that protects aquatic life in the receiving water environment. The proposed EDOs represent the effluent substance concentrations that will protect the receiving environment and its designated water uses.

There are no situations where there is a high probability of occurrences of long or extended-term residual environmental effects on surface water quality of high magnitude, or high probability of occurrences of an irreversible residual environmental effect of high magnitude. With the implementation of the facility's commissioning and operational plans identified in this Addendum, including mitigation measures (in addition to those outlined and provided in greater detail in Appendix C, D, E, F and G of this Addendum), the residual environmental effects of the project on surface water (marine environment) during all phases of the project are rated not significant, with a high level of confidence.

5.0 Additional Items

5.1 Indigenous Engagement

The Proponent consulted with the Nova Scotia Office of L'nu Affairs to help identify the appropriate Indigenous groups to engage regarding the proposed undertaking (correspondence was included in Appendix I of the April 2021 EARD submission). In early December 2020, project notification letters were sent by email to the following Mi'kmaq communities and organizations:

- Millbrook First Nation;
- Sipeknakatik (Shubenacadie) First Nation; and
- Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO).

The project notification letters described the purpose and need for the undertaking and the proposed facility and operations, including the typical types of materials that will be handled at site. Follow up correspondence by phone and email to representatives of the above noted communities and organizations was carried out over the course of December 2020 and early January 2021. Notification was also provided by email regarding the Registration of this Addendum document.

To date, the above noted First Nations and KMKNO have not responded to the project notification letters, or demonstrated interest in the proposed undertaking. However, the Native Council of Nova Scotia (NCNS) did provide comments during the 30 day public review and comment period for the April 2021 EARD submission regarding the proposed undertaking. Comments provided by NCNS were primarily associated with odour and air emissions, surface water management and containment, and emergency response and contingency planning. The Proponent has responded directly to NCNS's comments on May 28, 2021, indicating that additional component studies would be completed and more information would be compiled and presented in subsequent Addendum submissions as part of the Environmental Assessment process, and these assessments and the additional information provided would specifically address NCNS's expressed interests and concerns. The Proponent did not receive a response from NCNS following the May 2021 communications, and no additional comments were received from NCNS from the public review and comment period for the December 2021 Addendum submission.

Envirosoil has also noted that the nature of the concerns identified in NCNS's comments to date were particularly relevant to the Permit to Construct and Operate (Part V Approval) under the province's Industrial Approval (IA) process including, but not limited to, odour, emergency response, and spill management. These concerns were addressed in detail in the December 2021 EA Addendum submission, and supplemental information is provided in this Addendum to help satisfy NCNS's interests. It is understood that NSECC's provincial Industrial Approval process will also help to further support NCNS's identified areas of interest regarding the proposed undertaking.

5.2 Emergency Response and Contingency Plan (ERCP)

As Envirosoil develops a final Emergency Response and Contingency Plan for the proposed project, anticipated to be submitted as part of a provincial Industrial Approval application requirement, the recommendations provided by regulatory authorities following review of provincial EA documents (i.e., EARD and Addendum documents) will be incorporated, where appropriate, based on final operational plans and conditions including, but not limited to, the following:

- Reviewing additional standards and best practices;
- Clarifying language, roles and responsibilities and reporting requirements, and
- A final review of potential emergency scenarios.

A Draft ERCP, considering regulatory agency feedback received to date regarding the project, and consistent with the 2021 Nova Scotia Contingency Planning Guidelines has been developed by Envirosoil to support the subject environmental assessment. The Draft ERCP is presented in Appendix G.

6.0 References

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COSEWIC 2006. COSEWIC assessment and update status report on the harbour porpoise Phocoena phocoena (Northwest Atlantic population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 32 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

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COSEWIC. 2012b. COSEWIC assessment and status report on the Northern Wolffish Anarhichas denticulatus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 41 pp. Committee on the Status of Endangered Wildlife in Canada

COSEWIC. 2012c. COSEWIC assessment and status report on the American Eel Anguilla rostrata in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 109 pp.

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COSEWIC. 2019. COSEWIC assessment and status report on the Fin Whale Balaenoptera physalus, Atlantic population and Pacific population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 72 pp. (https://www.canada.ca/en/environment-climatechange/services/species-risk-public-registry.html).

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