

## FOCUSED STUDY ACTIVITY WORK PLAN

### General Information

<b>Work Plan Unique Identifier:</b>	GW-MD-3-1718
<b>Focused Study Activity Title:</b>	Assessment of Groundwater Monitoring- Towards a Comprehensive Groundwater Monitoring Strategy/Design.
<b>Focused Study Category:</b>	Monitoring Design and Method Improvement
<b>Geographic Location</b> ( <i>choose from drop-down menu. If Project Location is in more than one area choose from second drop-down</i> )	Athabasca Oil Sands Region
<b>Monitoring Site(s) Coordinates</b> ( <i>latitude and longitude</i> )	N/A
<b>Project Leader:</b>	Greg Bickerton & Cynthia McClain
<b>Organization and contact information:</b>	<p>Greg Bickerton Senior Hydrogeologist, Water Science and Technology Directorate Environment and Climate Change Canada (ECCC), Burlington ON greg.bickerton@canada.ca / Tel: 905-336-4597</p> <p>Cynthia McClain Hydrogeologist Environmental Monitoring and Science Division (EMSD) Alberta Environment and Parks (AEP), Calgary AB <a href="mailto:Cynthia.McClain@gov.ab.ca">Cynthia.McClain@gov.ab.ca</a> / Tel: 403-297-5950</p>
<b>Date Study initiated:</b>	April 1, 2017
<b>Monitoring Category:</b> <i>(From OSM long-term plan; choose from drop-down menu)</i>	Watershed Monitoring
<b>Strategic Objective of Focused Study:</b> ( <i>From OSM long-term plan; choose from drop-down menu</i> )	Objective W3: Integration and Synthesis
<b>Hypotheses:</b> <i>(Briefly outline the specific hypotheses that your focused study is aiming to address)</i>	Objective: Data discovery, compilation, review and analysis of existing groundwater quantity and quality information (e.g., AEP ERSK "database", industry data) and recommendations for a comprehensive groundwater monitoring strategy (e.g., plans/focused studies) that address Oil Sand Monitoring (OSM) objectives including: (a) whether industry's groundwater extraction is impacting groundwater levels (e.g., drawdown), and (b) whether

	industrial activities are influencing groundwater quality.
<p><b>Deliverables:</b></p> <p><i>What tangible goal (s) and/or product(s) will the monitoring produce and when?</i></p>	<ol style="list-style-type: none"> <li>1. Report on inventory and assessment of available groundwater data (March 2018)</li> <li>2. Report with recommendations for developing a comprehensive groundwater (and groundwater-surface water) monitoring strategy &amp; program that addresses OSM objectives (March 2018)</li> <li>3. Presentation of results at meeting (e.g., COSIA, Oil Sands Science Symposium) (March 2018)</li> </ol>

## Detailed Study Plan

(Please provide detailed information on the specifics of your focused study including – **(keywords, hypothesis and the assumptions and constraints behind your hypothesis)**)

**Provide a maximum of 10 key words that describe this project. Use commas to separate them:**

Groundwater, existing data, inventory, evaluation, compilation, meta-analysis, water quality, water resources

**Describe how you will test your hypothesis:**

- Conduct literature review, including review of recommendations from previous reports/studies (e.g., GW Solutions, 2015; Birks et al., 2016)
- Identify existing sources of groundwater information and monitoring infrastructure available
- Identify barriers that must be address to access/use information from existing groundwater programs and the human, institutional and financial resources required to address the barriers
- Define data and metadata formats, methods for analysis
- Establish data sharing agreements as necessary and/or where possible (e.g., with industry)
- Compile data from multiple sources
- Evaluate what information can be used and data gaps
- Conduct data analysis primarily focused on groundwater levels and groundwater quality
- Meet with wetland and surface water scientists to identify overlapping information/monitoring needs
- Use result of data compilation, analysis and literature review to identify and prioritize monitoring and focus studies to address JOSM objectives of monitoring groundwater levels and quality to evaluate industrial impacts
- Communicate findings in written reports and via a presentation at a scientific or stakeholder meeting
- Advance development of strategic direction for groundwater monitoring and recommend next steps

**Assumptions and Constraints behind the hypothesis and the testing method:**

We assume that unassessed groundwater data exists, and that it can be effectively and efficiently recovered from within AEP/ECCC or external sources (e.g., via data sharing agreements with industry). One of the groundwater "databases" identified is housed within AEP and called ERSK. ERSK is actually more of a filing system, which is composed of PDFs (post 2011) and hard copies (prior to 2011) containing groundwater data. Thus, we have included in this work plan provisions for data

technicians to digitize this information, pending data-sharing agreements.

We assume that an EMSD hydrogeologist will be hired, and will have sufficient time to contribute to this work.

## References:

GW Solutions (2015) Scientific Panel Review of the Groundwater Monitoring Plans in the Athabasca Oil Sands Region. Report prepared for AEMERA and EC.

Birks, J et al. (2016) "Oil Sands Groundwater Monitoring Program Review: Phase II" Report submitted to AEMERA by AITF.

## Data Management

*If this work generates data please summarize your project-level data management plan.*

Deliverables	Timeframe
Data Collection Period: <i>Field work (N/A)</i>	Start : 2016-09-14      End: 2016-09-14
Data Analysis Period: <i>Laboratory analysis (N/A) and QA/QC of data</i>	Start : 2017-04-01      End: 2018-03-31
Data Release Date: <i>Metadata and data consistent, complete and meet basic standard format for publication in Open Data; on or linked to JOSM portal</i>	2018-06-30

## Reporting and Publications

*Provide information on the anticipated reports / publications. (Insert additional rows if needed)*

Expected Subject/Titles of Publications or Reports	Short Description of Publication or Report	Expected Year of Publication
Assessment of available groundwater data in the Athabasca Oil Sands Region	Report on inventory and assessment of available groundwater data	2018
Recommendations for a comprehensive groundwater monitoring program in the Athabasca Oil Sands Region	Report with recommendations for developing a comprehensive groundwater (and groundwater-surface water) monitoring strategy & program that addresses OSM objectives	2018

## Technical / Professional Roles and Responsibilities

Identify members of the monitoring team/organization, their roles and responsibilities. Identify monitoring organization leads if different from overall monitoring activity lead. (Insert additional rows if needed)

Role	Responsibilities
Principal Investigator Greg Bickerton Environment and Climate Change Canada	Conduct work described in the detailed study plan and deliverables sections
Co-Principal Investigator Cynthia McClain Alberta Environment and Parks (AEP)	Conduct work described in the detailed study plan and deliverables sections
Data Technicians Multiple Organizations (To be determined)	Digitize groundwater data from PDF or hard copy
Data Sharing Agreements AEP and ECCC	Explore/Establish data sharing agreements with industry

**Deliverables (Year 1)** If your Focus Study is longer than 1 year then complete **Appendix 3** for multi-year deliverables breakdown

Provide a summary of tangible quarterly deliverables. Identify major project areas (deliverables) and results that can be identified as a tangible goal. This could include: field work, lab work/ analysis, evaluation, data, reports, publications, SOPs etc. Do not define process as your Deliverable e.g. ‘fly to Ft. McMurray to conduct fieldwork’ or ‘seek Director approval for report’.

<b>Deliverable(s)</b> (please provide enough information to support status reporting)
<b>Q1 – April to June</b>
Literature review and data discovery
Initiate data sharing agreements if required
Finalize metadata and data formats
<b>Q2 – July to September</b>
Continuation from Q1 if required
Data compilation & formatting
Methodology defined for assessment/analysis and gap assessment
<b>Q3 – October to December</b>
Continuation from Q1/Q2 if required
Analysis & draft report preparation
Meeting with surface water and wetlands scientists
<b>Q4 – January to March</b>
Report completion
Presentation of results at meeting

## Detailed Financial Breakdown – Year 1 of 1 (2017-2018)

Also complete **Appendix 2** for the multi-year financial breakdown

Budget requirements – List areas that require budget expenditures: (ADD OR DELETE BUDGET CATEGORIES AS REQUIRED)	OS Funding	External Funding (outside JOSM)
<b>O&amp;M - Operations and Maintenance:</b>		
Helicopter Costs	\$	\$
Field Costs	\$	\$
Data Management	\$	\$
Internal Lab Analysis	\$	\$
Consumable Materials & Supplies	\$10,500	\$
<b>Sub-Total</b>	\$	\$
<b>O&amp;M - Travel</b>		
Field Work	\$	\$
Conferences ( <i>identify conference</i> )	\$	\$
Meeting ( <i>identify meeting</i> ) Travel for G. Bickerton	\$ 25,000	\$
<b>Sub-Total</b>	\$	\$
<b>O&amp;M - External Contracts :</b>		
Goods and Services Contract ( <i>describe contractor</i> )	\$	\$
External Lab Analysis	\$	\$
<b>Sub-Total</b>	\$	\$
<b>Salaries:</b>		
Principal Investigators (G. Bickerton in-kind ECCC, EMSD Hydrogeologist)	\$40,000	\$
Technical / Professional Assistants	\$124,500	\$
Field Staff	\$	\$
<b>Sub-Total</b>	\$	\$
<b>Total Salaries</b>	\$164,500	
<b>Total O&amp;M</b>	\$35,500	
<b>2017-2018 GRAND TOTAL* (Before other related costs)</b>	\$200,000	\$

The total O&M cost for ECCC (\$29,402) with other related costs is \$30,607. \$169,393 is allocated to AEP.

## Appendix 1 - Approvals

<b>Project Submitted by:</b>		
Name:		
Organization:	Signature:	Date:
<b>Project Approved by:</b>		
Dr. Monique Dubé (AEP)	Dr. Kevin Cash (ECCC)	
Signature 	Signature 	
Date	Date	