2022-2023 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 ***October 5, 2021 at 4:30 PM Mountain Standard time.***	***October 5, 2021*** *4:30 PM MST*
Decision Notification	*Mid to Late January 2022*

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.

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.*

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.

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.*

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 Form and Distribution Package, accessible here: **Work Planning Form and Distribution Package**

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**.

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:

202223_wkpln_WorkPlanTitle_ ProjectLeadLastNameFirstName

Example:

202223_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:

202223_sup##_WorkPlanTitle_ ProjectLeadLastNameFirstName

Examples:

202223_sup01_OilSandsResiduesinFishTissue_SmithJoe

202223_sup02_OilSandsResiduesinFishTissue_SmithJoe

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202223_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 5, 2021, **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**.*

WORK PLAN APPLICATION

PROJECT INFORMATION	
Project Title:	Wetland Ecosystem Monitoring Program
Lead Applicant, Organization, or Community:	Danielle Cobbaert, Alberta Environment and Parks
Work Plan Identifier Number: *If this is an on-going project please fill the identifier number for 20/21 fiscal by adjusting the last four digits:* ***Example:*** *D-1-2020 would become D-1-****2022***	WL-PD-10-2223
Project Region(s):	Oil Sands Region
Project Start Year: *First year funding under the OSM program was received for this project (if applicable)*	2017
Project End Year: *Last year funding under the OSM program is requested* ***Example: 2022***	Ongoing
Total 2022/23 Project Budget: *For the 2022/23 fiscal year*	$2,967,793.00
Requested OSM Program Funding: *For the 2022/23 fiscal year*	$2,967,793.00
Project Type:	Longterm Monitoring
Project Theme:	Wetlands
Anticipated Total Duration of Projects (Core and Focused Study (3 years))	Year 5
Current Year	**Focused Study:** Choose an item.
	Core Monitoring: Year 1

CONTACT INFORMATION	
Lead Applicant/ Principal Investigator: Every work plan application requires one lead applicant. This lead is accountable for the entire work plan and all deliverables.	Danielle Cobbaert
Job Title:	Wetland Scientist
Organization:	Alberta Environment and Parks
Address:	9888 Jasper Ave, 10th Floor, Edmonton AB T5J 5C6
Phone:	1-587-986-0653
Email:	Danielle.Cobbaert@gov.ab.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 purpose of this work plan is to achieve the vision of the Wetlands Technical Advisory Committee of an Integrated Wetland Monitoring Program with an adaptive monitoring, evaluation and reporting system that is inclusive of and responsive to local Indigenous Communities.

The Integrated Wetland Work Plan includes the following wetland sub-workplans: 1) Surveillance Wetland Monitoring Program, 2) Peace-Athabasca Delta (PAD) Wetland Monitoring & Synthesis, 3) Wetland Geospatial Plan, 4) Bog Ecosystem Investigation of Cause, and 5) Watershed Hydrology Modelling, and 6) Wetland Wildlife Indicator Development. A summary of how each of these sub-workplans collectively contribute to the Integrated Wetland Work Plan within an adaptive monitoring approach provided in Supplement 03.

The Integrated Wetland Work Plan was developed by a team of wetland scientists in collaboration with the Wetland Technical Advisory Committee (TAC), which is a multi-stakeholder group that includes representatives from government, local Indigenous communities and industry. Three Wetland TAC focus meetings were held in September 2021 to inform the development of the integrated work plan.

The Integrated Wetland Monitoring Program work plan collectively addresses the mandate of the OSM Program to determine (1) if changes in wetland ecosystem indicators are occurring in the oil sands region and (2) if these changes are caused by oil sands development activities and (3) what the contribution caused by oil sands development in the context of cumulative effects. Together these projects also address the Oversight Committee's direction to develop an adaptive monitoring approach such as Environment and Climate Change Canada's Environmental Effects Monitoring Program. Across these various projects we have ensured no redundancies; however, several of the objectives, tasks and deliverables are dependent upon tasks and products from other projects, which are noted in the sub-workplans.

A key driver for the Integrated Wetland Ecosystem Monitoring Program work plan is to ensure oil sands operators' are deemed 'in compliance' of Environmental Protection and Enhancement Act (EPEA) approval conditions for regional wetland monitoring to determine the effects of oil sand development activities on wetland ecosystems.

Partnerships with Alberta Environment and Parks, Environment and Climate Change Canada, the Alberta Biodiversity Monitoring Institute, Service Alberta, Hatfield Consultants, Canadian Rivers Institute, the University of Waterloo, Villanova University, and other external collaborators through other OSM TACs are vital to the continued success of Integrated Wetland Monitoring Program.

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 the EEM 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 EEM framework 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*
- *Discuss results of previous monitoring/studies/development and* what has been achieved to date.

Details on each component of the integrated Wetland Ecosystem Monitoring Program can be found in the associated supplementary materials 04 through 10.

2.0 Objectives of the Work Plan

List in point form the Objectives of the 2022/23 work plan below

Objectives associated with each component of the integrated Wetland Ecosystem Monitoring Program can be found in the associated supplementary materials 04 through 10.

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)
- integrate western science with Indigenous Community-Based Monitoring
- addresses the EEM framework 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:

Wetlands

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 2022/23 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:

Choose an item.

3.4.1.2 Surface Water Key Questions

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

1. Are changes occurring in water quality, biological health (e.g., benthos, fish) and/or water quantity/flows, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. 7.6. Where does the monitoring fit on the conceptual model within the EEM framework for the theme area and relative to the conceptual model for the OSM Program theme area? How will this work advance understanding transition towards of the conceptual model EEM framework?

Click or tap here to enter text.

7. Is the work plan contributing to Programmatic State of Environment Reporting?

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.Are changes occurring in groundwater quality and/or quantity, to what degree are changes attributable to oil sands activities, are changes affecting other ecosystems, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

2. 2. 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.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

Click or tap here to enter text.

3.3.3 Wetlands Theme

3.3.3.1 Sub Themes:

Cross-Cutting

3.3.3.2 Wetland - Key Questions

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

1. Are changes occurring in wetlands due to contaminants and hydrological processes, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

There is evidence that there are changes in wetland vegetation communities in the oil sands region due to various land disturbance activities. Land disturbance activities can impact wetland vegetation communities by introducing non-native species (Boutin and Carpenter, 2017), and by reducing seed germination (Crowe et al., 2002), both of which can result in reduced abundance of native species and reduced overall floristic quality of wetlands (Ficken et al. 2019). Land disturbance associated with OS development can influence wetland hydrologic function and vegetation through numerous physical, chemical, and biological mechanisms (Volick et al. in review; Ficken et al. 2019). For example, physical disturbances to the landscape (e.g. seismic lines,well pads, or buried pipe lines) that affect water availability (Ryder et al., 2004; Lee and Boutin, 2006; Strack et al., 2018; Lovitt et al., 2018) can affect plant diversity and composition.

Open mine operation has a significant effect on surface and groundwater flow, including water table lowering and water diversion through canals, reservoirs and dikes. Ground water removal can disrupt hydrologic connectivity between the basal and shallow groundwater, alter local and regional recharge/discharge and create a drawdown zone around a mine. Such drawdown can result in desiccation of the adjacent wetlands and uplands, and it is expected that the VSM will affect more than 700 ha ofwetlands proximal to the mine. Water diversion not only affects HC between landscapes, surface waterbodies and underlying aquifers, but also alters the water budget of the area through changes in evaporation (e.g., wetland evaporation rates vs. reservoir evaporation rates), water storage (e.g., wetland water storage capacity vs. canal water storage capacity) and run off. Previous simulation of runoff for Environmental Impact Assessment of the VSM suggested that during the operational phases of the mine, Poplar Creek discharge is expected to decline due to closed-circuit mining areas within the watershed, and rates will be similar to rates before the diversion of Beaver River into Poplar Creek watershed in 1970's. Consequently, VSM has a potential to affect the hydrologic function of the entire Poplar Creek basin; predicting the watershed response to the surface mining is crucial for estimating the true footprint of proposed mining. Hydrologic alterations associated with OSM development including surface water diversions, groundwater and surface water withdrawals and indirect alterations associated with land disturbance are predicted to cause local to watershed scale impacts to adjacent wetlands (Volick et al. in review).

Previous work has detected contaminants attributed to oil sands resource extraction activities in wetlands. N-deposition (Ndep), Sdep, and base cation (BCdep) gradients are well explained between oil sands mining operation sources and receptor sites nearby within 10-15 km, and are detectable out to a distance of 20-50 km, ≥ 50 km from sources Ndep approaches regional background values (Edgerton et al. 2020). Bogs and poor fens are predicted to be the most sensitive wetland ecosystem to increased Ndep, due to naturally low nutrient levels. Increased NPP, increased shrubs and forbs biomass, & decreased Sphagnum biomass are predicted at sites with > 3 kg-N ha−1 a−1 (Wieder et al. 2019). There is a high (90% confident) likelihood that N-deposition from oil sands operations will cause negative effects to bogs and poor fens in the region including increased shrub growth and vascular plants, shading and loss of Sphagnum species. Other wetland classes (rich fens, swamps and open water wetlands) presumed less sensitive to N deposition (mesotrophic; not N-limited). Increased Ndep may cause increased NPP of all wetland ecosystems near N-emissions sources.

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

Core monitoring work in the Peace-Athabasca Delta includes areas of interest to local communities. Additionally, the core surveillance wetland monitoring includes indicators and protocols of interest to local communities including culturally important wetland plants (e.g., rat root, pitcher plant).

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

Yes, all data produced by the core Wetland Monitoring Program will follow OSM Program requirements, and be provided to the OSM Program data management system.

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

All methodologies apply existing Standard Operating Procedures and Methods

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

The Wetland Monitoring Program is integrated amongst other environmental monitoring program through integrated conceptual models, consistent data collection protocols, and a study design and site selection approach that is consistent with other theme areas including terrestrial biological monitoring.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

1) Selecting monitoring sites along a cumulative oil sands pressure gradient that includes land disturbance density, contaminant load, and hydrologic alteration. The study design allocates more sites in high-risk areas (i.e. watersheds with high cumulative pressures index scores and sites adjacent tomine boundaries). 2) Selecting wetland monitoring indicators that are sensitive to oil sands pressures and early-warning indicators (e.g. N-loading experiments have found to cause increased shrub biomass; bog and fen plant communities have been shown to be particularly sensitive to land disturbance; N-content in bog plant tissues are sensitive to N-deposition loading). 3) Working with communities to co-develop a wetland monitoring program that addresses their values of wetland ecosystems and their perceived threats of oil sands development. Several sites have been chosen by communities' which incorporates their perception of risk of oil sands development affecting high value wetlands. We are also working with communities to co-develop wetland indicators that are highly valued by communities (e.g. monitoring protocol under development for culturally important wetland plant surveys).

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

The core wetland monitoring program is designed to address oil sands pressures (land disturbance, contamination, and hydrologic alteration) identified in the conceptual model. All wetland monitoring program indicators are oil sands pressures (atmospheric deposition, land disturbance in buffer, or hydrologic alteration in local watershed), wetland stressors (wetland hydrology/ meteorology, surface water quality or sediment quality) or wetland ecosystem responses (vegetation, invertebrates). This wetland monitoring program will test and validate the relationships of the wetland conceptual model. Key gaps under the oil sands pressures are integrated hydrology watershed models to understand the

effects of loss wetlands and streams and the loss of hydrologic connectivity on adjacent wetland ecosystems, and the cumulative effects of various oil sands pressures.

We are working collaboratively with the OSM Groundwater Monitoring Program to map groundwater-surface water interactions and identify wetlands that are vulnerable to hydrologic alteration. This will be used to identify wetland sites that are high risk for impacts from groundwater and surface water alterations associated with oil sands development.hibians). This wetland monitoring program will test and validate the relationships of the wetland conceptual model.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

Yes this work plan will provide data, evaluation and reporting products to directly support Programmatic Condition of Environment Reporting.

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. Are changes are occurring in air quality, to what degree are changes attributable to oil sands emissions, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

2. Are changes informing Indigenous key questions and concerns?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting? (Answer Box)

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. Are changes occurring in terrestrial ecosystems due to contaminants and landscape alteration, to what degree are changes attributable to oil sands activities, and what is the contribution in the context of cumulative effects?

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

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

Click or tap here to enter text.

6. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

7. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

8. Is the work plan contributing to Programmatic State of Environment Reporting?

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. Where does the monitoring fit within the EEM framework and relative to the theme area? How will this work advance transition towards the EEM framework?

Click or tap here to enter text.

5. Where does the monitoring fit on the conceptual model for the theme area and relative to the conceptual model for the OSM Program? How will this work advance understanding of the conceptual model?

Click or tap here to enter text.

6. Is the work plan contributing to Programmatic State of Environment Reporting?

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 give consideration for the EEM framework and the approved Key Questions.

The key driver for Core Wetland Monitoring Program is to ensure oil sands operators are deemed 'in compliance' of Environmental Protection and Enhancement Act (EPEA) approval conditions for regional wetland monitoring to determine the effects of oil sand development activities on wetland ecosystems in the oil sands region. Results from the monitoring program are used to informregulatory decisions on oil sands development activities as well as government policies.

The Wetland Monitoring Program aims toaddress key concerns of local indigenous communities regarding oil sands development activities on wetland ecosystems raised in Environmental Impact Assessments (EIA),and to test and validate EIA predictive models on source-pathway-effects towetland ecosystems (e.g. aerial deposition, and regional hydrology watershed models).

A Wetland Monitoring Program is required under Oil Sands operators' Environmental Protection and Enhancement Act (EPEA) approval conditions which includes the following:
(a) a plan to monitor natural wetlands for natural variability;
(b) a plan to determine and monitor the potential effect of oil sands development activities (various activities and pressures are listed including for mines the effects of dewatering and mine development, and for in situ projects the effects of roads, well pads, or other infrastructure, surface water and groundwater withdrawals and any other disturbances) on wetland communities; and
(c) corrective measures, where appropriate, to protect affected wetland communities.

Wetland monitoring data collected under this program supports assessment of whether oil sands development regulatory decisions and other land use decisions are leading to environmental outcomes that are consistent with the goals and objectives of the provincial Wetland Policy and desired land use planning outcomesunder the Lower Athabasca Regional Plan (LARP).

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

Local communities have raised concerns regarding effects of oil sands development activities on wetland ecosystems through oil sands regulatory hearings, land use planning engagement activities, and OSM engagement activities, which has been incorporated in the Wetland Monitoring Programas follows:

1) Development of a wetland conceptual model that follows an oil sands development source-pathway-wetland indicator framework that incorporates local indigenous community concerns and observations regarding oil sands development activities on wetland ecosystem indicators that are valued. Inputs of contaminants are thought to be affecting the health and potency of culturally important foods and medicines, land disturbances are causing changes to plant communities and wildlife habitat, and increases in noise and human activity affecting wildlife distribution and abundance. Changes to wetland hydrology in the region are a concern to local indigenous communities (i.e. wetlands are drying up; changes to community access and navigation to land). These observationsand concerns regarding wetlands are being incorporated into the development of culturally important wetland indicators under the core wetland monitoring program.

2) Wetland Site selection –Local indigenous communities supported under the Wetland Monitoring Program have selected wetland monitoring sites that are valued by theirlocal community.

3) Indicators and associated protocols –We are working with communities to develop core wetland indicators and protocols that are high valued by the community and can be collected by the community.

4) Empowering communities to monitor wetlands –We are providing training and resources to enable communities to monitor their own wetlands.

5) Evaluation and Reporting –We are working with communities to provide monitoring program information that is valued and effectively-communicated.

The Program is inclusive whereby traditional and local knowledge informs that monitoring program design through program objectives, site selection and indicator selection,providing appropriate capacity and support such as training, and collaboration on shared information, gatherings and reporting.

Does this project include an Integrated Community Based Monitoring Component?

Yes

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 can be assessed against a baseline condition. As relevant give consideration for the EEM framework and the approved Key Questions.

Wetland ecosystem changes will be assessed against reference conditions through selecting wetland sites along a cumulative effects stressor gradient from high risk stressor areas to areas with little to minimal oil sands stressors (reference areas). Wetlands in high oil sands stressor areas will be compared to wetlands in low to minimal oil sands stressor areas. The study design is also constrained by natural wetland landscape units (covariables include surficial geology, topography, fire history) in the oil sands region to minimize factors affecting natural variability.

Some wetland sites are also selected in areas where development is currently absent but expected to occur over time (e.g. TECK Frontier Mine, Jackpine sites) to capture baseline conditions and changes over time as oil sands disturbances increase.

Preliminary analysis of various wetland plant community parameters (e.g. species richness) and oil sands stressor gradients indicates that at least 30 wetland sites of each wetland class (i.e. 30 bogs, 30 fens, 30 swamps and 30 SOWWs) are needed to detect effects. A total of 120 sites (bogs, fens, swamps and open water) will be monitored in 2022/23 and additional power analysis will be used to further review and modify the wetland monitoring site network as needed.

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 give consideration for the EEM framework and the approved Key Questions.

This is the first year of implementation of a core wetland monitoring program (Phase 2) beyond the pilot scale work completed to date (Phase 1). Surveillance monitoring sites in 2022-2023 is focused on assessing effects of mining and in situ development in the Athabasca Oil Sands Region and the Peace-Athabasca Delta. The program is scaling up from the pilot network of 22 wetlands to a total of 120 wetlands across four wetland classes (bogs, fens, swamps and open water).

The Core Wetland Monitoring Network is focused on monitoring wetlands indicators that are sensitive to oil sands stressors and that can be scaled-up to watershed and regional scales through remote sensing and modelling approaches. Wetland monitoring sites are located along oil sands stressors gradients to test and validate predicted effects in high risk cumulative oil sands stressor areas compared to reference areas. Through scaling-up approaches the Wetland Monitoring Program aims to answer 'What is the spatial extent and magnitude of wetland changes in the Oil Sands Region?' and 'Are these changes due to oil sands development activities or cumulative effects from other human development activities?'

The Wetland Monitoring Program will scale-up wetland field measurements through two complementary and parallel approaches:

1) Remote sensing approach: A pilot-scale wetland ecosystem change project is nearing completion using lidar data to quantify vegetation canopy height changes (2008 vs. 2018) along transects over the oil sands mine centre. The spatialization of wetland change can be linked to various regional oil sands stressor datasets including contaminant deposition models and the human footprint inventory, and then quantified over space and time. This provides spatial quantification of:
a) land covers that are most sensitive to disturbance (using vegetation structure as a proxy indicator), and
b) disturbance types from Alberta Human Footprint that have the greatest impact.

We propose to scale-up using remote sensing data in a machine learning framework to characterize and assess the current state of land surface characteristics such as wetland extent and class to establish regional baseline information (derived from optical imagery and lidar data). Improved topographic digital elevation models will be produced (derived from lidar data) for improved fine-scale analysis. These products can be used to assess areas of greatest sensitivity (and greatest resilience) to disturbance. This will then be tested against eco-hydrological model (part 2 of scaling-up).

2) A cumulative effects modeling approach consistent with the EEM framework direction is proposed under the Integrated Modelling plan, which will incorporate modeling of key source-pathway-wetland ecosystem responses and serve as a point of integration across the various theme areas. Wetlands and

groundwater support further development of groundwater -surface modelling, which has been developed using a USGS platform on the Poplar Creek watershed. This modeling will enable the assessment of effects of oil sands development on wetland ecosystems at a watershed/ sub-regional scale, which is one of the objectives of OSM Wetland Monitoring Program. The modeling will help to answer the key questions of the Program by 1) identifying wetlands within the watershed that are more susceptible to hydrologic disturbances, 2) by isolating the effects of oil sandsmine development activities including groundwater dewatering. Modeled results will be validated by field observation at surveillance and sentinel monitoring sites in the watershed. The simulated streamflow in Beaver and Poplar Creek and three other gauging stations within these watersheds will be compared and validated by the observed daily streamflow at these stations. Simulation of changes in hydrological connectivity will improve the understanding of interactions between communities of living organisms and hydrologic conditions and will contribute to making well-informed decision on wetland mitigation by recognizing signals from open mining operation.

While Environmental Impact Assessment (EIA) of the Voyageur South Mine (VSM) simulated deep groundwater flow and Poplar Creek discharge during the operational phases of the mine, possible changes to shallow groundwater flow and their effects on wetlands are still unknown. This study can fill this knowledge gap by the assessment of changes in shallow groundwater movement that is essential for wetland maintenance. In addition, the model will be useful for validation of EIA predictions. The study can assess changes in hydrologic connectivity of Poplar Creek watershed due to open mining activities by assessing such indicators as 1) wetland area, 2) water table depth, and 3) soil moisture. Despite possible uncertainties related to model development, results of modeling will reveal the areas of highest risk and will detect changes along related go proximity to open mining activities. Although prediction of changes in every single wetland at community level may be associated with some uncertainty, the model has sufficient power to accurately predict decadal changes due to mining development at watershed level. In addition, modeling results will allow the assessment of changes along a stressor gradient associated with proximity to mining operations and will be helpful for comparison of magnitude of changes related to differences in topography, surface geology, and landscape position.

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 give consideration for the EEM framework and the approved Key Questions.

Monitoring utilizes standard operating procedures. The Wetland Monitoring Program staff are currently working with Service Alberta staff to release core wetland monitoring program data through an onlinedata portal system. Targets have been set to have all core wetland monitoring datato be QA/QC and available online with 3 months of data collection. Reporting and deliverables of Wetland Monitoring data have been identified that include scientific manuscripts as well as scientific reports, annual State of the Environment reports.

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 give consideration for the EEM framework and the approved Key Questions.

The Wetland Monitoring Program is efficient by maximizing the likelihood of detecting effects by:

1) a study design that maximizes the likelihood of detecting effects through selecting sites along key oil sands stressor gradients including targeting high risk areas and reference areas, and

2) selecting wetland indicators that are sensitive to oil sands stressors and can be used to scaled-up site-level observations to regional-scale observations through either remote sensing or modelling approaches, and

3) development of wetland indicator protocols that are robust and repeatable and consistent with other OSM monitoring programs and projects to the extent appropriate and practical (e.g. protocols and labs are consistent for atmospheric deposition, surface water quality and use of acoustic recording units and wildlife cameras to monitor birds, amphibians and mammals), and

4) in-kind and leveraged resources and partnerships (e.g. shared service providers, lab contracts, helicopter contracts).

5) Co-location of monitoring sites, monitoring indicators, protocols and analytic laboratories avoids duplications.

10.0 Work Plan Approach/Methods

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

Details associated with each project phase can be found in the associated supplementary materials 04 through 10.

10.2 Describe how changes in environmental Condition will be assessed *

Changes in wetland ecosystem condition will be assessed in relation to key oil sands pressures of concern including atmospheric deposition, landscape disturbance and hydrologic alteration. Other factors that may affect wetland change in the region such as inter-annual weather variability, underlying landscape factors, and fire history will be treated as covariates.

Wetland condition will be assessed at each site: including hydrology (water level), water quality, sediment quality, plant community composition and structure, and benthic invertebrate community composition (only at shallow open water wetlands.

Remote sensing data will be used periodically to assess changes in wetland condition (location, areal extent, and wetland class) over time across the region. Long-term wetland monitoring sites will be used to validate wetland inventories. A pilot scale project using lidar data to detect changes in wetland vegetation canopy height shows promising results that may be applied further in the future.

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

Yes, water, sediment, and biotic tissues collected as part of this work plan are compared to existing protective environmental guidelines (e.g., CCME guidelines for the protection of aquatic life) in order to provide toxicological context and to assess changes in environmental condition. Where protective environmental guidelines do not exist, then wetland ecosystem conditions in higher impact areas (i.e. close to oil sands development) will be compared to reference conditions.

(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 *

Detailed explanation of the Western Science monitoring methods by project phase can be found in the associated supplementary materials 04 through 10.

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

The key indicators monitored in the core surveillance program can be found in the associated supplementary materials 04. Additionally, details on new indicators under development can be found in associated supplementary materials 06 through 08.

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.*

Knowledge translation will involve training for local Indigenous community partners on protocols for monitoring core wetland indicators under the Program, to enable them to conduct their own wetland monitoring consistent with the core program.

An annual Condition of Environment Report (or similar) will be produced each year for various end-users including local Indigenous communities, and other stakeholders, The Condition of Environment report will be plain-language and summarize key findings on wetland ecosystem indicators in relation to oil sands development activities.

Ongoing conversations and engagement over the course of the year involving members of the ICBMAC, IKCMCS, and Indigenous members of the wetland TAC, will continue to work towards co-development of a multiple evidence based approach to monitoring wetlands including engagement on defining baseline conditions under an adaptive monitoring framework. This may involve participation in CBM workshops , working meetings, desktop research, and field visits to communities by project leads. Conversations will seek to leverage lessons and guidance from completed and ongoing activities by the ICBMAC and IKCMCS related to ICBM best practices, ethical guidelines and conceptual models.

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

Continued development of the surveillance Wetland Ecosystem Monitoring Program is led by Dr. Danielle Cobbaert and AEP's wetland science team with input from all project partners. This includes site network optimization along key oil sands source gradients, core wetland indicator development, and defining baseline conditions and monitoring tiers and triggers to support State of the Environment Reporting.

Investigation of cause monitoring for effects of atmospheric deposition on sentinel bog monitoring sites, and contributions to the development of the bog monitoring component of the surveillance monitoring program is led by Drs. R. Kelman Wieder (Villanova University), Melanie Vile (West Chester University) and Dale Vitt (University of Southern Illinois); Existing partner; new grant required.

Continued intensive sentinel monitoring of six priority wetland sites to assess wetland hydrology responses to various land disturbance, and continued development of surveillance for wetland hydrology responses is led by Profs. R. Petrone and J. Price (University of Waterloo). This work also includes a watershed modeling component to develop an integrated surface water/groundwater model for the Poplar Creek Watershed using GSFLOW (a platform already proven useful for the OSM groundwater program in the McKay River watershed to quantify groundwater discharge to surface water under development and climate change scenarios). Existing partner; existing grant to be amended.

For the implementation phase (Phase 2) of the wetland monitoring program, the field component of monitoring at 120 wetland sites will be jointly delivered by AEP wetland staff and technicians from the Alberta Biodiversity Monitoring Institute. Existing partner; new contract required.

Development of new wildlife-based (mammal, bird) indicators for wetland habitat will be led by the Alberta Biodiversity Monitoring Institute. This work will leverage existing data on wildlife indicators / metrics from the Terrestrial Biological Monitoring program to assess gaps in approach for wetland habitats. Recommendations will be developed on wildlife indicators and SOPs for monitoring to include in the core surveillance wetland monitoring program. Existing grant (22GRRSD07); to be amended.

Surface water quality and sediment samples will be analyzed under contracts with various commercial analytical laboratories. Existing contracts for both water quality and sediment quality are used by all theme areas for consistency within and among monitoring programs. Vendors include the Biogeochemical Analytical Services Laboratory (22RSD850; 22RSD949), SGS AXS (22RSD853; 22RSD950), Bureau Veritas (22RSD851), ALS Canada (22RSD948) and InnoTech (22RSD852; 22RSD919).

Wetland benthic invertebrate samples will be sent to Biologica Environmental Inc. (under existing contract 20AEM837) for processing following the CABIN Laboratory Methods, Processing, Taxonomy and Quality Control of Benthic Macroinvertebrate Samples (http://ec.gc.ca/rcba-cabin/). Associated eDNA samples will be sent to the Centre for Biodiversity Genomics at the University of Guelph for extraction and sequencing.

*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:

2022-05-01

13.5 Estimated Data Collection End Date:

2022-10-28

13.6 Estimated Timeline For Upload Start Date:

2022-12-01

13.7 Estimated Timeline For Upload End Date:

2023-03-31

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, xlsx, etc.)	Security Classification
Wetland Hydrometric Hydrology	OSM Data Portal	xlsx	Open by Default
Wetland Surface Water Quality	OSM Data Portal	xlsx	Open by Default
Wetland Groundwater Quality	OSM Data Portal	xlsx	Open by Default

Wetland Sediment Quality	OSM Data Portal	xlsx	Open by Default

Wetland Benthic Invertebrates	OSM Data Portal	xlsx	Open by Default

Wetland Vegetation Composition	OSM Data Portal	xlsx	Open by Default

14.0 2022/23 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
Other (Describe in Description Section)	Q4	Updated wetland inventory
Other (Describe in Description Section)	Q4	High resolution DEM
Other (Describe in Description Section)	Q4	Hgh resolution watersheds and topography data in the oil sands region
Stakeholder or Community Presentation	Q4	Geospatial Needs Assessment (Key OS Stressors, RS Wetland Indicators, Key Products & Tasks). Presentation to Wetland TAC
Other (Describe in Description Section)	Q4	Monthly LAI for entire Oil Sands Region for 2022 condition
Other (Describe in Description Section)	Q4	Assessment of vegetation greenness and wetness trend over 37 years (Poplar Creek Watershed)
Technical Report	Q4	Assessent of Key Stressors and wetlands receptor relationship[in wetland monitoring sites in the Oil Sands Region
Stakeholder or Community Presentation	Q2	Presentation from TBM Science Team to Wetland TAC – draft outcomes for feedback
Stakeholder or Community Presentation	Q3	Presentation from TBM Science Team to Wetland TAC – final outcomes
Technical Report	Q3	Summary report of project outcomes for wildlife indicator development
Other (Describe in Description Section)	Q4	Bog monitoring data (deposition, tissue analysis, water quality) posted to Oil Sands Data Portal
Technical Report	Q4	Annual Project Report for proposed grant for investigation of cause monitoring at bog habitats

Non-peer reviewed conference proceeding	Q4	COVID-permitting, results will be presented at a scientific conference. Meeting TBD.
Other (Describe in Description Section)	Q4	Data on evapotranspiration at bog and swamp sites
Other (Describe in Description Section)	Q4	Hydrological and meteorological data from western part of Poplar Creek watershed
Other (Describe in Description Section)	Q4	Data on hydrophysical properties of peat, isotopic carbon and nitrogen signatures
Peer-reviewed Journal Publication	Q4	Wetlands as integral parts of surface-groundwater interactions in the AOSR: a synthesis review
Peer-reviewed Journal Publication	Q4	The compression and rebound characteristics of peat types characteristic of the Western Boreal Plain in relation to hydrological disturbance
Other (Describe in Description Section)	Q4	Monitoring results uploaded to the OSM data portal
Technical Report	Q4	Variability of key SOW wetland indicators in a 10-year data set
Peer-reviewed Journal Publication	Q4	eDNA biomonitoring model
Technical Report	Q4	Annual evaluation and reprting of program datasets for Condition of Environment Reporting (or similar report)
Other (Describe in Description Section)	Q4	OSM Wetland core indicators data (water quality, sediment quality, benthic invertebrate composition, vegetation composition, water level and temperature) added to OSM Data Portal
Technical Report	Q4	Annual report to Wetland TAC and stakeholder groups
Stakeholder or Community Presentation	Q4	Annual presentation of surveillance wetland monitoring program to wetland TAC and stakeholder groups

Technical Report	Q4	Five-year surveillance wetland monitoring program review and synthesis, and recommendations for Phase 3

Choose an item.	Choose an item.	Click or tap here to enter text.

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.*

Alberta Environment and Parks team members include:

Danielle Cobbaert, Ph.D. (AEP), Principle Investigator, Senior Wetland Scientist
Danielle has over 10 years of experience in the area of wetland ecology and as a government scientist in various wetland monitoring, regulatory and policy roles. Danielle is responsible for overseeing all aspects of the Wetland Monitoring Program.
- Wetland TAC co-lead
- Lead OSM Wetland Monitoring Program
- Lead Wetland CBM project oversight and integration
- manage and oversee wetland monitoring program implementation with AEP staff and external partners
- participate in Indigenous Community and stakeholder engagement
- supervise and assist with field work as required
- supervise and conduct analyses, write scientific manuscripts
- lead Wetland Monitoring Program evaluation and reporting, including supervise analyses and write scientific manuscripts, technical reports and knowledge translation products.

Stephanie Connor (AEP), Wetland Scientist, M.Sc.
- hydrology, surface water quality, sediment, and benthic invertebrate technical lead
- field data collection
- field data validation, review and analysis
- database management
- literature review and manuscript preparation

Joshua Montgomery (AEP), Wetland Scientist, M.Sc.
- meteorology, vegetation and remote sensing technical lead
- GIS and remote sensing analysis
- field data validation, review and analysis
- literature review and manuscript preparation

Dr. Craig Mahoney (AEP), Wetland Scientist, Ph.D.
- geospatial analysis of OSM monitoring sites data in wetlands in relation to key stressors associated with oil sands development
- GIS and remote sensing analysis
- supervise and assist with field work as required
- field data validation, review and analysis
- remote sensing and wetland change detection
- literature review and manuscript preparation

Dr. Mina Nasr (AEP), Senior Geospatial Scientist, Ph.D.
- geospatial support
- development of remote sensing-based wetland indicators
- contribute to updated wetland inventory and high resolution digital elevation model

Team members on the Peace-Athabasca Delta core wetland monitoring component of the project include:

Dr. Donald Baird (ECCC), Project Co-lead, Wetland Ecologist, Ph.D. Watershed Hydrology and Ecology Research Division, Water Science and Technology, Environment and Climate Change Canada, Fredericton, New Brunswick. Donald's has over 30 years of experience in the area of aquatic ecology and his main research interests focus on ecological risk assessment, and the development of new methods for ecosystem observation. Over the past 10 years, he has pioneered the use of ecogenomics approaches in biodiversity observation in rivers and wetlands for ecosystem assessment. He is active in developing new approaches to understand the effects of the complex stressor regimes acting on ecosystems, characteristic of our new Anthropocene era.
- manage and coordinate ECCC staff participation and process as required for project delivery
- lead for Design of Deltaic Wetland Ecosystem Health Monitoring Program
- lead PAD CBM project with ACFN and MCFN

Daniel Peters, Watershed hydrologist, Ph.D. – Watershed Hydrology and Ecology Research Division, Water Science and Technology, Environment and Climate Change Canada, Victoria, British Columbia. Daniel's research focuses on identifying, quantifying and modelling hydrologic and ecological impacts of climate variability and change on water resources and aquatic ecosystems in Canada including the effects of flow regulation and land-use change on hydrologic systems, runoff processes and generation of flood waters and the ecological flow needs of Canadian rivers.

Wendy Monk (ECCC), Ecohydrologist and Geospatial specialist, Ph.D. – Watershed Hydrology and Ecology Research Division, Water Science and Technology, Environment and Climate Change Canada (ECCC-WHERD), Fredericton, New Brunswick: With more than 18 years of research experience in both academia and government research, Wendy's research highly interdisciplinary integrating hydrology, aquatic ecology, and geospatial analyses to isolate understand complex relationships among drivers, pressures, stressors, and their impact on the human and natural ecosystem. Deploying multivariate statistical tools paired with geospatial analyses, Wendy's research brings together data and information from different sources and approaches to answer applied research questions.
- co-ordinate with OSM Geospatial Team regarding wetlands aspects of geospatial monitoring
- co-ordinate wetland macroinvertebrate indicators development

RES-01 PRP tbc (ECCC), Post-doctoral scientist
- statistical and geospatial modelling analysis
- contribution to reports and peer-reviewed publications
- assist with fieldwork as required

Kristie Heard (ECCC) Research technician
- supervise and assist with fieldwork as required

Team members of the sentinel bog ecosystem monitoring component of the work plan includes:

Dr. R. Kelman Wieder, Professor of Biology, Villanova University, will serve as lead principal investigator overseeing all aspects of the bog ecosystem project, participating in field work, data analysis, data synthesis, manuscript preparation, presentation of findings to stakeholders and at scientific conferences/workshops. Wieder will be responsible for reporting to AEP. Wieder is an ecosystem ecologist/biogeochemist with over 35 years of experience, mostly related to carbon, nitrogen, and sulfur cycling in peatland ecosystems, and has coauthored over 80 papers in peer-reviewed journals.

Kimberli D. Scott, Research Associate, Villanova University, will oversee day-to-day operations at Villanova University including budget management, purchasing, analysis of samples, maintenance of instrumentation, data management, coordination of field campaigns, training/supervising undergraduate student assistants.

Scott has 20 years of experience in this role at Villanova University, and has been earned coauthorship on 10 papers in peer-reviewed journals and will continue to contribute to manuscript preparation.

Dr. Melanie A. Vile, Assistant Professor, West Chester University, a co-principal investigator, will have primary responsibility for the biological nitrogen fixation and field gas flux aspects of the project, and will participate in field work, data analysis, data synthesis, manuscript preparation, presentation of findings to stakeholders and at scientific conferences/workshops. Vile is an ecosystem ecologist/biogeochemist with over 25 years of experience, mostly related to carbon, nitrogen, and sulfur cycling in peatland and coastal marsh ecosystems, and has coauthored over 30 papers in peer-reviewed journals.

Dr. Dale H. Vitt, Emeritus Professor, Department of Plant Sciences, Southern Illinois University, a co-principal investigator, will have primary responsibility for the quantitative vegetation survey and lichen pigment analysis aspects of the project, and will participate in field work, data analysis, data synthesis, manuscript preparation, presentation of findings to stakeholders and at scientific conferences and workshops. Vitt is an peatland ecologist and bryologist with over 45 years of experience, mostly related to peatland ecology, plant community ecology, and mosses and has coauthored over 120 papers in peer-reviewed journals.

Team members of the sentinel fen – hydrologic alteration ecosystem monitoring component of the work plan includes:

Dr. Richard M. Petrone (Project Lead), hydrometeorology, ~20 years experience in wetland ecohydrology in the Boreal Plains and AOSR.

Dr. Jonathan S. Price (Co-PI), hydrology, >30 years experience in wetland hydrological research and restoration/reclamation.

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
Wetland Scientist	Program Co-Lead	70%
Senior Geospatial Scientist	Remote Sensing Indicator Development	15%
Click or tap here to enter text.	Click or tap here to enter text.	0%
Wetland Scientist	Habitat and Biotics Lead	100%
Wetland Scientist	Hydromet and Vegetation Lead	100%
Wetland Scientist	Geospatial Lead	100%
Wetland Scientist	Vacant	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
Baird, Donald	Program Co-Lead	30%
Peters, Daniel	Hydrologist	10%

Monk, Wendy	Aquatic ecologist	10%
Heard, Kristie	Research technician	25%
RES-01 (TBC)	Postdoctoral Scientist (data analysis & reporting)	100%
Technologist (TBC)	Monitoring & data management	25%

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
Salaries and Benefits *(Calculated from Table 16.1.1 above)*	**485.00%**	**$582,000.00**
Operations and Maintenance		
Consumable materials and supplies		$480,595.00
Conferences and meetings travel		$0.00
Project-related travel		$0.00
Engagement		$0.00
Reporting		$0.00
Overhead		$48,060.00
Total All Grants *(Calculated from Table 16.4 below)*		**$765,477.00**
Total All Contracts *(Calculated from Table 16.5 below)*		**$820,000.00**
Sub- TOTAL *(Calculated)*		**$2,696,132.00**
Capital*		$0.00
AEP TOTAL *(Calculated)*		**$2,696,132.00**

* 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
Salaries and Benefits FTE *(Please manually provide the number in the space below)*		
Salaries and Benefits		$104,128.00
Operations and Maintenance		
Consumable materials and supplies		$111,000.00
Conferences and meetings travel		$6,000.00
Project-related travel		$20,000.00
Engagement		$15,000.00
Reporting		$0.00
Overhead		$15,533.00
ECCC TOTAL *(Calculated)*		**$271,661.00**

* 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	22GRRSD07; Terrestrial Biological Monitoring (ABMI)
GRANT RECIPIENT - ONLY: Organization	Alberta Biodiversity Monitoring Institute
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$25,000.00
Operations and Maintenance	
Consumable materials and supplies	$0.00
Conferences and meetings travel	$0.00
Project-related travel	$0.00
Engagement	$0.00
Reporting	$0.00
Overhead	$2,500.00
GRANT TOTAL *(Calculated)*	**$27,500.00**
GRANT RECIPIENT - ONLY: Name	TBA
GRANT RECIPIENT - ONLY: Organization	Unconfirmed RKelman Wieder, U Villanova
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$301,287.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
GRANT TOTAL *(Calculated)*	**$301,287.00**
GRANT RECIPIENT - ONLY: Name	TBA
GRANT RECIPIENT - ONLY: Organization	Unconfirmed Richard Petrone, U Waterloo
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$140,690.00
Operations and Maintenance	
Consumable materials and supplies	$0.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	$0.00

GRANT TOTAL *(Calculated)*	**$140,690.00**
GRANT RECIPIENT - ONLY: Name	TBA
GRANT RECIPIENT - ONLY: Organization	Unconfirmed ABMI
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$227,272.73
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	$22,727.27
GRANT TOTAL *(Calculated)*	**$250,000.00**
GRANT RECIPIENT - ONLY: Name	TBA
GRANT RECIPIENT - ONLY: Organization	Unconfirmed Canadian Rivers Institute
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$35,000.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	$5,000.00
Overhead	$6,000.00
GRANT TOTAL *(Calculated)*	**$46,000.00**

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	TBA
CONTRACT RECIPIENT - ONLY: Organization	Unconfirmed ABMI
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$341,000.00
Operations and Maintenance	
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
CONTRACT TOTAL *(Calculated)*	**$341,000.00**
CONTRACT RECIPIENT - ONLY: Name	TBA
CONTRACT RECIPIENT - ONLY: Organization	Unconfirmed Hatfield Consultants
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$147,000.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	$0.00
CONTRACT TOTAL *(Calculated)*	**$147,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD852; Laboratory Analysis of Water Quality Parameters, in the Oil Sands Area – trace metals, rare earth metals, naphthenic acids and chlorophyll A
CONTRACT RECIPIENT - ONLY: Organization	InnoTech
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$0.00
Operations and Maintenance	
Consumable materials and supplies	$71,000.00
Conferences and meetings travel	$0.00
Project-related travel	0

Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$71,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD850; Laboratory Analysis of Water Quality Parameters, in the Oil Sands Area - mercury
CONTRACT RECIPIENT - ONLY: Organization	Biogeochemical Analytical Services Laboratory
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$0.00
Operations and Maintenance	
Consumable materials and supplies	$19,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$19,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD851; Laboratory Analysis of Water Quality Parameters, in the Oil Sands Area - Routines, nutrients, isotopes, gases
CONTRACT RECIPIENT - ONLY: Organization	Bureau Veritas
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$48,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$48,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD853; Laboratory Analysis of Water Quality Parameters, in the Oil Sands Area - polycyclic aromatic compounds
CONTRACT RECIPIENT - ONLY: Organization	SGS AXYS
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$22,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	$0.00

Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$22,000.00**
CONTRACT RECIPIENT - ONLY: Name	18AEM802-02
CONTRACT RECIPIENT - ONLY: Organization	InnoTech U Vic
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$18,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$18,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD919; Laboratory analysis of sediments from lakes, rivers and wetlands – naphthenic acids and trace elements
CONTRACT RECIPIENT - ONLY: Organization	InnoTech
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$5,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$5,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD948; Laboratory analysis of sediments from lakes, rivers and wetlands – phenols, nutrients and particle size
CONTRACT RECIPIENT - ONLY: Organization	ALS Canada
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$4,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL	**$4,000.00**

(Calculated)	
CONTRACT RECIPIENT - ONLY: Name	22RSD950; Laboratory analysis of sediments from lakes, rivers and wetlands – polycyclic aromatic compounds
CONTRACT RECIPIENT - ONLY: Organization	SGS AXYS
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$24,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$24,000.00**
CONTRACT RECIPIENT - ONLY: Name	20AEM837: Laboratory Taxonomy of Wetland Benthic Invertebrates
CONTRACT RECIPIENT - ONLY: Organization	Biologica Inc
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$19,000.00
Conferences and meetings travel	$0.00
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$19,000.00**
CONTRACT RECIPIENT - ONLY: Name	TBA
CONTRACT RECIPIENT - ONLY: Organization	Unconfirmed Vendor
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$0.00
Operations and Maintenance	
Consumable materials and supplies	$20,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$20,000.00**
CONTRACT RECIPIENT - ONLY: Name	22RSD949; Laboratory analysis of sediments from lakes, rivers and wetlands – mercury and isotopic composition

CONTRACT RECIPIENT - ONLY: Organization	Biogeochemical Analytical Services Laboratory
Category	**Total Funding Requested from OSM**
Salaries and Benefits	0
Operations and Maintenance	
Consumable materials and supplies	$11,000.00
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$11,000.00**
CONTRACT RECIPIENT - ONLY: Name	TBA
CONTRACT RECIPIENT - ONLY: Organization	Unconfirmed InnoTech
Category	**Total Funding Requested from OSM**
Salaries and Benefits	$71,000.00
Operations and Maintenance	
Consumable materials and supplies	0
Conferences and meetings travel	0
Project-related travel	0
Engagement	0
Reporting	0
Overhead	0
CONTRACT TOTAL *(Calculated)*	**$71,000.00**

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
Salaries and Benefits ***Sums totals for salaries and benefits from AEP and ECCC ONLY***	$686,128.00
Operations and Maintenance	
Consumable materials and supplies *Sums totals for AEP and ECCC ONLY*	$591,595.00
Conferences and meetings travel *Sums totals for AEP and ECCC ONLY*	$6,000.00
Project-related travel *Sums totals for AEP and ECCC ONLY*	$20,000.00
Engagement *Sums totals for AEP and ECCC ONLY*	$15,000.00
Reporting *Sums totals for AEP and ECCC ONLY*	$0.00
Overhead *Sums totals for AEP and ECCC ONLY*	$63,593.00
Total All Grants (from table 16.2.1 above) *Sums totals for AEP Tables ONLY*	$765,477.00
Total All Contracts (from table 16.2.1 above) *Sums totals for AEP Tables ONLY*	$820,000.00
Sub- TOTAL	$2,967,793.00
Capital* *Sums total for AEP*	$0.00
GRAND PROJECT TOTAL	$2,967,793.00

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.*

Throughout the duration of the wetland monitoring project cost overruns and cost underruns will be managed by ensuring there is quarterly reporting from external partners and contractors, with any variance in budget highlighted and justified. In addition, we will hold quarterly project team meetings, where any potential barriers to the proposed work plan will be brought forward, solutions proposed, and potential impact on project budget and timelines communicated.

To mitigate the risks associated with the reliance on hiring new wetland staff given provincial constraints, this work plan has included outsourcing some of the wetland monitoring work to academic partners and NGO partners. Because a significant portion of the work for this project will be completed under contract/grant, there is a risk that if contracts and grants are not quickly initiated and approved in Q1 of 2022/2023 FY that multiple phases/tasks/deliverables may be delayed or not completed in entirety within the 2022/2023 fiscal year.

Potential risks and barriers to the successful implementation of the wetland work plan include: Timely approval of the work plan to the tasks can be initiated on schedule, hiring available resources to undertake work as required, and the ability to get contracts and grants in place in a timely fashion; support with wetland data architecture and services from Service Alberta, and the collaboration and support from all theme areas in supplying spatial data and; the availability and suitability of high quality geospatial data to assess both stressors and natural co-variates.

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)
In Kind Salary	University of Waterloo	$56,000.00
In Kind Operations	University of Waterloo	$179,500.00
Lab Space and Equipment	Alberta Biodiversity Monitoring Institute	$92,000.00
In Kind Technical Expertise	Alberta Biodiversity Monitoring Institute	$35,000.00
In Kind Salary	Environment and Climate Change Canada	$81,754.00
In Kind Salary	Villanova University	$233,039.00
	TOTAL	**$677,293.00**

19.0 Consent & Declaration of Completion

Lead Applicant Name

Danielle Cobbaert

Title/Organization

Wetland Scientist, Alberta Environment and Parks

Signature

Danielle Cobbaert

Date

2021-10-05

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.