



# 2023-2024 OSM WORK PLAN APPLICATION

This form will be used to assess the merits of the proposed work plan and its fit with the Oil Sands Monitoring (OSM) Program mandate and strategic priorities. Applicants must complete the form in its entirety. Applicants that fail to use this form and complete all sections in the timeframe will not be considered.

OSM Work Plan Submission Deadline: The deadline for submission of proposed work plans is <b>October 31, 2022 at 4:30 PM Mountain Standard time</b> . Late submissions will not be accepted.	<b>October 31, 2022 4:30 PM MST</b>
<b>Decision Notification</b>	Mid to Late March 2023

## WORK PLAN COMPLETION

Please **Enable Macros** on the form when prompted.

The applicant is required to provide information in sufficient detail to allow the evaluation team to assess the work plan. Please follow the requirements/instructions carefully while at the same time being concise in substantiating the project's merits. The OSM Program is not responsible for the costs incurred by the applicant in the preparation and submission of any proposed work plan.

**Privacy:** The OSM Program is governed by the Freedom of Information and Protection of Privacy Act (FOIP) and may be required to disclose information received under this Application, or other information delivered to the OSM Program in relation to a Project, when an access request is made by anyone in the public. Applicants are encouraged to familiarize themselves with FOIP. All work plans are public documents.

**Technical Requirements:** When working on this form, please maintain Macros compatibility by always saving your draft and your final submission as a **Microsoft Word Macro-Enabled Document**, failure to do so will result in loss of form functionality. This form was created using Microsoft word 2016 on a PC and may not have functionality on other versions of Microsoft on PC or MACS.

**Government Lead/Coordinator:** All work plans under the OSM Program require either a government lead or a government coordinator. This will ensure that the financial tables (for Alberta Environment and Parks & Environment and Climate Change Canada) are completed accurately for work plan consideration. **However**, if an **Indigenous community, environmental nongovernmental organization** or any other **external partner** is completing a work plan proposal, they would **only** complete the **grant or contract budget component** of the **Human Resources & Financials Section** for their project. The government coordinator within Alberta Environment & Parks would be responsible for completing the remaining components of the Human Resources and Financial Section of this Work Plan Application, as they are responsible for contract and grant facilitation of successful submissions. All other sections outside of **Human Resources & Financials Section** of this work plan proposal are to be completed in full by all applicants.

**Supplemental Materials:** The OSM Program recognizes that majority of work planning submissions are a result of joint effort and monitoring expertise. Should the applicant wish to submit supplemental materials in addition to their application additional resources are available in the Work Planning Package accessible here: [2023-24 Work Planning Package \(Ctrl+CLICK\)](#)

Should you have any **questions** about completing this work planning form or uploading your final submission documents, please send all inquiries by email to: [OSM.Info@gov.ab.ca](mailto:OSM.Info@gov.ab.ca).



## WORK PLAN SUBMISSION

Upon completion of this application, please submit the appropriately named work plan (**Microsoft Word Macro-Enabled Document**) and all supporting documents to the link provided below. Failure to follow the naming convention provided may result in oversight of your application.

Please upload (by drag and dropping) the **WORK PLAN SUBMISSION & ALL SUPPORTING DOCUMENTS** here:

[\*\*WORK PLAN SUBMISSION LINK \(CTRL+CLICK HERE\)\*\*](#)

Please use the following file naming convention when submitting your **WORK PLAN**:

**202324\_wkpln\_WorkPlanTitle\_ProjectLeadLastNameFirstName**

**Example:**

202324\_wkpln\_OilSandsResiduesinFishTissue\_SmithJoe

If applicable, please use the following file naming convention when submitting your **supplementary or supporting files**. Please number them according to the guidance and examples provided:

**202324\_sup##\_WorkPlanTitle\_ProjectLeadLastNameFirstName**

**Examples:**

202324\_sup01\_OilSandsResiduesinFishTissue\_SmithJoe

202324\_sup02\_OilSandsResiduesinFishTissue\_SmithJoe

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202324\_sup10\_OilSandsResiduesinFishTissue\_SmithJoe

**Do not resave your work plan or documents under any other naming conventions.** If you need to make revisions and resubmit before the work planning deadline of October 31, 2022, **DO NOT** rename your submission. When resubmitting, simply resubmit with the exact naming convention so that it replaces the original submission. **DO NOT** add any additional components such as versioning or dates to the file naming convention. Please direct any questions regarding the submission or naming of submissions to [OSM.Info@gov.ab.ca](mailto:OSM.Info@gov.ab.ca).



## WORK PLAN APPLICATION

PROJECT INFORMATION	
<b>Project Title:</b>	OSM Surface Water Quality Monitoring
<b>Lead Applicant, Organization, or Community:</b>	Environment and Climate Change Canada
<b>Work Plan Identifier Number:</b> <i>If this is an on-going project please fill the identifier number for 22/23 fiscal by adjusting the last four digits: <b>Example:</b> D-1-2223 would become D-1-2324</i>	W-LTM-S-2-2324
<b>Project Region(s):</b>	Oil Sands Region
<b>Project Start Year:</b> <i>First year funding under the OSM program was received for this project (if applicable)</i>	2018
<b>Project End Year:</b> <i>Last year funding under the OSM program is requested <b>Example:</b> 2024</i>	2024
<b>Total 2023/24 Project Budget:</b> <i>For the 2023/24 fiscal year</i>	\$4,003,803.00
<b>Requested OSM Program Funding:</b> <i>For the 2023/24 fiscal year</i>	\$4,003,803.00
<b>Project Type:</b>	Longterm Monitoring
<b>Project Theme:</b>	Surface Water
<b>Anticipated Total Duration of Projects (Core and Focused Study (3 years))</b>	Year 5
<b>Current Year</b>	<b>Focused Study:</b> Choose an item.
	<b>Core Monitoring:</b> Year 5

CONTACT INFORMATION	
<b>Lead Applicant/ Principal Investigator:</b> <i>Every work plan application requires one lead applicant. This lead is accountable for the entire work plan and all deliverables.</i>	Nancy Glozier
<b>Job Title:</b>	Section Manger, Arctic Athabasca Watershed
<b>Organization:</b>	ECCC
<b>Address:</b>	11 Innovation Blvd. Saskatoon SK, S7N3H5
<b>Phone:</b>	306-260-3298
<b>Email:</b>	Nancy.glozier@ec.gc.ca



## PROJECT SUMMARY

Should your application be successful, The OSM Program reserves the right to publish this work plan application. Please check the box below to acknowledge you have read and understand:

I acknowledge and understand

In the space below please provide a summary (300 words max) of the proposed project that includes a brief overview of the project drivers and objectives, the proposed approach/methodology, project deliverables, and how the project will deliver to the OSM Program objectives. The summary should be written in plain language.

The OSM Surface Water Quality (WQ) Monitoring Program is an adaptive core program that operates on a five-year cycle. The initial water quality monitoring program design (in 2012) incorporated activities led and conducted by an independent contractor (RAMP), the Government of Alberta, and the Government of Canada. In 2015-16 (Year 4 of the initial five-year cycle), data collected during the first 3 years were evaluated and reported on in the Water Data Synthesis Reports. Informed by this effort, the surface water quality monitoring network design was revisited and revised; in 2017-18, the Surface Water Quality Monitoring Program began its second five-year cycle. However, as several years (2020, 2021, and 2022) were not fully sampled due to unforeseen issues according to the planned sampling design, 2023-24 is considered the final year of the 5 year monitoring plan.

By associating indicators of water quality with other variables that are related to Pressures and Stressors, the current program design is able to determine 1) whether changes in WQ are occurring; 2) if there are linkages with oil sands development; 3) and the extent of cumulative effects along the river course, including outfalls.

Key reporting activities in 2023-2024 will focus on:

- Review of monitoring data within the context of OSM adaptive framework, provide a draft framework in the form of a decision tree to guide the program based on results.
- Continue the review and discussion of approaches to establishing critical effect sizes, temporal and spatial variability, as well as key indicators of change in WQ applicable to OSM areas and lead workshop to establish a consensus approach.
- Lead, along with SW TAC members and with linkages to the Adaptive Monitoring team at University of Calgary, the development and implementation of the adaptive monitoring design for a revised water quality core-monitoring program. This will include a review of the key questions and decision tree of the 2018 optimization plan (Cooke et al., 2018)

## 1.0 Merits of the Work Plan

All work plans under the OSM Program must serve the mandate of the program by determining (1) if changes in indicators are occurring in the oil sands region and (2) if the changes are caused by oil sands development activities and (3) the contribution in the context of cumulative effects. In the space below please provide information on the following:

- Describe the key drivers for the project identifying linkages to Adaptive Monitoring framework particularly as it relates to surveillance, confirmation and limits of change (as per OC approved Key Questions).
- Explain the knowledge gap as it relates to the Adaptive Monitoring that is being addressed along with the context and scope of the problem as well as the Source – pathway – Receptor Conceptual Models .
- Describe how the project meets the mandate of the OSM Program or areas of limited knowledge is the work being designed to answer with consideration for the TAC specific Scope of Work Document (attached) and the Key Questions (attached)?
- Discuss results of previous monitoring/studies/development and what has been achieved to date. Please identify potential linkages to relevant sections of the State of Environment Report.

UPDATE JUNE 6 2023:

- ALL LAKE SAMPLING HAS BEEN REMOVED FROM THE SAMPLING PLAN AND MONITORING SCHEDULE
- ALL HIGH FREQUENCY SAMPLING AT 9 TRIBUTARY SITES HAVE BEEN REMOVED FROM THE SAMPLING PLAN AND MONITORING SCHEDULE.
- ALL SAMPLING AT 5 LAKE CLAIRE/ PAD TRIBUTARIES HAVE BEEN REMOVED FROM THE SAMPING PLAN AND MONITORING SCHEDULE.
- ECCC & AEPA BUDGETS HAVE BEEN REDUCED ACCORDINGLY
- CONTRACT BUDGET ADDED AS PER OC DIRECTION THAT \$100,000 OF THE APPROVED BUDGET BE ALLOCATED TO THE SW TAC FOR EXTERNAL TECHNICAL SUPPORT FOR 1) IDENTIFY EXISTING OUTFALLS AND COMPLETE A MAPPING ASSESSMENT OF INDUSTRIAL OUTFALLS AND COMPILER THE VOLUMES AND CONSTITUENTS OF EFFLUENT FOR THE LAST TEN YEARS, AND, 2) DEVELOP A SEDIMENT QUALITY MONITORING PROGRAM

This workplan serves the mandate of the OSM program by addressing the key OSM Program questions (above) with a focus on surface water quality. The geographic scope of this program covers all three oil sands deposits (the Cold Lake Deposit, the Athabasca Deposit, and the Peace River Deposit). Any watersheds with Stressor or Pressures from either in-situ or open-pit (or both) bitumen extraction activities, and all surface water systems (i.e., both rivers and lakes), are similarly in scope for this program. Water quality parameters measured include those known to be enriched in bitumen (e.g., polycyclic aromatic compounds, vanadium, selenium, etc.), parameters known to influence the transport and cycling of key contaminants of concern (e.g., carbon), as well as parameters known to be released to aquatic ecosystems during periods of landscape disturbance or as tracers of altered watershed hydrology (e.g., nutrients, measures of dissolved and suspended solids, major ions, etc.). Water quality is measured and evaluated as concentrations (e.g., mg/L), loads (e.g., kg/year), and yields (e.g., kg/km<sup>2</sup>/year).

The current Surface Water Quality Program revolves around answering a series of eight key questions (Cooke et al. 2018). These key questions are:

1. Is the waterbody a drinking water supply?;
2. Does the McMurray Formation outcrop within the watershed?;
3. Does oil sands development occur within the watershed?;
4. Are areas within the watershed leased or are there plans for future development within the watershed?;
5. Is monitoring within the watershed required to quantify regional mass balance for the Lower Athabasca River?;
6. Is monitoring within the watershed required to meet the information needs of another long-term monitoring component?;
7. Is the monitoring station forward looking (i.e., 5–10 years pre-development)?;
8. Is monitoring required as a reference site or to establish baseline conditions within a watershed?

In many cases, water quality monitoring at a particular station can be used to answer more than one of these questions. For example, monitoring near the mouth of the Muskeg River occurs both downstream of

development and supports regional hydrologic mass balance calculations. Importantly, sampling frequency is also tied to these key questions. For example, understanding the cumulative impacts of multiple mine operators (and distinguishing these from other non-oil sands stressors, e.g., pulp and paper mills, municipal effluent discharge, etc.) requires sampling frequently enough to accurately quantify episodic mass transport in response to high-magnitude events (e.g., during spring freshet). The importance of this approach has been highlighted in publications (Chambers et al. 2018; Kerr et al. 2018).

This work plan is ADAPTIVE in the sense that the key questions and objectives are revisited (and revised) on a five-year cycle. Five years of data are necessary to quantify the range of natural variability; watershed response can change depending upon ambient conditions.

The work plan includes budgeting for the following details from the Surface water Scoping document

- Sampling Locations that are core and integrated are highlighted in the Monitoring Schedule file attached (OSM Program Field Monitoring Schedule\_2023-24 Glozier SWQ\_FINAL). Of the 57 OSM water quality sampling locations established in rivers, 46 are active stations (11 have been suspended through ongoing adaptive monitoring evaluations between 2015-2022), and 36 are integrated with at least one other OMS component (Benthos, Fish, Hydrology). Thus, the current water quality monitoring has been adapted to integrate and establish a core set of reaches within the lower Athabasca River (LAR) and extended geographic area (EGA) where intense, long-term water quality monitoring is used to inform and integrate with other programs. The core sampling in the Athabasca River, its major tributaries and in locations in EGA through to site at the mouth of the Slave River (SL1) will continue to be sampled at the current planned frequency based on the 2018 optimization plan.

- As in previous years, sampling locations for ongoing, one time per year, lake sampling, are listed in the attached monitoring schedule (OSM Program Field Monitoring Schedule\_2023-24 Glozier SWQ\_FINAL).

- No specific sampling for IOC or focused studies are proposed at this stage, although the design of future studies will be considered upon review of results.

- The project team will work with the Water TAC in planning a workshop to review the WQ program in detail in the spring of 2023. This exercise will guide future sampling design including a revised adaptive monitoring flow diagram, establishing critical effect sizes, limits of change, power, sample size, and rotational frequency.

## 2.0 Objectives of the Work Plan

List in point form the Objectives of the 2023/24 work plan below

The objective of this work plan is to collect the data necessary to answer the key OSM questions as they relate to Water Quality Monitoring component of the OSM Surface Water Quality Monitoring Program. With respect to monitoring, these objectives are:

1. Collect water quality samples at the stations listed in the monitoring schedule attached to this work plan;
2. Conduct water quality sampling at a frequency sufficient to generate the data needed to answer the eight key surface water quality questions listed above;
3. Assist the OSM data management team within AEP in properly curating the data and in making the data publically available;
4. Assist in OSM data integration team (or other teams/organizations) in advancement of adaptive monitoring;
5. Support water quality data requirements for other long-term core and/or focused studies;
6. Provide support, technical and scientific expertise as need to the CBM work plan;
7. Continue evaluation and reporting activities.

In addition, 2023-24 objectives also include

- Review of monitoring data within the context of OSM adaptive framework, provide a draft framework in the form of a decision tree to guide the program based on results.

- Conduct a review of approaches to establishing critical effect sizes, temporal and spatial variability, as well as key indicators of change in WQ applicable to OSM areas and lead workshop to establish a consensus approach.

- Lead, along with SW TAC members and with linkages to the Adaptive Monitoring team at University of Calgary the development and implementation of the adaptive monitoring design for a



revised water quality core-monitoring program. This will include a review of the key questions and decision tree of the 2018 optimization plan (Cooke et al., 2018)

### 3.0 Scope

#### Evaluation of Scope Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would:

- be in scope of the OSM Program (e.g., regional boundaries, specific to oil sands development, within boundaries of the Oil Sands Environmental Monitoring Program Regulation)
- consider the TAC-specific Scope of Work document and the key questions
- integrate western science with Indigenous Community-Based Monitoring)
- address the Adaptive Monitoring particularly as it relates to surveillance, confirmation and limits of change as per approved Key Questions.
- have an experimental design that addresses the Pressure/Stressor, Pathway/Exposure, Response continuum
- produce data/knowledge aligned with OSM Program requirements and is working with Service Alberta
- uses Standard Operating Procedures/ Best Management Practices/ Standard Methods including for Indigenous Community-Based Monitoring

### 3.1 Sub Theme

Please select from the dropdown menu below the theme(s) your monitoring work plan relates to:

Surface Water

### 3.2 Core Monitoring or Focused study

Please select from the dropdown menu below if the monitoring in the work plan is "core monitoring" and/or a "focused study". Core monitoring are long term monitoring programs that have been in operation for at least 3 years, have been previously designated by the OSM program as core, and will continue to operate into the future. Focused studies are short term projects 1-2 years that address a specific emerging issue. For the purposes of 2023/24 work planning all Community Based Monitoring Projects are Focused Studies.

Core Monitoring



### 3.3 Sub Theme Key Questions

Please select from the dropdown menus below the sub-theme(s) your monitoring work plan relates to and address the Key Questions:

#### 3.3.1 Surface Water Theme

##### 3.3.1.1. Sub Themes:

Quality
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##### 3.4.1.2 Surface Water Key Questions

Explain how your surface water monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

The program has established base line as follows:

a. Both the Mainstem Athabasca River and Tributary Water Quality OSM program have:

- The program has established a Baseline for reference and accumulated state in exposure areas - 52 sites, 5 > 30-50 years, OSM sites added in 2012 (8-9 years); 10 LAR/PR/SR; 6 CR; 29 LAR Tributaries; 7 PAD. Baseline data from sites in the PAD are being reviewed and baseline conditions being summarized for reporting before end of March 2023. The Surface Water TAC will be consulted during the drafting of this reporting.
- The water quality program has demonstrated statistically significant differences among reference and exposure areas, and long-term trend assessments. Recent trend analysis with data up to and including 2020 for all mainstem sites (M3-M12) is currently being completed for final review and reporting before end of March 2023. The Surface Water TAC will be consulted during the drafting of this reporting.

b. Thresholds or limits of change?  
Limits of Change have been assessed with specific water quality guidelines. Development of site specific guidelines specific to OSM were recommended. Percentile changes in water quality trends have been determined and will be presented for discussion.

ALL LAKE SAMPLING HAS BEEN SUSPENDED - Lakes

a. Coordinated efforts to identify changes across lakes in the OSM region have been limited. Accordingly, identifying any observed changes in them is difficult. The work proposed for the next year will identify and quantify baseline and variability and the development of an updated, integrated monitoring program design for lakes. This will be done through a process of collaborative, cross-TAC discussions and workshops focusing on identifying current monitoring and research efforts, to help inform an updated monitoring program in future years. Defining of baseline PAH values and hydrocarbon fractions may be doable utilizing historical lake sediment samples. Some work on this is currently being conducted under the ASL program.

b. Atmospheric contaminant release and subsequent deposition can transport acidifying compounds (Makar et al. 2018). Some impacts relating to acid deposition, and corresponding neutralization from fugitive dust have been connected with OS development. However additional work by other groups in the region have found conflicting results, further emphasizing the need for a coordinated monitoring effort.

c. Lake sampling efforts in the region have occurred over multiple decades, with the most comprehensive monitoring being undertaken under the Acid Sensitive Lake (ASL) program conducted in the AOSR and others (Cold Lake and Peace Oil Sands regions). The ASL program monitored a suite of 50 lakes with a focus on understanding the relationship between oil sands emissions and corresponding acidification of lacustrine systems along a spatial gradient. In addition to water quality sampling, various lake sediments have been used to reconstruct historical contaminant loadings. Additional routine

monitoring and community-based monitoring has also occurred in the region, but the data has not been fully analyzed and is not centralized in a single database.

2. Are changes occurring in water quality, biological health (e.g., benthos, fish) and/or water quantity/flows relative to baseline? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models and what is the contribution in the context of cumulative effects?)

Spatial and temporal changes in surface water quality as a result of oil sands activities have been reported in the surface mineable area. Evidence includes the episodic acidification of river water (Alexander et al. 2017) as well as changes in both river (Kelly et al. 2009; Kelly et al. 2010; Schwalb et al. 2014; Alexander and Chambers 2016; Wasiuta et al. 2020) and lake (Kurek et al. 2013; Cooke et al. 2017) water chemistry. The spatial and temporal extent of reported change depends upon the parameter; not all water quality parameters have been evaluated. Some changes have been reported that may be a result of cumulative effects of multiple stressors along the Athabasca River (Glozier et al., 2018).

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

No

4. Are changes in water quality and/or water quantity and/or biological health informing Indigenous key questions and concerns?

The current list of key questions that guide surface water quality monitoring are informed by previous discussions with communities. However, it is anticipated that communities may have new questions that are currently out of scope for the program. Moreover, communities not previously engaged in OSM (or its predecessor, JOSM) may not yet have had an opportunity to provide input into the specific key questions that currently guide surface water quality monitoring activities. Therefore, this year, as we begin preparing for the next five-year cycle of water quality monitoring, we will make a concerted effort to engage communities in defining the specific key question for surface water quality monitoring. This will be accomplished in collaboration with the Community Based Monitoring Workplan.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Data are produced following OSM Program requirements and are posted publically after QA/QC checks have been completed. Data are available on the Canada-Alberta Oil Sands data portal (<https://www.canada.ca/en/environment-climate-change/services/oil-sands-monitoring.html>) and the AEP OSM Data Portal (<https://aws.kisters.net/OSM/applications/public.html?publicuser=Guest>). Data posted to the OSM Data Portal are available in near real time. Requests for un-validated data are also routinely distributed.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Yes. Information on Standard Operating Procedures and Best Management Practices are available at the following link <http://environmentalmonitoring.alberta.ca/resources/standards-and-protocols/>

7. How does the monitoring identify integration amongst projects, themes or with communities?

Sampling Locations that are CORE and INTEGRATED are highlighted in the Monitoring Schedule. Of the 52 sampling locations in rivers 46 are active stations for 2022-23, and 36 are integrated with at least one other OMS component (Benthos, Fish, Hydrology). Details are in the file attached to the work plan. The water quality core monitoring program in this work plan is integrated with the fish and benthos core programs, as described in Cooke et al., 2018 with Question 6 - Is monitoring within the watershed required to meet the information needs of another long-term monitoring component? Thus the current water quality monitoring has been adapted to integrate and establish a core set of reaches within the lower Athabasca River (LAR) and extended geographic area (EGA) where intense, long-term water



quality monitoring could be used to inform and integrate with other programs. It also integrates with the air program as snow deposition of contaminants potentially impacts water quality. There is also an effort for the Enhanced Monitoring Program to link up with core water quality mainstem monitoring (M3/M7) in terms of endpoints and linking up sample collection weeks/SPMD exposures. Sites M3 and M7 were selected as part of the Enhanced study design.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Surface water quality monitoring is explicitly listed on the theme area conceptual model. It also provides information on stressors (e.g., PACs, heavy metals, nutrients, etc.) as well as hydrologic transport. Monitoring data are used to quantify the contribution of relevant pressures on stressor water concentrations, loads and yields, and as key environmental drivers of biotic receptors (e.g., benthic macroinvertebrates and fish). All of these conceptual model components also appear on the OSM Programmatic model. This work will continue to provide necessary data for linking stressors to responses and determine the relative impact of various pressures on surface water quality.

9. How will this work advance understanding transition towards adaptive monitoring?

The OSM Surface Water Quality (WQ) Monitoring Program is an adaptive core program that operates on a five-year cycle. The initial water quality monitoring program design (in 2012) incorporated activities led and conducted by an independent contractor (RAMP), the Government of Alberta, and the Government of Canada. In 2015-16 (Year 4 of the initial five-year cycle), data collected during the first 3 years were evaluated and reported on in the Water Data Synthesis Reports. Informed by this effort, the surface water quality monitoring network design was revisited and revised; in 2017-18, the Surface Water Quality Monitoring Program began its second five-year cycle. However, as several years (2020, 2021, and 2022) were not fully sampled according to the planned sampling design, 2023-24 is considered the final year of the 5 year monitoring plan. The project team of this work plan will lead, along with SW TAC members and with linkages to the Adaptive Monitoring team at University of Calgary the development and implementation of the adaptive monitoring design for a revised water quality core-monitoring program. This will include a review of the key questions and decision tree of the 2018 optimization plan (Cooke et al., 2018)

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



**3.3.2 Groundwater Theme**

**3.3.2.1 Sub Themes:**

Choose an item.

**3.3.2.2 Groundwater Key Questions**

Explain how your groundwater monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in groundwater quality and/or quantity relative to baseline? If yes, is there evidence that the observed change is attributable to oil sands development? (*Describe source-pathway-receptor and/or conceptual models*) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in groundwater quality and/or quantity informing Indigenous key questions and concerns Indigenous concerns and health?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



**3.3.3 Wetlands Theme**

**3.3.3.1 Sub Themes:**

Choose an item.

**3.3.3.2 Wetlands - Key Questions**

Explain how your wetlands monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in wetlands due to contaminants and hydrological processes? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in wetlands informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



**3.3.4 Air Theme**

**3.3.4.1 Sub Themes:**

Choose an item.

**3.3.4.2 Air & Deposition - Key Questions**

Explain how your air & deposition monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in air quality? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies

Click or tap here to enter text.

4. Are changes in air quality informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



**3.3.5 Terrestrial Biology Theme**

**3.3.5.1 Sub Themes:**

Choose an item.

**3.3.5.2 Terrestrial Biology - Key Questions**

Explain how your terrestrial biological monitoring program addresses the key questions below.

1. Has baseline been established? Have thresholds or limits of change been identified?

Click or tap here to enter text.

2. Are changes occurring in terrestrial ecosystems due to contaminants and landscape alteration? If yes, is there evidence that the observed change is attributable to oil sands development? (Describe source-pathway-receptor and/or conceptual models) and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

3. Are there unanticipated results in the data? If yes, is there need for investigation of cause studies?

Click or tap here to enter text.

4. Are changes in terrestrial ecosystems informing Indigenous key questions and concerns?

Click or tap here to enter text.

5. Are data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

6. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

7. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

8. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

9. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

10. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



**3.3.6 Cross-Cutting Across Theme Areas**

**3.3.6.1 Sub Themes:**

Choose an item.

If "Other" was selected from the drop down list above please describe below:

Click or tap here to enter text.

**3.3.6.2 Cross-Cutting - Key Questions**

Explain how your cross-cutting monitoring program addresses the key questions below.

1. Is data produced following OSM Program requirements and provided into the OSM Program data management system?

Click or tap here to enter text.

2. Do methodologies use relevant Standard Operating Procedures/ Best Management Practices/ Standard Methods?

Click or tap here to enter text.

3. How does the monitoring identify integration amongst projects, themes or with communities?

Click or tap here to enter text.

4. With consideration for adaptive monitoring, where does the proposed monitoring fit on the conceptual model for the theme area relative to the conceptual model for the OSM Program?

Click or tap here to enter text.

5. How will this work advance understanding transition towards adaptive monitoring?

Click or tap here to enter text.

6. Is the work plan contributing to Programmatic State of Environment Reporting? If yes, please identify potential linkages to relevant sections of the State of Environment Report.

Click or tap here to enter text.



## 4.0 Mitigation

### Evaluation of Mitigation Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially inform:

- efficacy of an existing regulation or policy
- an EPEA approval condition
- a regional framework (i.e., LARP)
- an emerging issue

Explain how your monitoring program informs management, policy and regulatory compliance. As relevant consider adaptive monitoring and the approved Key Questions in your response.

#### Efficacy of an existing regulation or policy

The Surface Water Quality Program generates the information required by AEP to fulfill the 2015 Bilateral Agreement between Alberta and NWT. Specifically, the site on the Slave River at Fort Fitzgerald (M11A) is used for assessment related to Transboundary Objectives, while 10 other sites are identified in the agreement as key for long term regional and basin level monitoring to inform transboundary conditions. An additional 33 locations are listed as sites of interest.

#### An EPEA approval condition

The Surface Water Quality Program:

- generates the information required to assess the potential acidification of surface waters due to the emission and deposition of acidifying agents;
- contains a description of each of the monitoring sites that is sufficient to be used by the Alberta Energy Regulator to deem compliance with individual EPEA approval conditions;
- contains a description of quality assurance and quality control program that is sufficient to be used by the Alberta Energy Regulator to deem compliance with individual EPEA approval conditions;
- contains a list of water quality parameters measured by the program that is sufficient to be used by the Alberta Energy Regulator to deem compliance with individual EPEA approval conditions;
- generates the monitoring data necessary to assess the status and trends of the measured water quality parameters;
- generates the water quality data required to conduct chemical mass balance for individual watersheds impacted by oil sands extraction and processing activities (note this activity is also dependent upon the Water Quantity Monitoring Program) that is sufficient to be used by the Alberta Energy Regulator to deem compliance with individual EPEA approval conditions.

#### A regional Framework (i.e., LARP 2012)

Data collected as part of the surface water quality monitoring program is used as part of AEP's reporting requirements and management response under LARP. Specifically, this program will generate the data needed to:

- monitor at surface water quality stations M3 and M7 stations to support future expansion of an amended Surface Water Quality Management Framework (SWQualMF); and
- monitor PAHs in the water column at surface water quality stations M3, M7 and M9 to support future expansion of amended SWQualMF.

Other sites linked to LARP that are monitored as part of this work plan include: M0, M2, M9A as well as several sites on the Muskeg River.

## 5.0 Indigenous Issues

### Evaluation of Indigenous Issues Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would potentially:

- Investigate Indigenous communities key questions and concerns
- Includes culturally relevant receptor(s) and indicator(s)
- Include or be driven by Indigenous communities (participatory or collaborative)
- Develop capacity in Indigenous communities
- Include a Council Resolution or Letter of Support from one or more Indigenous communities
- Describe how ethics protocols and best practices regarding involvement of Indigenous peoples will be adhered to
- Provide information on how Indigenous Knowledge will be collected, interpreted, validated, and used in a way that meets community Indigenous Knowledge protocols

Explain how your monitoring activities are inclusive and respond to Indigenous key questions and concerns and inform the ability to understand impacts on concerns and inform Section 35 Rights

This work plan monitors a wide range of contaminants (e.g., PACs, trace metals) that are of concern to communities. There are potential impacts of contaminants on wildlife health (e.g., fish) and human health through consumption of country foods. Surface water quality monitoring data are also used to assess ecological changes to wetlands and to understand the interaction between surface and ground water resources, which are relevant to communities. Participatory community involvement is being discussed and will be facilitated through the Athabasca University Facilitation Centre.

Project team members will participate in an All TAC meeting with ICBMAC and the Athabasca University Facilitation Centre, and support a consistent approach and implementation of engagement and/or integration of Indigenous community based monitoring, where appropriate.

Does this project include an Integrated Community Based Monitoring Component?

No

**If YES, please complete the [ICBM Work Plan Forms](#) and submit using the link below**

***Please note that completion of the ICBM template is mandatory if yes is indicated above and must be submitted along with each work plan that includes an integrated CBM component***

**[ICBM WORK PLAN SUBMISSION LINK \(CTRL+CLICK HERE\)](#)**



**5.1 Alignment with Interim Ethical Guidelines for ICBM in the OSM Program**

1. Are there any community specific protocols that will be followed?

NA

2. Does the work plan involve methods for Indigenous participants to share information or knowledge (e.g. interview, focus group, survey/structured interview), or any other Indigenous participation? If yes, describe how risks and harms will be assessed, and the consent process that will be used.

NA

3. Do the activities include any other collecting/sharing, interpreting, or applying Indigenous knowledge? Please describe how these activities will be conducted in alignment with the Interim Ethical Guidelines, and any community-based protocols and/or guidelines that may also apply.

NA

4. Indicate how Indigenous communities / Indigenous knowledge holders will be involved to ensure appropriate analysis, interpretation and application of data and knowledge.

NA

5. How are Indigenous communities involved in identifying or confirming the appropriateness of approach, methods, and/or indicators?

NA

6. How does this work plan directly benefit your community? How does it support capacity building in your community?

NA

7. How is the information from this work plan going to be reported back to your community in a way that is accessible, transparent and easy to understand?

NA

## 6.0 Measuring Change

### **Evaluation of Measuring Change Criteria (Information Box Only- No action required)**

Your workplan will be evaluated against the criteria below. A successful workplan would potentially:

- assess changes in environmental conditions compared to baseline (e.g., validation of EIA predictions)
- report uncertainty in estimates and monitoring is of sufficient power to detect change due to oil sands development on reasonable temporal or spatial scales
- include indicators along the spectrum of response (e.g., individual, population, community)
- focus on areas of highest risk (where change is detected, where change is greater than expected, where development is expected to expand (collection of baseline))
- measure change along a stressor gradient or a stressor/reference comparison

Explain how your monitoring identifies environmental changes and how can be assessed against a baseline condition. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

This workplan will generate the surface water quality data necessary to assess environmental condition relative to baseline. These data will include the concentrations of a suite of chemical parameters in key surface water quality systems impacted by both open-pit and in-situ bitumen extraction and processing activities. The TAC will formalize definitions for "baseline" and "limits of change" to assess the extent to which change has occurred. Temporal changes have been assessed for a broad suite of parameters within both the Athabasca River (e.g., Glozier et al. 2018) and tributaries to the Athabasca River (e.g., Chambers et al. 2018; Alexander and Chambers 2016). Spatial patterns have also been assessed and compared with snowpack chemistry in rivers (e.g., Wasiuta et al. 2019) and with modeled emissions and deposition patterns in lakes (Emmertson et al. 2018).

## 7.0 Accounting for Scale

### **Evaluation of Accounting for Scale Criteria (Information Box Only- No action required)**

Your workplan will be evaluated against the criteria below. A successful workplan would potentially be:

- appropriate to the key question and indicator of interest
- relevant to sub-regional and regional questions
- relevant to organism, population and/or community levels of biological organization
- where modelled results are validated with monitored data
- where monitoring informs on environmental processes that occur at a regional scale. e.g. Characterizing individual sources to gain a regional estimate of acid deposition and understand signal from individual contributing sources.

Explain how your monitoring tracks regional and sub-regional state of the environment, including cumulative effects. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

This work plan collects the data necessary to inform evaluation and reporting activities focused on answering the key questions. The program design spans multiple spatial scales, from small watersheds like the Muskeg River watershed, up to collecting the information to understand mass balance loading to the Peace-Athabasca River and the Slave River Delta. The data collected have (and will continue to be) used by modelling efforts to predict watershed response to future development (e.g., Eum et al. 2016), and data collected by this program are relied upon by other components of aquatic ecosystem health (i.e., benthic macroinvertebrates and fish) to assess environmental condition.

## 8.0 Transparency

### **Evaluation of Transparency Criteria (Information Box Only- No action required)**

Your workplan will be evaluated against the criteria below. A successful workplan would potentially include:

- a plan for dissemination of monitoring data, including appropriate timing, format, and aligns with OSM program data management plan
- demonstrated transparency in past performance
- identified an annual progress report as a deliverable
- reporting of monitoring results occurs at timing and format that is appropriate for recipient audience.

Explain how your monitoring generates data and reporting that is accessible, credible and useful. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

Monitoring data are made publically available via the AEP OSM Data Portal: (<https://aws.kisters.net/OSM/applications/public.html?publicuser=Guest>) and via the Environment and Climate Change Canada Oil Sands Data Portal (<https://www.canada.ca/en/environment-climate-change/services/oil-sands-monitoring.html>).

Several Key Engagement presentations are listed in the deliverables to openly communicate the results of the program and approaches to adapting the program. Including presentations on the results of the long term trend assessments, establishing baseline in the EGA area, results of the SPMD dissolved PACs assessments, compilation of and presentation of water quality data and daily/ monthly loads, to contribute to the adaptive monitoring exercise.

## 9.0 Efficiency

### Evaluation of Efficiency Criteria (Information Box Only- No action required)

Your workplan will be evaluated against the criteria below. A successful workplan would include:

- appropriately addressed a risk-informed allocation of resources
- identified the role and justification for each staff member on the proposed work plan
- identified in-kind and leveraged resources (e.g., resources and approaches are appropriately shared with other OSM projects where possible)
- established partnerships (value-added) and demonstrated examples of coordinated efficiencies (e.g., field, analytical)
- identified co-location of monitoring effort
- demonstrated monitoring activities and information collected are not duplicative
- considered sampling/measurement/methods compatibility to other data sources (e.g., AER)

Explain how your monitoring is integrated with other OSM projects and incorporates community-based participation and/or engagement in proposed monitoring activities. As relevant, consider adaptive monitoring, the TAC specific Scope of Work document and the Key Questions in your response.

The allocation of resources in this work plan is focused on surface water quality monitoring where information is required to answer one of the driving questions for the program. Specifically, the majority of staff resources are allocated to field work, including sample submission to the appropriate analytical laboratory and assisting the OSM data management team in the curation and provision of these data. Most surface water quality stations are sampled monthly; however, answering some of the questions requires more frequent sample collection. For example, determining if open-pit mining changes the concentrations, loads, and yields of key water quality parameters within rivers requires sampling frequently enough to quantify parameter transport during high-magnitude, low-frequency events (e.g., during freshet and after large rainfall events) (Chambers et al. 2018; Kerr et al. 2018).

Specific roles are provided in Section 15. There are coordinated efficiencies between AEP and ECCC, such as joint sampling trips and coordinating sampling shipping and laboratory analyses. Most of the surface water quality sampling sites are co-located with sites that are also key monitoring sites for other components of aquatic ecosystem health (e.g., benthic macroinvertebrates and fish). Based on previous workshops and reports there is little-to-no duplicative surface water quality monitoring.

## 10.0 Work Plan Approach/Methods

### 10.1 List the Key Project Phases and Provide Bullets for Each Major Task under Each Project Phase \*

1. Data Collection
  - 1.1. Preparation for field work (ordering supplies, procuring helicopter support, etc)
  - 1.2. Collection of samples and field measurements and observations recorded
  - 1.3. Shipping and submission to designated laboratory
2. Laboratory analysis
  - 2.1. Acknowledgement of sample arrival from labs
  - 2.2. Analysis of sample for requested parameters
  - 2.3. Laboratory specific quality assurance and quality control
  - 2.4. Delivery of results as both electronic data file and laboratory report (PDF)
3. Data management
  - 3.1. Field and lab data received and uploaded to database
  - 3.2. Review of results including matching with sample metadata and verification and validation of data
  - 3.3. Preparation of data release files in machine readable format (e.g., CSV)
  - 3.4. Review and approval for data release
  - 3.5.5 Public data release

### 10.2 Describe how changes in environmental Condition will be assessed \*

Changes will be assessed to measured parameters on an ongoing basis. Anomalous changes or unusual trends will be flagged and subject to further investigation. Ongoing data evaluation and reporting products preparation will be achieved through data analysis by ECCC and AEP scientists and through discussion with the SW TAC and the Adaptive Monitoring team at the University of Calgary

### 10.3 Are There Benchmarks Being Used to Assess Changes in Environmental Condition? If So, Please Describe, If Not, State "NONE" \*

Yes, there are both federal Government of Canada (CCME) and provincial Government of Alberta surface water quality guidelines. In addition, triggers and limits have been formally established for 38 indicators under the Surface Water Quality Management Framework for the Lower Athabasca Regional Plan

(e.g., objectives, tiers, triggers, limits, reference conditions, thresholds, etc.)

### 10.4 Provide a Brief Description of the Western Science or Community-Based Monitoring Indigenous Community-Based Monitoring Methods by Project Phase \*

Sampling methodologies will follow the ECCC and AEP field Standard Operating Procedures (SOPs), as appropriate. Field SOPs include guidelines for obtaining and recording field measurements and observations. Field SOPs are available online. Laboratory methods will be provided by contracted labs and reviewed by AEP and ECCC staff to ensure they are appropriate for the parameters measured.

### 10.5 List the Key Indicators Measured, If Not Applicable, State N/A \*





Major ions (e.g., calcium) nutrients (e.g., phosphorus) physical parameters (e.g., total suspended solids), total and dissolved metals (e.g., lead), total and dissolved mercury and methylmercury, total and dissolved polycyclic aromatic hydrocarbons (e.g., phenanthrene), water isotopes, carbon, and naphthenic acids (key sites to be determined and dependent upon the availability of suitable reference material).

## 11.0 Knowledge Translation

*In the space below, please provide the following:*

- *Describe the plan for knowledge transfer and distribution of learnings from the project. This could include workshops, publications, best practice documentation, marketing plan, etc.*
- *Demonstrate that the knowledge transfer plan is appropriate for the intended end-users.*

Over the past several years, standard operating procedures have been developed to sample water quality and the collection of supporting variables as appropriate such as water and sediment chemistry. These documents can be used by other monitoring groups to ensure consistency in sampling regimes and data used to assess change in water quality in the Oil Sands Areas of Alberta. We have published integration documents from the first 3 years of JOSM that include chapters on water quality Chambers et al., 2018; Glozier et al., 2018). A number of peer reviewed scientific documents have been published as well including a recent manuscript on the synthesis of results (Culp et. al., 2020).

## 12.0 External Partners

List by project or project phase each component that will be delivered by an external party (including analytical laboratories) and name the party. Describe and name the associate work plan/grant/contract for these services. \* state none if not required

Partners for core monitoring components include:

A number of contracts will be established with external analytical laboratories according to AEP and ECCC procurement processes. This process is ongoing.  
Contracts with helicopter providers will be established according to AEP and ECCC procurement processes.

\*To ensure complete work plan proposal submission, all grants and contracts listed in this section should also be captured in Grants & Contracts.

## 13.0 Data Sharing and Data Management

For 2022-23 the following approach will be taken by the OSM Program related to data sharing.

For all work plans of a **western science** nature funded under the OSM Program, data sharing is a condition of funding and must align with the principle of "**Open by Default**". In this case, all data is to be shared with the OSM Program as directed by the OSM Program Data Management work plan.

For all work plans involving **Indigenous Knowledge** as defined below and funded under the OSM Program, data sharing is a condition of funding and the Indigenous Knowledge components of the work plan must align with the principle of "**Protected by Default**". In this case, all data as defined as Indigenous Knowledge, are to be retained by the Indigenous community to which the Indigenous Knowledge is held.

*Indigenous Knowledge is defined as:*

"The knowledge held by First Nations, Inuit and Métis peoples, the Aboriginal peoples of Canada. Traditional knowledge is specific to place, usually transmitted orally, and rooted in the experience of multiple generations. It is determined by an Aboriginal community's land, environment, region, culture and language. Traditional knowledge is usually described by Aboriginal peoples as holistic, involving body, mind, feelings and spirit. Knowledge may be expressed in symbols, arts, ceremonial and everyday practices, narratives and, especially, in relationships. The word tradition is not necessarily synonymous with old. Traditional knowledge is held collectively by all members of a community, although some members may have particular responsibility for its transmission. It includes preserved knowledge created by, and received from, past generations and innovations and new knowledge transmitted to subsequent generations. In international or scholarly discourse, the terms traditional knowledge and Indigenous knowledge are sometimes used interchangeably."

*This definition was taken from the Canadian Government's Tri-council Policy Statement for Ethical Research involving Humans (Chapter 9, pg. 113) and is an interim definition specific to the Oil Sands Monitoring Program.*

**Data Sharing and Data Management** *Continued*

13.1 Has there, or will there be, a Data Sharing agreement established through this Project? \*

YES

13.2 Type of Quantitative Data Variables:

Both

13.3 Frequency of Collection:

Other

13.4 Estimated Data Collection Start Date:

2023-04-04

13.5 Estimated Data Collection End Date:

2024-03-31

13.6 Estimated Timeline For Upload Start Date:

2024-06-03

13.7 Estimated Timeline For Upload End Date:

2021-12-31

13.8 Will the data Include traditional knowledge as defined by and provided by an Indigenous representative, Community or Organization?

NO

**TABLE 13.9 Please describe below the Location of Data and Data Type:**

*Add a Data Source by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table*

Name of Dataset	Location of Dataset (E.g.: Path, Website, Database, etc.)	Data File Formats (E.g.: csv, txt, API, accdb, xls, etc.)	Security Classification
AEP Water quality Data	AEP Data portal	Various including CSV	Open by Default
ECCC Water Quality Data	ECCC data portal	Various including CSV	Open by Default

## 14.0 2023/24 Deliverables

Add an additional deliverable by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table.

Type of Deliverable	Delivery Date	Description
OSM Program Annual Progress Report (required)	Q4	ECCC & AEP Quarterly and annual reporting as required
Condition of Environment Report	Q4	ECCC & AEP – As needed and in the SOER work plan, work with ECCC and AEP team members to provide data, advice and interpretation for 2023 SOER updates for LAR, EGA and tributary WQ
Key Engagement/Participation Meeting	Q4	Glozier and Steeves – Present final report on updated long term trend analyses
Key Engagement/Participation Meeting	Q4	Levesque & Glozier – Present results of publication of SPMD dissolved PACs in Lower Athabasca River
Key Engagement/Participation Meeting	Q4	Pippy & Steeves – Present final report on Baseline Conditions in the EGA
Key Engagement/Participation Meeting	Q4	Levesque – As needed and determined in the CBM work plans be available for engagement and training opportunities with community
Other (Describe in Description Section)	Q4	AEP – provide data from surface water quality data from lakes and rivers sampled in 2022-2023 to OSM data systems.
Technical Report	Q3	AEP - Preliminary study of naphthenic acids variation in representative tributaries in NOSR (Carried over from last fiscal)
Technical Report	Q4	AEP and ECCC Historical review of OSM surface water monitoring program and data

Key Engagement/Participation Meeting	Q2	AEP -Presentation on OSM tributary surface water data compilation, contingent to the "Rationalization water quality monitoring network in the oil sands" workshop
Peer-reviewed Journal Publication	Q4	AEP -Examination of riverine carbon sources and sinks in mining-impacted tributaries, using 13C analyses (Carried over from last fiscal
Technical Report	Q4	AEP - Summary of long-term lake chemistry data for the use of stakeholders and to inform directions of future research
Conference Presentation	Q3	AEP - Presentation of CO2 modelling results derived from lake data at scientific conferences
Key Engagement/Participation Meeting	Q2	AEP -Presentation on daily, monthly and annual loads of dissolved substance in the Athabasca River. This presentation is pertaining to the organization of "Rationalization water quality monitoring network in the oil sands" workshop.
Peer-reviewed Journal Publication	Q4	AEP - Publication on naphthenic acids variation in representative tributaries in NOSR (Carried over from last fiscal)
Public Dissemination Document	Q2	AEP - fact sheets summarizing OSM tributary water quality monitoring
Technical Report	Q3	AEP - PAH profiling in Athabasca tributaries
Other (Describe in Description Section)	Q2	AEP- Develop R code to model CO2 partial pressure in surface water, in order to facilitate the interpretation of SWQ data. The code will be shared within AEP-OSM branch for broader use
Peer-reviewed Journal Publication	Q4	AEP - Drafting publication on Historical review of OSM surface water monitoring program and data



Peer-reviewed Journal Publication	Q4	AEP - Drafting publication on Variation of CO2 Effluxes from northern lakes: observation and modelling from long term lake monitoring
Technical Report	Q4	Sample and Data summary report for last 5 year period

## 15.0 Project Team & Partners

In the space below please provide information on the following:

- Describe key members of the project team, including roles, responsibilities and expertise relevant to the proposed project.
- Describe the competency of this team to complete the project.
- Identify any personnel or expertise gaps for successful completion of the project relative to the OSM Program mandate and discuss how these gaps will be addressed.
- Describe the project management approach and the management structure.

Surface Water Quality (ECCC; InKind & VNR)

Project Lead (Work plan PI): Nancy Glozier (Arctic-Athabasca Section Manager) – Mainstem (M2-M9) and EGA water quality study lead

Kerry Pippy (Senior Aquatic Scientist) – EGA water quality study co-lead

Lucie Levesque (Senior Aquatic Scientist) & Julie Roy (Aquatic Scientist) – Lead SPMD data processing, data analysis, interpretation and reporting for Mainstem

Minzhen Su (Data Scientist) – Database management and distribution

Primary Field Technical Staff: Jim Syrgiannis (Senior Field Technician), Erica Keet (Aquatic Technician), Jennifer Maines (Aquatic Technician), Leah Dirk (Aquatic Technician), John Coughlin (Aquatic Technician), Orla Tobin (Aquatic Technician).

Vijay Tumber (Senior Aquatic Data Technician) – WQ data tracking and QA for mainstem

There is also support from other WQMS staff from various offices to assist in fieldwork on occasion. In addition a term Physical Scientist will be hired for 12 months to work on water quality reporting products identified in the deliverables.

Surface Water Quality (AEPA)

Project Lead: Angela Sun – Tributary Water Quality study lead

Scientific and Technical Staff: 3.0 AEP Monitoring Scientific and 5.0 Technical staff.



## 16.0 Project Human Resources & Financing

### Section 16.1 Human Resource Estimates

Building off of the competencies listed in the previous section, please complete the table below. Add additional rows as necessary. This table must include **ALL staff involved** in the project, their role and the % of that staff's time allocated to this work plan. The AEP calculated amount is based on an estimate of \$120,000/year for FTEs. This number cannot be changed. The OSM program recognizes that this is an estimate.

**Table 16.1.1 AEP**

*Add an additional AEP Staff member by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total FTE (Full Time Equivalent) is Auto Summed (in Table 16.2.1) and converted to a dollar amount.*

Name (Last, First)	Role	% Time Allocated to Project
Water Quality Technician	Field planning and implementation	100%
Water Quality Technician	Field planning and implementation	100%
Water Quality Technican	Field planning and implementation	100%
Water Quality Technician	Field planning and implentation	100%
Water Quality Technician	Field planning and implementation	100%
Watershed Scientists	Program planning, data analysis and reporting	100%
Watershed Scientists	Program planning, data analysis and reporting	100%
Watershed Scientists	Program planning, data analysis and reporting	100%

**Table 16.1.2 ECCC**

*Add an additional ECCC Staff member by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total FTE (Full Time Equivalent) is Auto Summed in Table 16.2.2*



Name (Last, First)	Role	% Time Allocated to Project
<i>Glozier, Nancy</i>	In-kind, PI, Section Manager and Ecosystem Scientist	35%
<i>Levesque, Lucie</i>	In Kind – Lead SPMD design & analysis	15%
<i>Pippy, Kerry</i>	In Kind – Co-Lead EGA WQ	60%
<i>Roy, Julie</i>	In Kind – SPMD Data analysis	40%
<i>Syrgiannis, Jim</i>	In Kind – Lead Field Technician	70%
<i>Keet, Erica</i>	VNR – Primary Field Technician	70%
<i>Maines, Jennifer</i>	VRN – Primary Field Technican	70%
<i>Dirk, Leah</i>	VNR – Primar SPMD/Field Technican	70%
<i>Coughlin, John</i>	VNR – Primary Field Technican	90%
<i>Steeves, Kean</i>	VNR, Term Primary Data Scientist, field support – REDUCED TO 50%	50%
<i>Tumber, Vijay</i>	In-kind, Data tracking and nt QAQC	60%
<i>Su, Minzhen</i>	In-kind, Data management and distribution	60%
Casual field Technican	VNR HIRING CANCELLED	0%
<b>Click or tap here to enter text.</b>	Click or tap here to enter text.	0%





The tables below are the financial tables for Alberta Environment & Parks (AEP) and Environment & Climate Change Canada. All work plans under the OSM Program require either a government lead or a government coordinator.

**Section 16.2 Financing**

The OSM Program recognizes that many of these submissions are a result of joint effort and monitoring initiatives. A detailed "PROJECT FINANCE BREAKDOWN" must be provided using the Project Finance Breakdown Template provided, accessible here (ctrl + click the link below). Please note that completion of this Project Finance Breakdown Template is mandatory and must be submitted along with each workplan.

**[PROJECT FINANCE BREAKDOWN TEMPLATE \(CTRL+CLICK HERE\)](#)**

**Table 16.2.1 Funding Requested BY ALBERTA ENVIRONMENT & PARKS**

Organization – Alberta Environment & Parks ONLY	Total % time allocated to project for AEP staff	Total Funding Requested from OSM
<b>Salaries and Benefits</b> <i>(Calculated from Table 16.1.1 above)</i>	<b>800.00%</b>	<b>\$960,000.00</b>
<b>Operations and Maintenance</b>		
Consumable materials and supplies		\$190,000.00
Conferences and meetings travel		\$0.00
Project-related travel		\$45,000.00
Engagement		\$0.00
Reporting		\$0.00
Overhead		\$0.00
<b>Total All Grants</b> <i>(Calculated from Table 16.4 below)</i>		<b>\$0.00</b>
<b>Total All Contracts</b> <i>(Calculated from Table 16.5 below)</i>		<b>\$1,057,687.00</b>
<b>Sub- TOTAL</b> <i>(Calculated)</i>		<b>\$2,252,687.00</b>
Capital*		\$12,500.00
<b>AEP TOTAL</b> <i>(Calculated)</i>		<b>\$2,265,187.00</b>

\* The Government of Alberta Financial Policies (Policy # A600) requires that all **capital asset** purchases comply with governmental and departmental legislation, policies, procedures, directives and guidelines. **Capital assets** (Financial Policy # A100, Government of Alberta, January 2014) are tangible assets that: have economic life greater than one year; are acquired, constructed, or developed for use on a continuing basis; are not held for sale in ordinary course of operations; are recorded and tracked centrally; have a cost greater than \$5,000.

Some **examples of capital asset equipment include:** laboratory equipment, appliances, boats, motors, field equipment, ATV's/snowmobiles, stationary equipment (pier/sign/weather), fire/safety equipment, pumps/tanks, heavy equipment, irrigation systems, furniture, trailers, vehicles, etc. (Financial Policy # A100, Government of Alberta, January 2014).

**Table 16.2.2 Funding Requested BY ENVIRONMENT & CLIMATE CHANGE CANADA**

Organization – Environment & Climate Change Canada ONLY	Total % time allocated to project for ECCC staff	Total Funding Requested from OSM
<b>Salaries and Benefits FTE</b> <i>(Please manually provide the number in the space below)</i>		
Salaries and Benefits		\$706,952.00
<b>Operations and Maintenance</b>		
Consumable materials and supplies		\$704,372.98
Conferences and meetings travel		\$0.00
Project-related travel		\$218,500.00
Engagement		\$2,500.00
Reporting		\$5,000.00
Overhead		\$101,291.12
<b>ECCC TOTAL</b> <i>(Calculated)</i>		<b>\$1,738,616.10</b>

\* ECCC cannot request capital under the OSM program. Any capital requirements to support long-term monitoring under the OSM program should be procured by Alberta and captured in that budget table.



**Table 16.3**

**Complete ONE table per Grant recipient.**

*Add a Recipient by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. The total of all Grants is Auto Summed in Table 16.2.1*

GRANT RECIPIENT - ONLY: Name	Click or tap here to enter text.
GRANT RECIPIENT - ONLY: Organization	Click or tap here to enter text.
<b>Category</b>	<b>Total Funding Requested from OSM</b>
Salaries and Benefits	\$0.00
<b>Operations and Maintenance</b>	
Consumable materials and supplies	\$0.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00
Overhead	\$0.00
<b>GRANT TOTAL</b> <i>(Calculated)</i>	<b>\$0.00</b>

**Table 16.4**

**Complete ONE table per Contract recipient.**

*Add a Recipient by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table. This section is only to be completed should the applicant intend to contract components or stages of the project out to external organizations. The total of all Contracts is Auto Summed in Table 16.2.1*

CONTRACT RECIPIENT - ONLY: Name	CONTRACT for Helicopter Services
CONTRACT RECIPIENT - ONLY: Organization	VARIOUS
<b>Category</b>	<b>Total Funding Requested from OSM</b>
Salaries and Benefits	\$0.00
<b>Operations and Maintenance</b>	
Consumable materials and supplies	\$277,200.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00
Overhead	\$0.00
CONTRACT TOTAL <i>(Calculated)</i>	<b>\$277,200.00</b>
CONTRACT RECIPIENT - ONLY: Name	CONTRACT for Analytical Services
CONTRACT RECIPIENT - ONLY: Organization	VARIOUS
<b>Category</b>	<b>Total Funding Requested from OSM</b>
Salaries and Benefits	\$0.00
<b>Operations and Maintenance</b>	
Consumable materials and supplies	\$644,487.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00
Overhead	\$0.00
CONTRACT TOTAL <i>(Calculated)</i>	<b>\$644,487.00</b>
CONTRACT RECIPIENT - ONLY: Name	OSM storage with Versacold
CONTRACT RECIPIENT - ONLY: Organization	Versacold
<b>Category</b>	<b>Total Funding Requested from OSM</b>
Salaries and Benefits	\$0.00
<b>Operations and Maintenance</b>	
Consumable materials and supplies	\$36,000.00
Conferences and meetings travel	\$0.00
Project-related travel	\$0.00
Engagement	\$0.00
Reporting	\$0.00



Overhead	\$0.00
<b>CONTRACT TOTAL</b> <i>(Calculated)</i>	<b>\$36,000.00</b>
CONTRACT RECIPIENT - ONLY: Name	TBC – as per OC direction \$100,000 of the approved budget be allocated to the SW TAC for external technical support
CONTRACT RECIPIENT - ONLY: Organization	TBC
<b>Category</b>	<b>Total Funding Requested from OSM</b>
Salaries and Benefits	0
<b>Operations and Maintenance</b>	
Consumable materials and supplies	\$100,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
<b>CONTRACT TOTAL</b> <i>(Calculated)</i>	<b>\$100,000.00</b>



**Table 16.5 GRAND TOTAL Project Funding Requested from OSM Program**

The table below is auto calculated, please do not try to manually manipulate these contents.

Category	Total Funding Requested from OSM
<b>Salaries and Benefits</b> <i>Sums totals for salaries and benefits from AEP and ECCC ONLY</i>	\$1,666,952.00
<b>Operations and Maintenance</b>	
<b>Consumable materials and supplies</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$894,372.98
<b>Conferences and meetings travel</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$0.00
<b>Project-related travel</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$263,500.00
<b>Engagement</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$2,500.00
<b>Reporting</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$5,000.00
<b>Overhead</b> <i>Sums totals for AEP and ECCC ONLY</i>	\$101,291.12
<b>Total All Grants (from table 16.2.1 above)</b> <i>Sums totals for AEP Tables ONLY</i>	\$0.00
<b>Total All Contracts (from table 16.2.1 above)</b> <i>Sums totals for AEP Tables ONLY</i>	\$1,057,687.00
<b>Sub- TOTAL</b>	\$3,991,303.10
<b>Capital*</b> <i>Sums total for AEP</i>	\$12,500.00
<b>GRAND PROJECT TOTAL</b>	\$4,003,803.10

Some **examples of capital asset equipment include:** laboratory equipment, appliances, boats, motors, field equipment, ATV's/snowmobiles, stationary equipment (pier/sign/weather), fire/safety equipment, pumps/tanks, heavy equipment, irrigation systems, furniture, trailers, vehicles, etc. (*Financial Policy # A100, Government of Alberta, January 2014*).



## 17.0 FINANCIAL MANAGEMENT

**The OSM Program reserves the right to reallocate project funding during the current fiscal year on the basis of project performance and financial overspend or underspend.**

Please check this box to acknowledge you have read and understand

**In the space below please describe the following:**

- Discuss how potential cost overruns and cost underruns will be managed.
- If this is a continuing project from last year, identify if this project was overspent or underspent in the previous year and explain why.
- Describe what risks and/or barriers may affect this project.

Glozier and a representative from AEP will perform quarterly reviews of budgets and deliverables. Deviations from the proposed workplan will be reported to the OSM program office, and management actions may be taken to facilitate meeting of budget and deliverable expectations.

Foreseeable risks to the program include (i) delays in hiring, grants, and contracts and (ii) integration with CBM projects. AEP and ECCC currently have limited capacity and expertise for community engagement and capacity building.



## 18.0 Alternate Sources of Project Financing – In-Kind Contributions

Table 18.1 In-kind Contributions

Add an In Kind Contribution by clicking on the table and then clicking on the blue "+" symbol on the bottom right side of table.

DESCRIPTION	SOURCE	EQUIVALENT AMOUNT (\$CAD)
Scientific Expertise	ECCC	\$198,450.00
Technical Expertise	ECCC	\$151,200.00
<b>TOTAL</b>		<b>\$349,650.00</b>



## 19.0 Consent & Declaration of Completion

**Lead Applicant Name**

Nancy E Glozier

**Title/Organization**

ECCC

**Signature**

Nancy Glozier

**Date**

2022-10-31

**Government Lead / Government Coordinator Name** (if different from lead applicant)

Click or tap here to enter text.

**Title/Organization**

Click or tap here to enter text.

**Signature**

Click or tap here to enter text.

**Date**

Click or tap to enter a date.



## PROGRAM OFFICE USE ONLY

### **Governance Review & Decision Process**

*this phase follows submission and triggers the Governance Review*

**TAC Review (Date):**

Click or tap to enter a date.

**ICBMAC Review (Date):**

Click or tap to enter a date.

**SIKIC Review (Date):**

Click or tap to enter a date.

**OC Review (Date):**

Click or tap to enter a date.

**Final Recommendations:**

**Decision Pool:**

Choose an item.

**Notes:**

Click or tap here to enter text.

### **Post Decision: Submission Work Plan Revisions Follow-up Process**

*This phase will only be implemented if the final recommendation requires revisions and follow-up from governance*

**ICBMAC Review (Date):**

Click or tap to enter a date.

**SIKIC Review (Date):**

Click or tap to enter a date.

**OC Review (Date):**

Click or tap to enter a date.

**Comments:**

**Decision Pool:**

Choose an item.

**Notes & Additional Actions for Successful Work Plan Implementation:**

Click or tap here to enter text.