

**TRCA Technical Guidelines for the Development of  
Environmental Management Plans for Dewatering  
September 2013**

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**Rationale:**

The *Technical Guidelines for the Development of Environmental Management Plans for Dewatering* applies to a wide range of projects with a requirement for dewatering related to groundwater control, which could result in impacts to environmental receptors, including fish and fish habitat, forests and wetlands. The scale and scope of the Environmental Management Plan (EMP) is directly dependent upon the scale and scope of the potential environmental impact(s). Where appropriate, a commitment within an Environmental Assessment (EA) to undertake an EMP can facilitate TRCA support for the EA. Following the *Technical Guidelines for the Development of Environmental Management Plans for Dewatering* can then assist the proponent in obtaining approval under the programs and policies of the *Conservation Authorities Act*, including *Ontario Regulation 166/06*, and under the *Fisheries Act* or the *Planning Act*, as appropriate. Through the review process, TRCA will advise the proponent as early as possible whether or not an EMP is required.

As appropriate, approval of the EMP will be a condition of *Fisheries Act* approval based on the Level 3 Agreement between TRCA and Fisheries and Oceans Canada (DFO). Should the EMP require construction of supporting infrastructure a TRCA permit or permits under *Ontario Regulation 166/06* may also be required.

The EMP guidelines are as follows:

- Step I: Undertaking Detailed Desktop Studies/Preliminary Risk Screening
- Step II: Undertaking Detailed Studies/Evaluating the Need for an EMP
- Step III: Developing the EMP

The intent of these guidelines is to manage project level temporary dewatering. In cases where permanent dewatering is proposed, please contact TRCA to discuss. Following these guidelines does not preclude nor imply any approvals required by any existing laws and regulations, including landowner consents.

**Potential Environmental Receptors and Impacts**

The following potential environmental receptors and impacts form the basis of TRCA's review under *Ontario Regulation 166/06* and the *Fisheries Act*.

- Impacts to fish and fish habitat that could be caused through reduced groundwater inputs, including reduced baseflow or reduced groundwater upwellings to spawning habitats, or through impaired water quality or changes to the thermal regime.
- Impacts to fish and fish habitat that could be caused through the disposal of dewatering effluent and construction discharge including changes to in-stream volume and velocity

- causing erosion, impaired water quality and changes to the thermal regime and fish passage.
- Impacts to forests and wetlands that could be caused through reduced groundwater input including reduction in standing water, loss of soil moisture, impacts to vegetation community, loss or impairment of amphibians or wetland dependent birds or their habitat. This should be done on a seasonal or monthly basis, as appropriate.
- Impacts to forests and wetlands that could be caused through the disposal of dewatering effluent and construction discharge including changes in vegetation community composition, thermal impacts to wildlife and erosion that may affect vegetation health or wildlife habitat or cause erosion.
- Impacts to the ground surface stability of stream channels, stream banks or wetlands that could be caused through dewatering

### **Step I: Undertaking Desktop Studies/Preliminary Risk Screening**

Step I is a desktop analysis of the potential environmental receptors and impacts discussed above. It is intended as a preliminary evaluation of the need for an EMP. This should be undertaken in consultation with TRCA. The detailed requirements of the Step I evaluation of the need for an EMP are outlined in the following tasks in increasing levels of information. If it becomes clear at any point that an EMP is not appropriate, contact TRCA for confirmation.

1. Undertake a desktop hydrogeological study:
  - 1.1 Gather existing data on groundwater levels, quality, and stratigraphy and soil conditions.
  - 1.2 Assess the estimated dewatering volumes.
  - 1.3 Undertake a desktop analysis to estimate for each technology the size of the predicted Zone of Influence (ZOI) and predict the potential impact on baseflow or groundwater upwellings.
  - 1.4 Assess innovative construction techniques through the use of background data, studies, tests and maps.
  - 1.5 Identify data gaps in the baseline information.
2. Undertake a desktop Natural Heritage Evaluation of the environmental receptors that may be affected by dewatering:
  - 2.1 Identify the environmental receptors within the estimated ZOI or downstream of the discharge, which could be affected through the project dewatering.
  - 2.2 Gather and evaluate existing data, including historic data, for all environmental receptors.
  - 2.3 Identify data gaps in the baseline information.
3. Integrate hydrogeological and natural heritage data to identify potential impacts. Identify the potential mechanisms of impact.
4. Undertake an analysis of the likelihood and significance of impacts to each environmental receptor to determine whether to proceed to Step II as per Figure 1: EMP Decision Matrix. The matrix is a conceptual aid. The likelihood of impact is based on probability where low is unlikely (less than 10%), medium is possible (10% to less than 50%) and high is more likely than not (50% or greater). Figure 2 provides some factors that could be considered when evaluating the significance of impact. The relative weighting of factors is at the discretion of the proponent, in consultation with TRCA and other agencies, as required.

Figure 1

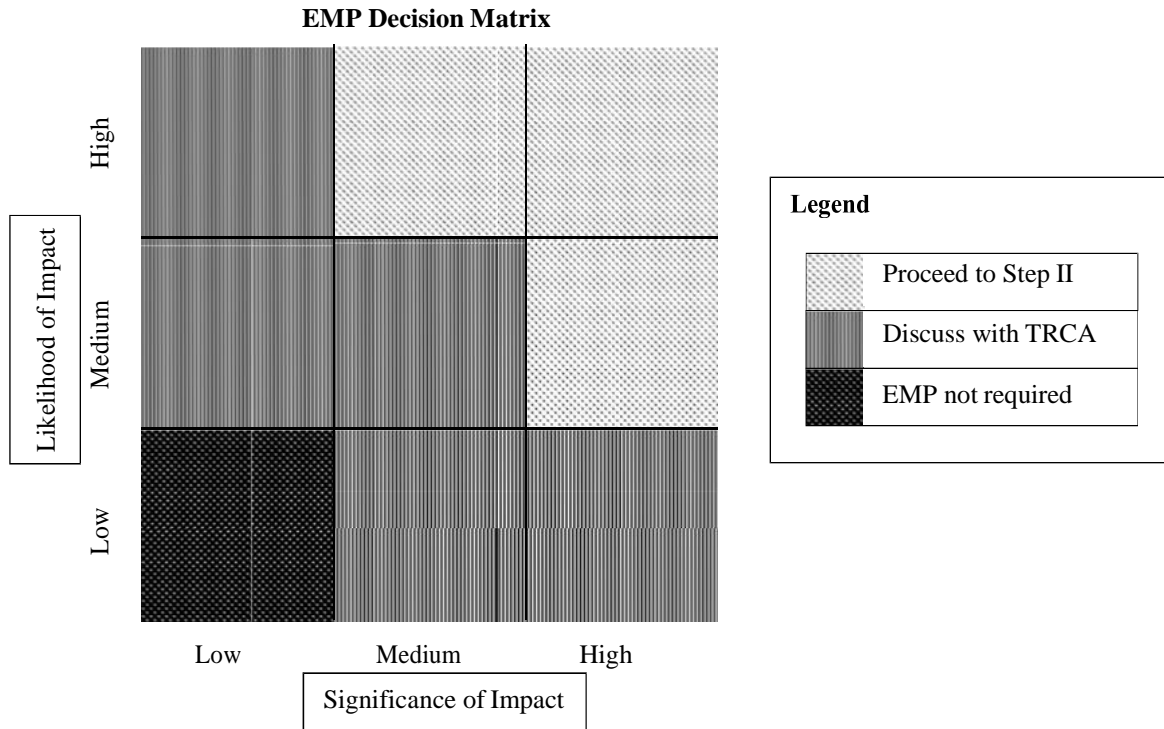


Figure 2

**Factors in the Determination of the Significance of Impact**

		Significance of Impact		
		Low	Medium	High
<b>Factor</b>	Endangered species	Not present		Species or recovery habitat present
	Tolerance of species	Tolerant		Sensitive
	Duration	<1 month	1 month to 1 year	>1 year
	Dewatering discharge volumes relative to baseflow	Low as compared to baseflow (<10%)	Medium as compared to baseflow (10% to 30%)	High as compared to baseflow (>30%)
	Scale	Affects small area (<0.1ha)	Affects medium area (0.1ha to 1.0ha)	Affects large area (>1.0ha)
	Proximity of discharge to watercourse or wetland	Discharge to sanitary sewer	Discharge to storm sewer	Discharge to watercourse or wetland
	Timing	Works outside breeding or nesting periods		Works within breeding or nesting periods

## **Step II: Undertaking Detailed Studies/Evaluating the Need for an EMP**

Step II involves detailed studies undertaken in consultation with TRCA staff. These studies will form the basis of the EMP and may be either a separate document or included in the appendices of the EMP.

1. Complete hydrogeologic and natural environment baseline conditions analysis to fill in the data gaps identified in Step I. Please note that baseline monitoring for the EMP should be undertaken for an appropriate length of time prior to any groundwater removals. Please also note that to complete studies in the field, such as a borehole investigation, approvals in accordance with *Ontario Regulation 166/06* or the *Fisheries Act* may be required.
2. Refine the Predicted Zone of Influence:
  - 2.1 Develop the minimum and maximum rates and duration for dewatering, including rates less than 50,000 litres per day, for all sources of pumping.
  - 2.2 Use field studies to develop a predicted ZOI for each aquifer that will be withdrawn.
  - 2.3 Address the cumulative impacts from all groundwater withdrawals and leakages between aquifers for the ZOI estimation.
3. Confirm the construction technologies and undertake a preliminary assessment of mitigation measures based on the results of the baseline monitoring program.
4. Based on the construction technologies and refined ZOI, confirm the environmental receptors and potential environmental impacts identified in Step I.
5. Determine the sensitivities and significance of the flora, fauna and hydrology for each environmental receptor. Consider vegetation community composition, amphibian habitat, wetland dependant birds, fish species dependent upon groundwater upwellings or specific temperatures for spawning (e.g., Brook Trout, Redside Dace), wetland water levels, baseflow, stream flow, velocities, stream geomorphology, and erosion thresholds in the context of duration and season.
6. Update the EMP decision matrix through an analysis of potential impacts from Step II (4) and the sensitivities and significance of the flora, fauna and hydrology from Step II (5) at each environmental receptor. Undertake an updated analysis of the likelihood and significance of the impact to each environmental receptor.

## **Step III: Developing the EMP**

The EMP is an action oriented document written for use primarily by field staff. It summarizes the results of the studies undertaken in Steps I and II. The EMP provides detailed mitigation, monitoring, and contingency plans, and provides a detailed plan for reporting and communications for implementing the EMP based on adaptive management principles.

Prior to developing an EMP, the need for an EMP must be fully assessed and quantified. If a significant length of time has lapsed since Step II, a gap analysis should be undertaken to update the studies and confirm the conclusions from Step II, especially the environmental receptors. The EMP must be applied to the construction and post-construction phases of the project. TRCA reviews the EMP based on requirements under *Ontario Regulation 166/06* and the *Fisheries Act*.

The following tasks outline the steps in developing the EMP:

### **Task 1: Develop the Mitigation Program**

Develop a detailed mitigation program based on the preliminary analysis completed in Step II (3). The intent of this program is to minimize or avoid construction impacts to each environmental receptor from water extraction or discharge. For each environmental receptor specify mitigation measures and their implementation sequence. The mitigation program should be designed to be flexible to adapt to updated information through monitoring. Examples include the selection of construction technologies, or the selection of discharge locations.

### **Task 2: Develop an Integrated Monitoring Program**

The intent of monitoring is to verify that mitigation is successful. The frequency and duration of monitoring should be included in the plans. Baseline monitoring for the EMP may be required for an appropriate time period prior to any groundwater removals. The extent and frequency of monitoring should be reasonable and based on the scope of the project and environmental risk. Detailed requirements are outlined in the following tasks for each environmental receptor:

1. Identify all monitoring sites, including a rationale for their selection. Correlated mapping should be provided.
2. Identify monitoring frequency, timing, and methodology.
3. Identify an acceptable range of conditions.
4. Identify the caution or warning triggers that may warrant implementation of the contingency strategy. The triggers should be sensitive to impacts to the environmental receptor and measurable as part of a monitoring program. The extent and frequency of monitoring should increase when a contingency scenario is entered and continue for the duration of the contingency scenario.
5. Establish criteria for scaling back or discontinuing monitoring.

### **Task 3: Develop Contingency Strategy**

1. Develop appropriate contingency measures and adaptations to the mitigation strategies to undertake when monitoring data approaches the caution or warning triggers. Include maps where appropriate.
2. The number and complexity of contingency measures should be scoped relative to the scope of the project, the environmental risk, and the likelihood of any given impact.
3. Permits under *Ontario Regulation 166/06* and requirements under other legislation may apply prior to implementing activities in the contingency strategy. There are options to expedite unforeseen, urgent requests for permits under *Ontario Regulation 166/06*.
4. Establish criteria for discontinuing the contingency measures.

#### **Task 4: Reporting and Communications**

An EMP is based on adaptive management principles. It accounts for the variability of lengthy projects, and allows for adaptive changes in mitigation based on monitoring throughout the project implementation. It is critical that TRCA staff be kept informed and updated on unforeseen environmental complications, conditions or events to enable an effective, timely and efficient response. The level of reporting and communications should be appropriate to the complexity of the project and environmental risk. Only actions taken, environmental impacts and deviations from the EMP should be documented and reported, along with actions for the next reporting period.

The following items should be clearly documented in an EMP:

1. Environmental inspector or environmental team that will be providing regular on-site inspections and monitoring and their reporting to the appropriate contacts, including TRCA.
2. Training plan for training staff on their roles and responsibilities.
3. Protocol for involving the TRCA primary point of contact in regular site meetings.
4. Protocol for responding to emergency situations, including notifying the TRCA contact.
5. Protocol for undertaking the appropriate contingency strategy or adapting the mitigation strategy when caution or warning triggers are met.
6. The form and frequency of monitoring reports. Monitoring reports will address all findings related to potential impacts to environmental receptors based on a comprehensive analysis of all monitoring data collected during the project implementation and recovery phases.
7. The form and frequency of regular updates to supplement regular monitoring reports, if required.
8. Protocol for updating the EMP as the project progresses, based upon monitoring or unforeseen conditions.

**Appendix A: Technical Guidelines for the development of EMPs for Dewatering – TRCA Points of Contact**

