

2018-19 Work Plan Template

All fields with an * are mandatory

Project Description Summary			Co-Chair Decision (March 8, 2018)
Date *	Project/Work Plan Identifier (if applicable)	Program Type and Strategic Alignment *	
03/01/2018	WL-PD-10-1819	OSM - Focus Study	
Program Category *	Status *	Dept. ID	
Wetlands	Existing Project		
Project Leadership / Contact information			
Project Title *	Key Words (max 10) *		
NEW Wetland Ecosystem Monitoring	wetlands, long-term monitoring, stressor, effects-based, atmospheric deposition, hydrology, land clearing, water quality, vegetation, biological indicators		
Surname *	Given Name *	Title *	
Cobbaert	Danielle	Dr.	
Organization *	Department	Division	
Alberta Provincial	Alberta Environment and Parks	Environmental Monitoring and Science Division	
Branch *	Section/Unit (if applicable)	Phone *	
Science	Biodiversity and Ecosystem Health	15879860653	
Email *	Mailing Address	City	
danielle.cobbaert@gov.ab.ca	9th Floor, 9888 Jasper Avenue	Edmonton	
Postal Code	EMSD Executive Owner (If Applicable)		
T5J5C6	Monique Dubé		
Project Information			
Project Objective(s) (Bullet Form) *	<ul style="list-style-type: none"> - Detect and report changes in wetland ecosystem in relation to Oil Sands Developments and related Point and Non-point source emissions - Evaluation and integration of wetland monitoring focus studies across air, water and biodiversity. 		
Plain Language Overview (100 words) *	<ul style="list-style-type: none"> - The primary goal of the project is to develop a wetland long-term monitoring program, and clear mechanisms to integrate existing Oil Sands Monitoring wetland Focus Studies. An integrated OSM wetlands monitoring program will support: better understanding of the effects of stressors associated with oil sands development activities on wetland ecosystems; and inclusion and application of Indigenous knowledge related to cultural wetland value and observations of ecosystem change. 		
Project Duration *	Project Original Start Date *	Estimated Completion Date *	
Multi-Year	01/04/2017	31/03/2020	
Specify Objectives This Project Will Address in 2018/2019. *	<ul style="list-style-type: none"> - Develop rigorous and efficient methods to assess wetland ecosystem responses to key stressors associated with oil sands development across various wetland classes (i.e. shallow open water wetlands, marshes, bogs, fens and swamps). 		
Specify Objectives This Project Will Address Beyond 2018/19 (if multi-year). *	<ol style="list-style-type: none"> 1) Establish a monitoring network of representative wetland ecosystems in the oil sands region that are (potentially) impacted by oil sands development; 2) Establish baseline wetland conditions including natural variability; 3) Provide a monitoring network and sampling design with sufficient statistical power to detect deviations from baseline conditions associated with oil sands development; and 4) Address key questions related to the environmental health of wetlands, and wetland health issues relevant to human use and consumption of wetland plants and animals. 		

<p>List Key Questions/Hypotheses Related to Each Objective Stated Above. *</p>	<p>1a) What are the effects of atmospheric deposition (N, S and base cations) associated with oil sands mines on the health, integrity and function of wetland ecosystems? 1b) What (and how) are the best ecological indicators to monitor the effects of atmospheric deposition associated with oil sands development on wetland ecosystems? 2a) What are the effects of hydrologic alteration (groundwater withdrawal and other hydrologic disturbances) associated with oil sands mines on wetland ecosystem health, integrity and function? 2b) What (and how) are the best indicators to monitor for the effects of hydrologic alteration associated with oil sands development on wetland ecosystems? 3a) What are the effects of land disturbance (human footprint) associated with oil sands mines on wetland ecosystem health, integrity and function? 3b) What (and how) are the best indicators to monitor for the effects of human disturbance associated with oil sands development on wetland ecosystems?</p>	
<p>Main Assumptions, Constraints, Dependencies. *</p>	<p>- Assumptions: Oil sands development is significantly affecting wetland ecosystems compared to the range of natural variability of reference conditions - Atmospheric deposition, hydrologic alteration and land disturbance are the key stressors affecting wetland ecosystems in the oil sands region. - bogs and poor fens are predicted to be highly sensitive to atmospheric deposition (mainly N and S) owing to their oligotrophic status - fens, marshes, swamps and shallow open water wetlands will be more responsive to hydrologic alteration than bogs - natural climatic cycle in the Boreal Plains is 15-20 years, and thus long-term monitoring of sentinel sites is critical to understand the full range of natural variability and will eventually allow us to come up with simpler cause-effect relationships and biometric indices - Constraints: Timely availability of funds to purchase and obtain equipment and hire qualified personnel for 2017-2018 field season.</p>	
<p>Partner Categories (select all that apply) * A partner is an individual, group, agency, community etc. that is an active participant in the project and in achieving the project deliverables.</p> <p><input checked="" type="checkbox"/> Federal Government <input type="checkbox"/> Another AEP Division <input type="checkbox"/> Another GoA Department <input checked="" type="checkbox"/> University/Academic Institution <input type="checkbox"/> Solely delivered by GoA <input type="checkbox"/> Citizen Science <input type="checkbox"/> Indigenous Community or Organization <input type="checkbox"/> ENGO <input type="checkbox"/> Other</p>	<p>Knowledge System *</p> <p>Both</p>	<p>Location (select all that apply) *</p> <p><input type="checkbox"/> Office or Laboratory <input type="checkbox"/> Sub-regional <input type="checkbox"/> Transboundary (provincial/territorial) <input checked="" type="checkbox"/> Lower Peace Region <input type="checkbox"/> Upper Peace Region <input type="checkbox"/> North Saskatchewan Region <input type="checkbox"/> Red Deer Region <input checked="" type="checkbox"/> Lower Athabasca Region <input type="checkbox"/> Upper Athabasca Region</p>
<p>AEP ONLY: Strategic Alignment to EMSD Outcomes</p>		
<p>AEP ONLY: Strategic Alignment to EMSD Science Plan, select 1-2 areas that apply (if Applicable)</p> <p>Human Relationship with the Environment Legislated/Policy Requirement</p>		
<p>AEP ONLY: Strategic Alignment to AEP Departmental Outcomes</p>		
<p>AEP ONLY: Environmental and Ecosystem Health and Integrity</p> <p>Biodiversity</p>	<p>AEP ONLY: Sustainable Economic Diversity</p> <p>No</p>	<p>AEP ONLY: Social Well-Being</p> <p>Yes</p>
<p>AEP ONLY: Protected Public Health and Safety from Environmental</p> <p>Yes</p>		
<p>AEP ONLY: IMAG/IMSC Information Needs, Please Specify Which Need(s) is Being Addressed. File location M:\EMSD\Common\Portfolio Mgmt System Shared Docs</p>	<p>1) Biodiversity 19.1: Develop and maintain long-term multi-taxa species data sets of current and historical status of species that can be used to address policy and planning needs, including (but not limited to) the development and implementation of Biodiversity Management Frameworks (BMFs). What is the current and historical condition or status of indicator X in region Y? And how is it changing over time? 3) Biodiversity 30: Environmental Health Risk in Alberta: A monitoring program that gathers environmental data for the purpose of assessing human and ecological health risk from exposure to chemicals in the air, water, soils, plants, wildlife and fish. 30.2. What are the levels of contaminants (metals and PAH, pesticides) in country foods (e.g.. berries, meat, medicine)?</p>	
<p>AEP ONLY: How This Project Will Address Each Strategic Theme Selected Above.</p>	<p>1) Multi-taxa (plants, invertebrates, amphibians and birds) will be monitored over time, which will indicate how these species are changing over time associated with oil sands activities. 2) Wetland monitoring sites will sample atmospheric deposition (N, S and base cations), surface water quality, sediment quality and tissues of valued wetland resources. This project will be integrated with monitoring of country foods led by other monitoring programs.</p>	
<p>Project Methodology</p>		

List the Key Project Phases and Provide Bullets for Each Major Task Under Each Project Phase. *	<p>- Phase 1: Develop Long-term Wetland Monitoring Program to assess the effects of oil sands mine activities on wetland ecosystems.</p> <p>Task 1a: Develop a conceptual framework for key stressors and associated wetland responses to for a core wetland monitoring program including key monitoring variables, study design and site selection criteria.</p> <p>Task 1b: Develop rigorous and efficient methods to assess the effects of key stressors on wetland ecosystems.</p> <p>Task 1c: Publish a Long-term Wetland Monitoring Program Plan for the mineable oil sands area detailing the key questions, rationale, study design, site selection criteria and methods.</p> <p>- Phase 2: Develop Long-term Wetland Monitoring Program to assess the effects of oil sands activities including surface mines and in situ facilities on wetland ecosystems across the oil sands regions.</p> <p>Tasks - same as above, adapted to assess the effects of in situ oil sands activities across all oil sands regions.</p>
Describe How Changes in Environmental Condition Will Be Assessed. *	- Changes in wetland ecosystem condition will be assessed by comparing wetlands nearby oil sands development (focal sites) to wetlands far from oil sands development (reference sites) and monitoring a core suite of variables including: water quality, sediment quality, vegetation community composition and structure, benthic invertebrate community composition, and bird and amphibian community composition.
Are There Benchmarks (e.g., objectives, tiers, triggers, limits, reference conditions, thresholds, etc.) Being Used to Assess Changes in Environmental Condition? If So, Please Describe, If Not, State "NONE". *	Baseline conditions of wetland area, types and condition are being assessed using historic photos and remote sensing data through a companion project (Remote Sensing Wetland Ecosystem Change).
Provide a Brief Description of the Methods By Project Phase. *	<p>Component 1: Atmospheric deposition effects on wetland ecosystems</p> <ul style="list-style-type: none"> - measure wet deposition of nitrogen and sulfur compounds, as well as calcium, magnesium and sodium using ion exchange resin collectors -measure carbon, nitrogen and sulfur concentrations in plant/lichen tissues - measure nutrients, dissolved inorganic carbon, pH and specific conductivity in bog interstitial pore water; Wieder et al. 2016 -measure growth of dominant peat-forming moss following cranked wire method; Wieder et al. 2010 <p>Component 2: Hydrologic alteration effects on wetland ecosystems</p> <ul style="list-style-type: none"> - measure nutrients, dissolved inorganic carbon, pH and specific conductivity in fen interstitial pore water following methods outlined in Vile et al. 2013 - measure nutrients, base cations, core water chemistry variables of fen sediments following methods outlined in Wood et al. 2015; Nwaishi et al. 2015 - measure growth of dominant peat-forming moss following cranked wire method - annual measurement of growth of dominant ericaceous shrubs and of Picea mariana - detailed characterization of plant/lichen community composition <p>Component 3: Human footprint effects on wetland ecosystems</p> <ul style="list-style-type: none"> - Assess ABM's wetland dataset for more than 700 sites (350 open water, 350 terrestrial) - develop biomonitoring tool such as vegetation-based index of biological integrity -threshold analysis to develop monitoring and management triggers to be used as benchmarks of wetland ecological condition and trends over time (Arciszewski et al. 2017)
List the Key Indicators Measured. *	' - atmospheric deposition (N, S and base cations), hydrologic budget during growing season, surface water quality, sediment quality, vegetation community composition and structure, benthic invertebrate community composition, bird and amphibian community composition (with acoustic recording units).
Describe Sample Handling Procedures, If Not Applicable, State N/A. *	N/A
List SOPs that Will Be Used, If Not Applicable, State N/A. *	- SOPs for components of the wetlands LTM (e.g. atmospheric deposition monitoring, hydrologic alteration monitoring, etc.) are being developed as project deliverables
Describe the QA/QC Plan, If Not Applicable, State N/A. *	Under development
Describe How Indigenous Communities are Involved in the Project Design, Data Collection, and Analysis (Knowledge Co-creation) and How their Consent Sought. If Not Applicable, State N/A. *	<p>- Indigenous communities have identified wetlands as culturally important and have expressed concerns regarding the loss and degradation of wetlands during engagement in the Lower Athabasca Regional Plan (LARP) (Government of Alberta (GOA) 2012) and currently during development of LARP environmental management frameworks.</p> <p>- This project is integrated with the OSM 'Culturally Important Wetland Plants' Focus Study (WL-LM-2_1718), which is working with 13 local indigenous and Metis communities across the Athabasca, Cold Lake and Peace oil sands regions.</p> <p>- The project is working with local communities to identify wetland monitoring sites of interest and wetland indicators of interest in a multiple evidence based approach.</p>

Components Delivered by Others	
List by Project or Project Phase Each Component That Will Be Delivered by An External Party (including analytical laboratories) and Name the Party. State None if Not Required. *	<ul style="list-style-type: none"> - Monitoring of six bog sites for effects of atmospheric deposition on bog ecosystems led by Drs. R. Kelman Wieder (Villanova University; existing grant 18GRAEM07), Melanie Vile (Villanova University) and Dale Vitt (University of Southern Illinois; existing grant 18GRAEM26) - Monitoring of six fen sites for effects of hydrologic alteration on fen ecosystems led by Profs. R. Petrone and J. Price (University of Waterloo; existing grant 18GRAEM09) - Development of biotic indicators for effects of oil sands development on wetlands co-led by Dr. Rebecca Rooney (University of Waterloo; existing grant 18GRAEM24) - Wood Buffalo Environmental Association (WBEA) to conduct bulk and dry deposition sampling work. - Surface water quality measurements follows the parameters, standard operating procedures, and laboratories used under the OSM Long-term Surface Water Quality Monitoring Program.
Will These Components be Delivered Under Grant or Contract or Both? Please Describe and Name the Associate Work Plan/Grant/Contract for These Services if Not Included Within This Work Plan. *	<ul style="list-style-type: none"> - Effects of atmospheric deposition on bog ecosystems is delivered under grant to Drs. R. Kelman Wieder, Melanie Vile (Villanova University; existing grant 18GRAEM07) and Dale Vitt (University of Southern Illinois; existing grant 18GRAEM26) - Effects of hydrologic alteration to fen ecosystems is delivered under grant to Profs. R. Petrone and J. Price (University of Waterloo; existing grant 18GRAEM09) - Development of biotic indicators based on analysis of ABMI's wetland datasets is delivered under a grant to Dr. Rebecca Rooney (University of Waterloo; existing grant 18GRAEM24) - Sampling of bulk and dry deposition at bog monitoring sites will be conducted by WBEA (contract under development)
Monitoring Site Locations and Coordinates (for all sites, please add them to the Monitoring Site Location tab - a separate excel sheet)	
Attach Map of Locations. Distinguish Indicators by Station if Necessary. Distinguish Sampling Frequency by Station if Necessary.	See attached map.
Project Schedule	
FOR OIL SANDS MONITORING PROJECTS ONLY: A coordinated field monitoring schedule for the OSM Program is required. Please complete the attached document named "OSM Program Field Monitoring Schedule" in addition to this work plan. Fill as much as you can recognizing that scheduling changes will occur and the scheduling document will be updated regularly. Please note the scheduling document will be shared with stakeholders.	See attached field monitoring schedule document.
FOR OIL SANDS MONITORING PROJECTS ONLY: Have You Coordinated With Other Project Leads On Field Logistics? If So, Please Specify. *	<ul style="list-style-type: none"> - This project is coordinated with the following wetland monitoring focus studies through program development to co-locate monitoring sites and development of consistent monitoring indicators and methods: - Culturally Important Wetland Plants (WL-LM-2_1718) - Remote sensing wetland ecosystem change detection method development (WL-MD-6-1718) - Design of Deltaic Wetland Ecosystem Health Monitoring Program (WL-MD-5-1718) - Acquisition of Aerial High-Resolution Digital Ground Terrain Information in the Peace Athabasca Delta for Wetland Monitoring (WL-MD-4-1718) - Amphibian and Wetland Health: Investigation of Wetland Ecosystem Health (WL-MD-11-1718)
Other	
Additional Details.	
Will Capacity Building and Training be a Component of the Project and If So, Explain How. If Not, State N/A. *	<ul style="list-style-type: none"> - Co-supervision of a PhD candidate and Post Doc by Drs. Danielle Cobbaert and Rebecca Rooney under the land-disturbance - biotic indicator response component. - Graduate students, technicians and post-docs from research labs at various partnered universities will be involved with project components and this contributes to development of HQPs - several EMSD staff are involved with various aspects of the project and this will contribute to capacity building and training in AEP
Environmental Impact and Considerations.	
Data Management and Digital Assets	

Will Data be Produced as a Result Of This Project? *	Type of Quantitative Data Variables	Frequency Of Collection
Yes	Continuous	Other
Data Collection Period: Start Date - End Date	Timeline For Upload Period: Start Date - End Date	
01/08/2017 - 31/03/2020	30/03/2020	
Is There a Data Sharing Agreement? (Yes or No).	Yes	
Will the Data Include Traditional Knowledge as Defined by and Provided by an Indigenous Representative, Community or Organization (Yes / No).	Yes, this component is led by Tracy Howlett, lead of the Culturally Important Wetland Plants project (WL-LM-2-1718).	
Platform/Location of Data Storage.	- existing data stored in on AEP's DIVA database - development of a wetland monitoring data storage underway	
Project Deliverables		
Proposed 2018-19 Deliverable Type (for each deliverable outline document, presentation, meeting, etc.)		
<input checked="" type="checkbox"/> Peer-reviewed Journal Publication	<input type="checkbox"/> Peer-reviewed Conference Proceeding	<input type="checkbox"/> Non-peer reviewed Conference Proceeding
	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
State of the Science: Wetland Remote Sensing in the Oil Sands Mining Region (collaboration with D. Cobbaert, L. Chasmer, D. Peters, J. Montgomery, and others)		
	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Comparison between methods for macroinvertebrate sampling in shallow open water wetlands (ABMI vs. CABIN) (D. Cobbaert, S. Connor, D. Baird, G. Scrimgeour and others)		
The causes of ecohydrological impacts and how they are manifest in AOSR wetlands - Focusing on disturbed sites to examine the gradient of impact to understand how far into a wetland it is translated; Determine what types, and parts, of systems are most sensitive and will most readily show changes (R. Petrone and J. Price)		
Focusing on disturbed sites to examine the	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
State of the Science: Wetland Monitoring and Research in the Oil Sands Mining region and recommendations for wetland monitoring (collaboration with D. Cobbaert, K. Wieder, M. Vile, D. Vitt, R. Rooney, R. Petrone, and J. Price)		
The characteristics of a system that are most sensitive, and will perform best as indicators of ecohydrological change (R. Petrone and J. Price)		
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Hydrologic connectivity among landscape units representative of the AOSR under a changing climate - Model the resilience of wetlands in the AOSR landscape under future climatic scenarios for the region (R. Petrone and J. Price)		
- The causal pathways connecting wetland vegetation to stressors induced by oil sands mining activities - Conversion of existing Fuzzy Cognitive Mapping into a quantitative Development of a structural equation model that links stressors and responses to highlight candidate indicators (R. Rooney and D. Cobbaert)	<input type="checkbox"/>	<input type="checkbox"/>
Technical Report	Book Chapter	Public Dissemination Document
Annual Report	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
- OSM LTM Wetland Monitoring Program Development Progress - March 2019		

Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
<input type="checkbox"/> Conference Presentation(s)	<input type="checkbox"/> Stakeholder Presentation	<input type="checkbox"/> Key Engagement/Participation Meeting *
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
<input type="checkbox"/> EMSD Strategic & Operational Publication	<input type="checkbox"/> Other Documents	
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	

Proposed Deliverables After 2018/2019 for the project funds received in 2018/2019		
<input checked="" type="checkbox"/> Peer-reviewed Journal Publication	<input type="checkbox"/> Peer-reviewed Conference Proceeding	<input type="checkbox"/> Non-peer reviewed Conference Proceeding
	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Carbon, Nitrogen, and Sulfur in Bog Plant/Lichen Tissues across the Athabasca Oil Sands Region Synthesis of 8 years of monitoring data (2009-2016) for 8 species from 5 bog sites (K. Wieder, M. Vile and D. Vitt)		
Bog Interstitial Water Chemistry across the Athabasca Oil Sands Region Synthesis of 8 years of monitoring data (2009-2016) for NH4+-N, NO3--N, SO42--S dissolved organic N, dissolved organic C from 5 bog sites (K. Wieder, M. Vile and D. Vitt)		
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
- Effects of atmospheric deposition associated with oil sands development on bog ecosystems - Synthesis of 3-years monitoring program results (collaboration with K. Wieder, M. Vile and D. Vitt)		
-Effects of land disturbance on wetland biota - Evaluation of ABMI's wetland dataset for assessing effects of oil sands development (collaboration with R. Rooney)		
- Effects of - Effects of hydrologic alteration associated with oil sands development on fen ecosystems - Synthesis of 3-years monitoring program results (collaborator with R. Petrone and J. Price)		
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
- Do multiple assemblages offer superior biomonitoring performance? - Use ABMI's biodiversity monitoring data on birds, vascular plants, bryophytes, and mites, explore which groups are most sensitive to human disturbance in Boreal peatlands of Alberta (R. Rooney and D. Cobbaert)		
<input checked="" type="checkbox"/> Technical Report	<input type="checkbox"/> Book Chapter	<input checked="" type="checkbox"/> Public Dissemination Document
Annual Report	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
- OSM LTM Wetland Monitoring Program Development Progress - March 2020		
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
		OSM Wetland Long-Term Monitoring Program Operations Manual
<input type="checkbox"/> Conference Presentation(s)	<input type="checkbox"/> Stakeholder Presentation	<input type="checkbox"/> Key Engagement/Participation Meeting *
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments

Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
<input type="checkbox"/> EMSD Strategic & Operational Publication	<input type="checkbox"/> Other Documents	
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	
All Completed Products		if a multi-
year project, specify all completed products to date (consistent format for the fields below). Add rows as required.		
Journal Paper		
Required Format: Author (follow APA citation format), Year, Title, Journal, Volume, Page Numbers, Open or Closed and Document Location		
Example: Jacoby, W. G. (1994). Public Attitudes Toward Government Spending. American Journal of Political Science, 38(2), 336-361.		
Fearon, J. D., & Laitin, D. D. (2003). Ethnicity, Insurgency, and Civil War. American Political Science Review, 97(01), 75. doi: 10.1017/S0003055403000534		
1)		
2)		
3)		
4)		
5)		
Technical Report		
Required Format: Author, Year, Title, Publisher Location, Name of Publisher, Publisher, Document Location		
Example: Author, F.M. (Publication Year). Title of Report (Report No. XXX). Publisher City, State: Publisher		

1)
2)
3)
4)
5)
Book Chapter
Required Format: Author, Year, Title of Paper, Editors, Title of Book, Page Numbers, Location of Publisher, Name of Publisher, Document Location
Example: Hemingway, E. (1999). The Killers. In J. Updike & K. Kenison (Eds.), The Best American Short Stories of the Century (pp.78-80). Boston, MA: Houghton Mifflin)
1)
2)
3)
4)
5)
Conference Proceeding
Required Format: Author, Year, Title of Paper, Editors, Title of Proceedings, Name of Conference Location of Conference, Publisher Location, Name of Paper Presented at Title of Conference: Subtitle of Conference, Location (inclusive page numbers). Place of Publication: Publisher.)
1)
2)
3)
4)
5)
Public Dissemination Document
Required Format: Author, Year, Title, Journal / Report, Volume, Publisher, Page Number, Number of Pages, Document Location
1) Cobbaert, D. et al. 2018. Oil Sands Wetland Long-term Wetland Monitoring Framework. Alberta Environment and Parks. 100 pages. March 31, 2018.
2)
3)
4)
5)
AEP ONLY: EMSD Strategic and Operational Publication
Required Format: Author, Year, Title, Publisher Location, Name of Publisher, Publisher, Document Location
1)
2)
3)
4)
5)
Other Documents
Detailed Information of Other Documents
1) GIS shapefile of OSM Wetland Monitoring Project study sites (updated annually); March 2018
2) Standards and Protocols for the Evaluation and Integration of OSM Wetland Studies; March 2018
3) Workshop final report - OSM Integrated Wetland Monitoring Program Plan; March 2018
4) Annual Report: OSM LTM Wetland Monitoring Program Development Progress; March 2018
5)
Conference Presentation
Required Format: Presenter, Date, Location, Title, Platform or Poster, Conference Name
1)
2)
3)
4)
5)
Stakeholder Presentation
Required Format: Presenter, Date, Location, Title, Platform or Poster, Name of Meeting
1)

2)
3)
4)
5)

Key Engagement/Participation Meeting

Required Format: Meeting Host, Date, Location

1) Danielle Cobbaert, AEP & Bruce Pauli, ECCC, 13 - 14 Dec 2017, Federal Building Room B041, Edmonton, OSM Wetland Monitoring Integration Workshop, 50 participants including provincial government, federal government, local communities, industry and non-government agencies.
1) Danielle Cobbaert, AEP & Bruce Pauli, ECCC, March 7-8, 2018, Federal Building, Edmonton, OSM Wetland Monitoring Integration Workshop to finalize the Wetland Monitoring Integration Plan, 50 participants including provincial government, federal government, local communities, industry and non-government agencies.
3)
4)
5)

**Human Resources / Staffing Plan
(roles and responsibilities)**

Name & Role	Organization	Responsibilities
Danielle Cobbaert, Lead	EMSD	- coordinate integration between various Wetland Monitoring Focus Studies and Wetland LTM program development - manage monitoring program implementation with external partners - participate in Indigenous Community engagement
Bruce Pauli, Co-Lead	ECCC	- manage and coordinate ECCC staff participation and process as required for project delivery - PI for Amphibian and Wetland Health FS; seek
Greg Wentworth, Co-Principal Investigator (Atmospheric Science)	EMSD	- coordinate Wetland Monitoring Program with various JOSM Atmospheric Deposition Monitoring Programs - Co-PI on atmospheric deposition component of
Tracy Howlett, Co-Principal Investigator (Indigenous Community)	EMSD	- Co-PI for Wetland Monitoring Program - Indigenous Community component - coordinate Wetland Monitoring Program with various JOSM Indigenous Community Monitoring
Donald Baird, Development Collaborator (OSM Wetland Monitoring)	ECCC	- PAD Wetland Monitoring FS co-lead
Daniel Peters, Development Collaborator (OSM Wetland Monitoring)	ECCC	- PAD Wetland Monitoring FS co-lead
Samantha Song, Development Collaborator (OSM Wetland Monitoring)	ECCC	- Co-PI for Wetland Habitat FS; seek integration and alignment between OSM wetland habitat monitoring program
Kel Wieder, Co-Principal Investigator (Atmospheric Deposition)	Villanova University	- external contract to implement Atmospheric Deposition component at 6 sentinel sites over 3
Melanie Vile, Co-Principal Investigator (Atmospheric Deposition)	Villanova University	
Dale Vitt, Co-Principal Investigator (Atmospheric Deposition)	University of Illinois	
Rich Petrone, Co-Principal Investigator (Hydrologic Alteration)	University of Waterloo	
Jonathan Price, Co-Principal Investigator (Hydrologic Alteration)	University of Waterloo	- external contract to implement Hydrologic Alteration component at 6 intensive sites
Rebecca Rooney, Co-Principal Investigator (Biotic indicator development)	University of Waterloo	- co-advisor with Danielle Cobbaert for PhD student and post-doc for biotic indicator program development including rationale and approach for
Stephanie Connor, Wetland Scientist	Alberta Environment and Parks	- field technician - surface water quality, sediment, and benthic invertebrate technical lead - field data validation and review and analysis - literature review and manuscript preparation
Joshua Montgomery, Wetland Scientist	Alberta Environment and Parks	- field technician - hydrology, vegetation and remote sensing technical lead - GIS and remote sensing analysis - field data validation and review and analysis
vacant, Biodiversity Scientist	Alberta Environment and Parks	- Statistical analysis of existing OSM biological monitoring data collected at wetland sites and recommendations on where, when, what and how to best monitor wetland biotic indicators to detect effects from oil sands development. - Geospatial analysis of OSM biological monitoring sites in wetlands in relation to key stressors associated with oil sands development. - Biological field data validation, review and analysis - Literature review and manuscript preparation

Agnieszka Sztaba, Wildlife Biologist	Alberta Environment and Parks	- field technician - amphibian, bird and wildlife field monitoring technical lead
Brett Sarchuk, Wildlife Biologist	Alberta Environment and Parks	- field technician - amphibian, bird and wildlife field monitoring technical lead - field logistics coordination
AEP ONLY: Additional Human Resources		
Name & Role	Branch - Section	Estimated time (% of annual FTE)
Danielle Cobbaert, Lead	Science - BLEH	60
Agnieszka Sztaba, Wildlife Biologist	Science - BLEH	15
Brett Sarchuk, Wildlife Biologist	Science - BLEH	10
Stephanie Connor, Wetland Scientist	Science - BLEH	100
Joshua Montgomery, Wetland Scientist	Science - BLEH	100
Wetland Scientist	Science - BLEH	100
Wetland Biologist	Science - BLEH	100
Financial Details and Budget Request		
Source of Funding Requested Year 1 - 2018/19		
	AEP ONLY: EMSD	OSM
Salaries and Benefits - EMSD Chargeback		\$102,000
Salaries and Benefits -New OSM Staff		\$480,000
Operations and Maintenance		\$0
Consumable materials and supplies - field supplies, atmospheric deposition, surface water quality, sediment quality analyses and benthic invertebrate identification		\$180,905
Conferences and meetings travel (team members to travel to 1 international science conference, 2 Canadian conferences)		\$6,000
		\$0
Field work travel -Accommodation and food (1 field crew from EDM to FMM 4 flights * \$600/ flight + 25 days * 2 person crew * Hotel \$200/ day * GOA per diems \$50/day); Field truck rental (\$4068)		\$27,400
Project-related travel - 2 ECCC workshops in Toronto; plus monthly trips to Edmonton and Fort McMurray		\$15,000
Engagement - Host one wetland workshop in Edmonton, including hosting community members		\$20,000
Reporting - public access to peer-review journals		\$5,000
Contract to WBEA for sampling 6 bog sites for atmospheric deposition using passive and bulk samplers (N, S, and base cations) including materials (\$4,400), analysis (\$32,900), labour (\$49,700), travel (\$3,000) and administration (\$16,200).		\$106,200
Overhead		\$0
Atmospheric Deposition Effects to Bogs - Biogeochemistry Response - Existing grant (18GRAEM07) to Villanova University (Prof. Kel Wieder and Melanie Vile) for intensive monitoring of 6 bog sites		\$382,896
Atmospheric Deposition Effects to Bogs - Plant Community Response - Existing grant (18GRAEM26) to University of Southern Illinois to Dr. Dale Vitt for intensive monitoring of 6 bog sites		\$66,000
Effects of Hydrologic Alteration to Fens - Existing grant (18GRAEM09) to University of Waterloo to Profs. R. Petrone and J. Price to intensively monitor 6 fen ecosystems for hydrologic responses		\$285,729
Biotic indicator program development - Existing grant (18GRAEM24) University of Waterloo to Dr. Rebecca Rooney to assess ABMI's wetland monitoring dataset and develop biomonitoring indicators and tools		\$110,055
Capital		\$0
Total budget request for the year	0	\$1,787,185
Total budget approved		
Source of Funding Requested Year 2 - 2019/20		
	AEP ONLY: EMSD	OSM
Salaries and Benefits - EMSD Chargeback		\$145,300
Salaries and Benefits -New OSM Staff		
Operations and Maintenance		\$0
Consumable materials and supplies		\$264,617
Conferences and meetings travel		\$6,000
Field work travel		\$183,688
Project-related travel		\$15,000

Engagement		\$20,000
Reporting		\$5,000
Contract to WBEA for sampling 6 bog sites for atmospheric deposition		\$106,200
Overhead		\$0
Atmospheric Deposition Effects to Bogs - Biogeochemistry Response - Existing grant (18GRAEM07) to Villanova University (Prof. Kel Wieder and Melanie Vile) for intensive monitoring of 6 bog sites		\$382,896
Atmospheric Deposition Effects to Bogs - Plant Community Response - Existing grant (18GRAEM26) to University of Southern Illinois to Dr. Dale Vitt for intensive monitoring of 6 bog sites		\$66,000
Effects of Hydrologic Alteration to Fens - Existing grant (18GRAEM09) to University of Waterloo to Profs. R. Petrone and J. Price to intensively monitor 6 fen ecosystems for hydrologic responses		\$285,729
Biotic indicator program development - Existing grant (18GRAEM24) University of Waterloo to Dr. Rebecca Rooney to assess ABMI's wetland monitoring dataset and develop biomonitoring indicators and tools		\$110,055
Capital		\$0
Total budget request for the year		\$1,590,485
Total budget approved		

Source of Funding Requested Year 3 - 2020/21

	AEP ONLY: EMSD	OSM
Salaries and Benefits - EMSD Chargeback		
Salaries and Benefits -New OSM Staff		
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		
Overhead		
Grants		
Capital		
Total budget request for the year	0	0
Total budget approved		

Source of Funding Requested Year 4 - 2021/22

	AEP ONLY: EMSD	OSM
Salaries and Benefits - EMSD Chargeback		
Salaries and Benefits -New OSM Staff		
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		
Overhead		
Grants		
Capital		
Total budget request for the year	0	0
Total budget approved		

Budget Request for the Entire Project	0	3,377,670
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Project Approval(s)

Proposal Submitted by

Surname	Given Name	Organization
Cobbaert	Danielle	EMSD

Signature	Date
	13/02/2018

X

Danielle Cobbaert
Wetland Scientist

Proposal for OSM Reviewed by		
EMSD Executive Director	Signature	Date
Bill Donahue, Science Branch		13/02/18
AEP Administrator/Coordinator - Review	X	Date
	Dan Farr, for Bill Donahue Director, Biodiversity and Ecosystem Health ...	
ECCC Administrator/Coordinator - Review		Date
OSM Project Approved by		
AEP Co-Lead for OSM	Signature	Date
ECCC Co-Lead for OSM	Signature	Date
AEP ONLY: Proposal for EMSD Reviewed by		
EMSD Director	Signature	Date
AEP ONLY: EMSD Project Approved by		
EMSD Executive Director	Signature	Date
EMSD Chief Scientist	Signature	Date
OSM / EMSD Project Has Not Been Approved		
Project Status	Date Notified	Date Required
The project is conditionally approved. The following conditions are required before approval is granted.		
List the Condition(s)		
Condition(s) Addressed / Approval Granted		
Choose one		
OSM / EMSD Approval Post Removal of Condition(s)		
Name & Title	Signature	Date

Add All Monitoring Site Locations and Coordinates (insert more rows if required)

Location Name *	Lat*	Long*
Firebag Fen	57.22433	-110.898
Poplar Road Fen	56.93852	-111.549
Unnamed 1 Fen	56.57392	-111.276
Pauciflora Fen	56.37542	-111.235
Unnamed 2 Fen	56.32108	-111.65
Mariana Fen	55.899	-112.096
McClelland Fen	57.44	-111.448
Kearl Fen	57.265	-111.262
JPH4 Bog	57.113	-111.423
McKay Bog	57.228	-111.703
McMurray Bog	56.627	-111.196
Anzac Bog	56.469	-111.043
Mariana Bog	57.431	-111.279
McClelland Bog	57.433	-111.256
Kearl Bog	57.275	-111.253
S46 SOWW	58.337	-111.504
Unnamed 1 SOWW	57.507	-111.544
McKay SOWW	57.143	-111.605
Unnamed 2 SOWW	57.027	-111.488
La Saline SOWW	57.076	-111.523
McMurray SOWW	56.818	-111.424
Voyager SOWW	56.934	-111.454
Shipyard SOWW	56.96	-111.436
Mariana SOWW	55.878	-112.113
McClelland SOWW	57.453	-111.294
Kearl SOWW	57.258	-111.252
Maqua SOWW	56.36996	-111.28354
Tower Road North SOWW	56.79252	-111.78166
Horse River SOWW	56.10873	-111.76422
Hangingstone SOWW	56.31507	-111.6237
Pat's Pond West SOWW	57.51162	-111.40179
AOSTRA Road SOWW	56.939	-111.66248

General Ledger - 2014		
Account	Debit	Credit
1000 Cash		1000
1010 Accounts Receivable		1010
1020 Inventory		1020
1030 Prepaid Expenses		1030
1040 Property, Plant, and Equipment		1040
1050 Accumulated Depreciation		1050
2000 Accounts Payable	2000	
2010 Accrued Liabilities	2010	
2020 Deferred Revenue	2020	
3000 Equity		3000
3010 Common Stock		3010
3020 Retained Earnings		3020
4000 Revenue		4000
4010 Sales Revenue		4010
4020 Service Revenue		4020
5000 Expenses	5000	
5010 Cost of Goods Sold	5010	
5020 Selling Expenses	5020	
5030 Administrative Expenses	5030	
5040 Depreciation Expense	5040	
5050 Interest Expense	5050	
5060 Income Tax Expense	5060	
6000 Dividends	6000	
7000 Income Statement		7000
7010 Net Income		7010
7020 Net Loss	7020	
8000 Balance Sheet		8000
8010 Total Assets		8010
8020 Total Liabilities	8020	
8030 Total Equity		8030

Financial Statement: Profit and Loss Statement		
Period: 2023-01-01 to 2023-12-31		
	2023-01-01 to 2023-06-30	2023-07-01 to 2023-12-31
Revenue	1000000	1000000
Cost of Goods Sold	(600000)	(600000)
Gross Profit	400000	400000
Operating Expenses	(200000)	(200000)
Operating Income	200000	200000
Interest Expense	(50000)	(50000)
Income Before Taxes	150000	150000
Taxes	(30000)	(30000)
Net Income	120000	120000
Other Income	0	0
Other Expenses	0	0
Net Income	120000	120000

Annual Financial Statement		
Account	2019	2018
Assets		
Cash	100	100
Accounts Receivable	200	200
Inventory	300	300
Property, Plant, and Equipment	400	400
Intangible Assets	500	500
Other Assets	600	600
Liabilities		
Accounts Payable	100	100
Long-Term Debt	200	200
Other Liabilities	300	300
Equity		
Common Stock	100	100
Retained Earnings	200	200
Other Equity	300	300
Total	1,500	1,500

Items of Funding Requested For F. 2015/16

2015/16 2015	
Salaries and Benefits	
Overseas and Conferences	
Equipment Purchase and Capital	
Construction and Building Costs	
Travel Costs	
Professional Fees	
Printing	
Research	
General Services - Organisation/Personnel Support	
Research	
Research - 3rd Party Support/Consultancy	
Other	
Total Budget Requested For the Year	
Total Budget Available	

Items of Funding Requested For F. 2015/16

2015/16 2015	
Salaries and Benefits	
Overseas and Conferences	
Equipment Purchase and Capital	
Construction and Building Costs	
Travel Costs	
Professional Fees	
Printing	
Research	
General Services - Organisation/Personnel Support	
Research	
Research - 3rd Party Support/Consultancy	
Other	
Total Budget Requested For the Year	
Total Budget Available	

Section 1: Introduction

Section 2: Overview

Section 3: Detailed Analysis

Section 4: Data Table 1

Section 5: Data Table 2

Section 6: Discussion

Section 7: Conclusion

Section 8: References

Section 9: Appendix A

Section 10: Appendix B

Section 11: Appendix C

Section 12: Appendix D

Section 13: Appendix E

Section 14: Appendix F

Section 15: Appendix G

Section 16: Appendix H

Section 17: Appendix I

Section 18: Appendix J

Section 19: Appendix K

Section 20: Appendix L

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Section 22: Final Remarks

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Section 33: Appendix R

Section 34: Appendix S

Section 35: Appendix T

Section 36: Appendix U

Section 37: Appendix V

Section 38: Appendix W

Section 39: Appendix X

Section 40: Appendix Y

Section 41: Appendix Z