



# **ENVIRONMENTAL MANAGEMENT PRACTICES GUIDANCE MANUAL**

April 2014

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## **IMPORTANT NOTICE TO READERS**

### **Changes to the *Fisheries Act (Canada)***

**Effective - November 25, 2013**

Amendments to the Federal *Fisheries Act* came into effect on November 25, 2013. Due to this recent change in statute, readers should confirm requirements respecting the protection of fish and fish habitat on projects underway at or prior to that date, directly with the DFO and/or the project Owner.



# MESSAGE FROM ORBA: Environmental Stewardship

## **Principle of Environmental Stewardship**

ORBA is committed to the principles of sustainability and environmental stewardship. We strive to promote best practices in environmental stewardship and project management among our members companies and the goals of reduced consumption of resources, reduced impacts on the environment and reduced waste.

## **About this Manual**

This Environmental Management Practices Guidance Manual is intended to support our members' efforts in the achievement of environmental protection goals. It is a work project of the ORBA Environment Committee, and was produced with the assistance of Golder Associates Ltd. It is intended to serve as a general information resource to ORBA members that provide construction services on bid-build contracts.

## **Limitations**

This Manual does not attempt to cover all aspects of work on road contraction projects to which environmental protection requirements may apply. Rather, it sets out information on a select number of the more typical aspects of works during construction of projects tendered under the bid-build contract model.

Selection of actual environmental protection methods and practices to be employed on any project should be made only after direct, careful review of all contract documents, applicable industry standards, federal and provincial law and regulation, and municipal and local agency requirements.

With respect to regulatory compliance issues, regulatory statutes are subject to periodic amendment. In addition, regulatory statutes are subject to interpretation and these interpretations may change over time. References to legislation within this Manual were obtained in most cases from non-government sources.

ORBA makes no representations whatsoever, including those concerning the significance of legal matters touched on in this Manual. The information is not intended as legal or professional advice to the reader. The ORBA cannot and does not represent or guarantee that the information in the Manual is current, accurate, complete or free of errors. Any reliance upon any information contained in the Manual is solely at the risk of the user of the Manual. The user should always seek legal or other such professional advice relating to the information contained in the Manual.

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## **Acknowledgement**

ORBA wishes to acknowledge the efforts of the members of the ORBA Environment Committee and Golder Associates Ltd. for its contributions to this Guidance Manual.



## CONTEXT:

# Environmental Regulation in Ontario

In Canada, environmental matters are legislated by each of the Federal, Provincial/ Territorial and local levels of government. The Federal government typically legislates trans-boundary aspects, that cross Provincial or national geo-political boundaries (such as interprovincial transportation of waste), activities that are undertaken on property under Federal jurisdiction (for example, on Federal Crown land or within a Federal government department), and issues that are otherwise unregulated (or perceived to be insufficiently regulated) by the Provinces and Territories. The regulation of environmental protection largely falls to the Provinces and Territories, with each having its own, albeit similar, enabling legislation for the regulation of regional interests with respect to air quality, water quality, waste disposal, chemical storage and handling, hazard identification and control, employee and public health and safety. Municipalities have the power to legislate local issues like nuisance noise, sewer use and waste management. Increasingly, these lower levels of government are introducing local rules that rival those of the Federal and Provincial/ Territorial governments in terms of the compliance burden.

The expected standard of care is to exercise all reasonable precautions to protect the natural environment, and this demands an understanding of environmental legal and other requirements, and the implementation of a well-planned approach to managing activities that have potential to cause environmental impacts. There is a legal duty and criminal liability for organizations and individuals when they fail to take reasonable steps to prevent or mitigate an impact on the environment. The statutory, financial and image risks are real and need to be pro-actively managed.

The purpose of this Manual is to help members better understand, and ultimately navigate, some of the more typical environmental protection requirements that apply to bid-build road construction projects. The applicability of federal, provincial, and municipal requirements will vary based on a number of factors, including but not limited to: the nature and scope of the project; geographical location; and ownership. Ultimately, it is up to you to determine which environmental protection requirements apply to a project, and how to manage your obligations.



## **CONTEXT:**

# **Contractual Obligations**

Beyond the obligations associated with environmental acts and regulations, there are various expectations for environmental management and worker and public safety that are described by contract. Many of these requirements are compatible with regulations – in fact some contracts and agreements will simply incorporate laws and regulations by reference. However, many contracts will identify specific conditions or requirements for environmental control, inspection and monitoring, and these must also be complied with.

The cost and effort necessary to comply with these requirements, contractual or statutory, is not insignificant, and it is important to ensure that the impact of these requirements on budget and schedule are considered at the tendering stage of the project.





# HOW TO USE THIS MANUAL: Format & Content

As noted, the purpose of this Manual is to help members better understand, and ultimately navigate, the myriad of environmental requirements that apply to projects, at the construction phases.

This Manual is organized by environmental aspect; that is, the way that project activities typically interact (and potentially interfere) with the natural environment. This is also the way that most environmental regulations are organized, and so it is appropriate to consider each in turn.

To facilitate the identification of which environmental aspects may be associated with different construction activities, we have prepared an “Applicability Matrix”. However, this is not an all-inclusive list and is meant only as a guideline. Members should use their discretion and awareness of project specific requirements when determining which aspects might apply.

This Manual focuses on several key topics and activities that interact with the natural environment and may result in an impact:

- General site management;
- Erosion & sediment control;
- Noise, dust & air emissions;
- Excess materials;
- Chemical & fuel management;
- Water & wastewater;
- Spills management;
- Natural Environment/ Biodiversity; and
- Community Relations.

Each chapter begins with a general Purpose Statement describing the contents of the chapter. The following Applicability Matrix can assist a project manager in determining whether the section is relevant to any of their activities. The Key Requirements section describes the regulatory requirements that may be applicable to the activity and the Implementation / Strategies section provides practical approaches and best management practices. Each chapter ends with a Reference section, which includes sources where users can obtain additional information.



# Applicability Matrix

The following Applicability Matrix can be used to determine which sections of the Manual are applicable to the project, based on activity:

Activity	General Site Management (Chapter 4)	Erosion & Sediment Control (Chapter 5)	Noise, Dust & Air Emissions (Chapter 6)	Excess Materials (Chapter 7)	Chemical & Fuel Management (Chapter 8)	Waste Management (Chapter 9)	Water & Wastewater (Chapter 10)	Spills Management (Chapter 11)	Natural Environment/Biodiversity (Chapter 12)	Community Relations (Chapter 13)
Planning: Scoping & Design	X	X	X	X	X	X	X	X	X	X
Construction: Surveying and Staking	X									
Construction: Clearing and Grubbing	X	X	X	X			X	X	X	
Construction: Parking, Storage Laydown Areas	X	X			X	X	X	X		
Construction: Soil Removal / Excavation/ Excavation for Caisson	X	X	X	X	X	X	X	X	X	
Construction: Blasting	X		X	X				X	X	X
Construction: Stream Diversion	X	X					X	X	X	
Construction: Pile Driving	X	X	X		X		X	X	X	
Construction: Road, Bridge Construction	X	X	X	X	X	X	X	X	X	
Construction: Compaction	X		X							
Construction: Concrete Pouring, Gravel and Asphalt Placement	X		X		X	X		X	X	
Maintenance & Reclamation: Equipment Repair, Fuelling	X		X		X		X	X		
Maintenance & Reclamation: Grading	X		X	X			X		X	
Maintenance & Reclamation: Road Closure	X		X						X	X



# GENERAL SITE MANAGEMENT: GSM-1

## Project Planning

### PURPOSE

- The purpose of this section is to describe the importance of considering environmental management in the pre-construction phase of the project. Information about the 7 distinct Phases of Construction planning is provided at the end of this section, for your information. This Environmental Practices Guidance Manual provides guidance related to the Construction Phase.
- **Pre-Construction Project Planning** is a critical element in environmental management. Effective environmental management relies on a thorough understanding of project scope, timelines, resources, location of sensitive receptors, stakeholder expectations, and the potential for change in any of these factors. Assessing and planning for the various environmental requirements that might apply to a project will also help ensure the project stays on budget and on schedule. It is important to understand what environmental controls may need to be implemented – these may be expensive and take time to implement. In addition, regulators and owners may require post-construction vegetation to meet or exceed original conditions and so good documentation of pre-existing conditions is important.

### APPLICABILITY

- This section is applicable to the post tender, pre-construction stage of the project and throughout the construction phase.

### KEY REQUIREMENTS

- Contractual obligations – environmental terms and conditions
- Regulatory requirements specified in this Manual
- Permits from regulatory agencies/ owners

### IMPLEMENTATION/ STRATEGIES

#### Pre-Bid Review

- Review of all contract documents, to identify and understand any environmental terms and conditions that could influence project budget or schedule.
- Request any available environmental reports, if not already included in the tender package, so that you understand the scope of environmental protection measure that may be required, i.e., presence of contaminated soil, sensitive habitat, species at risk, etc.
- Determine required resources, i.e., staffing, subject matter experts, materials, scheduling implications.

- Identify and price any environmental controls that may need to be engineered, and that could have a significant impact on project schedule or budget.

### **Pre-Construction Planning**

#### ○ **Upon award of the contract:**

- Carefully review all final contract documents.
- Request background environmental reports, if not already included in the tender package.
- Request and review all applicable permits (e.g., Fisheries and Oceans Canada, Ministry of Environment, Ministry of Natural Resources, etc.).
- Develop “on paper” familiarity with location, topography, soil conditions, local weather patterns, and location of sensitive receptors both within and in close proximity to job site.
- Identify all environmental protection controls, measures, and performance standards prescribed in the contract.
- Identify and classify all work activities ( see Applicability Matrix)
  - Potential environmental impacts of activities (e.g., vegetation, water, native species, human health, community engagement, air, noise, dust, etc.).
  - Identify applicable statutory environmental protection controls, restrictions, obligations, etc.

#### ○ **Work with the Project Management and Construction Team:**

- Determine the planned schedule of operations (i.e., when, where, approach).
- Discuss prescribed environmental restrictions on timing of operations.
- Review contract requirements, regulatory restrictions, and applicable best practices.
- Review/ determine seasonal considerations and related environmental impacts.
- Integrate prescribed permit requirements and contract requirements into order of operations of work (i.e., before work begins, during work, upon completion of work).
- Set scheduled meetings to review environmental impact considerations of scheduled works and selected mitigation controls.

#### ○ **Inspect the site conditions:**

- Walk the site and conduct visual inspections.
- Take photos to document pre-construction site conditions.
- **Develop a Site Map for posting at the site. Refer to Appendix A for a sample. Use the Site Map to illustrate:**
  - Locations of all sensitive receptors (i.e., water bodies, wells, provincial sensitive areas, communities, residential neighborhoods, species at risk locations).
  - Selected access/ egress routes.

- Setbacks from sensitive receptors (i.e., water banks, protected wetlands, well heads, storm sewers, etc.)
- “Do Not Enter” areas.
- Locations of spill kits, first aid kits, and fire extinguishers (or other emergency response equipment).
- Fuelling/ equipment repair locations.
- Temporary stock pile locations.
- Access/ egress locations.
- Other information applicable to specific project
- **Work with Project Manager and the Construction Team to confirm mitigation measures for the project:**
  - Select mitigation measures applicable to each work activity (i.e., See Applicability Matrix)
    - Prepare work instruction and standards of performance.
    - Determine records to be maintained.
    - Communicate roles and responsibilities for implementation and monitoring.
    - Establish frequency and timing of monitoring.
    - Customize checklists to reflect actual work activity on the project.
- **Develop a Spills Response and Emergency Plan**
- **Schedule pre-work training and awareness for site staff and subcontractors**
  - Review work and potential impacts.
  - Review required mitigation measures and timing.
  - Review Spills and Emergency Response plans.
  - Review Site Map, Access/ Egress Plan, Restricted areas.
  - Review roles and responsibilities for implementation, monitoring and reporting.

● **General Phases of a Road Building Process**

The road building process can be generally categorized into seven (7) phases, of which many of the phases can occur concurrently. The actual process and activities will vary depending on individual project complexity and scope.

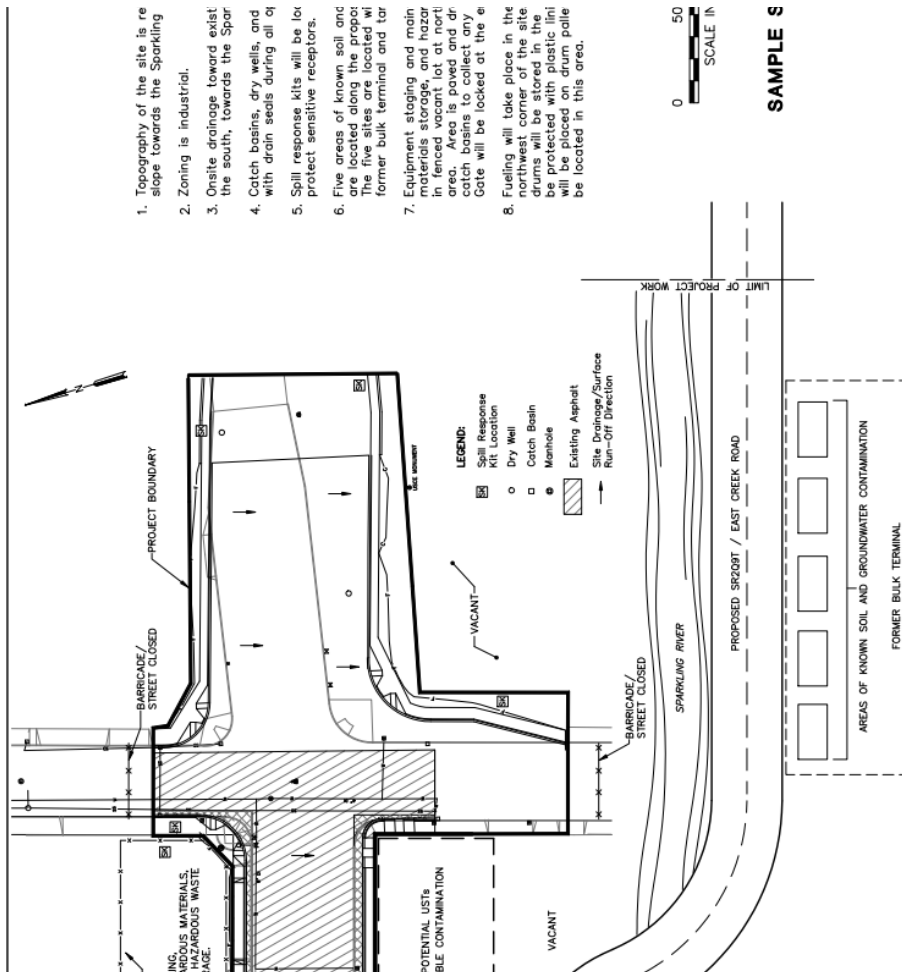
	<b>Phase</b>	<b>Typical Length of Phase</b>	<b>Typical Activities</b>
1	Planning	1 - 24 months	Defining activity scope and costs available, environmental and/ or economic impact
2	Scoping	1 - 18 months	Confirming project purpose and scope, initiating any required environmental review process, establishing project team, surveying, developing initial designs, and evaluating public involvement strategies.
3	Preliminary Design	1 – 18 months	Designing of roadway/ structures/ bridges, traffic control system planning, determining right of way,

			performing constructability studies, completion of environmental reviews, holding public consultation meetings if required, and obtaining design approvals.
4	Detailed Design	1 -12 months	Refining the design, developing appropriate erosion and sediment control plans and utility field inspections.
5	Final Design	1 – 24 months	Finalizing the design (i.e., roadways, structures, bridges, traffic control devices, landscaping), finalizing erosion and sediment control plans, reviewing work zone, traffic/ transportation management plans.
6	Advertisement	1 – 5 months	Finalizing plans, specifications, and estimates, securing any environmental permits, verifying funding, etc.
7	Construction	1 – 36 months	Awarding contracts, overseeing all aspects of construction, managing affected property owners, coordinating inspections.

## REFERENCES

- MTO's *Environmental Guide for Erosion and Sediment – Appendix C: Checklist for Erosion and Control During Construction of Highway Project.*

# Appendix A: Sample Site Plan



1. Topography of the site is a slope towards the Sparkling River to the south.
2. Zoning is industrial.
3. Onsite drainage toward the Sparkling River, towards the south.
4. Catch basins, dry wells, and manholes with drain seals during oil spill events will be located to protect sensitive receptors.
5. Five areas of known soil and groundwater contamination are located along the proposed project boundary. The five sites are located within the former bulk terminal and materials storage area.
6. Equipment staging and materials storage, and hazardous materials storage, are located in a fenced vacant lot at the northwest corner of the site. Area is paved and drainage catch basins to collect any spills. Gate will be locked at the northwest corner of the site.
7. Fueling will take place in the northwest corner of the site. Drums will be stored in the northwest corner of the site. Drums will be protected with plastic lining and will be placed on drum pallets. Drums will be located in this area.

**SAMPLE 8**



## Project Planning

	<b>Checklist</b>	<b>Comments</b>
	Have you reviewed <u>all</u> contract documents, to identify and understand any environmental terms or conditions that could influence project budget or schedule?	
	Have you requested and obtained available environmental reports, if not already included in the tender package, so that you understand the scope of potential environmental protection measures (i.e., contaminated soil or sensitive habitat or species at risk that may need to be managed)?	
	Has work activity been reviewed for scope of potential mitigation requirements? Have mitigating measures, Work Instructions and monitoring requirements been established?	
	Does the project involve work in/ near any environmentally sensitive areas (e.g., water bodies)? If yes, list the precautions to reduce potential adverse impact.	
	Have you identified any environmental controls that may need to be engineered, and that could have a significant impact on project schedule or budget?	
	Have you taken photos of the project site at pre-construction? Are areas of pre-existing damage/ impact documented?	
	Have you developed a Site Map? Are copies posted at the Site office/ trailers?	
	Is the Emergency Contact list prepared and posted at the job site?	
	Have you conducted environmental protection orientation training for workers?	
	Have workers been made aware of their respective environmental protection responsibilities?	
	Are daily/ weekly environmental inspection/ monitoring checklists available for use by site staff?	



# GENERAL SITE MANAGEMENT: GSM-2

## Housekeeping

### PURPOSE

- This section describes the importance of good housekeeping and the potential consequences of poor housekeeping at a project site.
- **Housekeeping** is a simple yet effective means of ensuring the job site remains safe and clean. Good housekeeping should be maintained throughout the life of the project. A clean, well-organized, and attractive work environment enhances employee morale and improves productivity. Experience tells us that poor housekeeping, and a messy job site, increases the likelihood of irresponsible storage, handling and disposal practices, and spills.
- Good housekeeping reflects well on the project owner, contractors, and is likely to result in fewer complaints from the general public and decrease the risk of spills or other environmentally adverse events.

### APPLICABILITY

- This section is applicable to all projects.

### KEY REQUIREMENTS

- Contract requirements
- General prohibitions in environmental statutes (e.g. Section 14 of Ontario's *Environmental Protection Act*) regarding the discharge of a contaminant that may result in an "adverse effect".

### IMPLEMENTATION/ STRATEGIES

- **Consequences of Poor Housekeeping**
  - Poor housekeeping can lead to:
    - Excessive materials in the work area/ materials in high risk areas
    - Wastes overflowing or leaking from poorly maintained containers
    - Hazardous materials not properly contained
    - Erosion, sediment in water
    - Improper disposal of hazardous wastes
    - Excessive dust
    - Health and safety risks (e.g., trips, fire risks)

- Fines and penalties resulting from contractor performance rating by owner or from breach in contract
- **Elements of Good Housekeeping**
  - Elements of good housekeeping include:
    - Designated laydown/ storage areas for materials and tools, away from sensitive receptors
    - Planned material flow for efficiency
    - Adequate number of temporary waste storage locations
    - Regular waste removal to prevent waste build-up
    - Clean up spills immediately to prevent slips and trips and maintain the visual appearance of site cleanliness
    - Housekeeping inspection program to identify and correct areas of concern
    - Train site supervisors on the importance of good housekeeping and encourage them to enforce the provisions of this chapter through regular inspection and communication

## REFERENCES

- Canadian Centre of Occupational Health and Safety (CCOHS), *What is an example of a workplace housekeeping checklist for construction sites.*

# Housekeeping

☑	Checklist	Comments
<b>Project Planning</b>		
	Are there photos of the pre-construction area? Ensure areas of pre-existing damages are well documented.	
	Have you established designated waste and chemical storage areas, with appropriate containment systems?	
	Is a copy of the Site Map readily accessible? Prior to construction, ensure the following are mapped: sensitive receptors, materials storage locations, access/ egress routes, restricted areas, equipment/ fuel storage/ wash areas, spills kits, emergency response materials.	
	Have you provided training to supervisors on the importance of good housekeeping?	
	Is everyone aware of their respective environmental roles and responsibilities, risks, applicable mitigation measures?	
	Are daily environmental inspection checklists available?	
	Are weekly environmental inspection checklists available?	

☑	Checklist	Comments
<b>Housekeeping</b>		
	<p>Is there evidence of good housekeeping? Look for:</p> <ul style="list-style-type: none"> <li>▪ General tidiness of job site – evidence of debris;</li> <li>▪ Obstruction of passageways;</li> <li>▪ Materials placed less than 2m away from excavations or trenches;</li> <li>▪ Signs of spills;</li> <li>▪ Excessive dust;</li> <li>▪ Designated laydown/ storage areas;</li> <li>▪ Proper storage of flammables and combustibles;</li> <li>▪ Compressed gas cylinders stored securely in upright position;</li> <li>▪ Tarping of soil/ stockpiles;</li> <li>▪ Tire wash areas;</li> <li>▪ Absence of materials tracked to public areas; and</li> <li>▪ Materials 30 m away from watercourses.</li> </ul>	



# EROSION & SEDIMENT CONTROL: ESC-1

## ESC Planning for Construction

### PURPOSE

- This section provides a general overview to erosion and sediment control planning. Proper planning is important to ensure that all elements to erosion and sediment control have been adequately considered.
- **Erosion** is the process by which the land surface is naturally worn away by nature (e.g., through water, wind, ice, etc.). However, human modifications and disturbance of ground cover through road building activities can also significantly increase erosion rates. Erosion Control is the process whereby the potential for erosion is minimized.
- **Sedimentation** is defined as the settling out of eroded soil particles previously held in suspension by flowing water. Sediment Control is the process whereby the potential for eroded soil being transported and/or deposited into a watercourse, provincially sensitive area, or municipal sewer system is minimized. “Sediment Control” is synonymous with sedimentation control.

### APPLICABILITY

- Typical activities associated with erosion and sedimentation include:
  - **Soil handling** - activities such as excavation, transport, stockpiling and fill can cause soil to be segregated and easily mobilized;
  - **Water transfers** – when water is pumped from an impoundment or is released from a ponded area, peak flows may result in erosion or gully formation;
  - **Newly excavated slopes** – failures can occur from high pore pressures, often combined with freeze-thaw cycles. Groundwater conditions under slopes can lead to erosion. Newly excavated slopes are particularly vulnerable to failures;
  - **In-stream work** – excavation and materials placed in flowing water can introduce large quantities of sediment into the watercourse;
  - **Temporary access roads** – dust and storm water runoff from temporary access roads can be a significant source of sediment.
- Effective erosion and sediment control is a critical strategy for the protection of water bodies and aquatic habitat. Users should read **WW-1 Working in or around Water Bodies** in conjunction with this procedure.

### KEY REQUIREMENTS

- **Ontario’s Environmental Protection Act**

- The Ontario EPA places a general prohibition on the discharge of a contaminant to the natural environment in a form that causes or has the potential to cause an adverse effect.
- **Ontario Water Resources Act (OWRA)**
  - Like the Ontario EPA, the OWRA places a general prohibition on the discharge of any material of any kind into or in any waters or on any shore or bank or into or in any place that may impair the quality of water. "Waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.
  - It is recommended that location of wellheads or nearby watercourses are identified project site map/ plan.
- **Conservation Authorities Act**
  - Individual watershed-based conservation authorities are empowered to administer resource conservation programs in partnership with municipalities and the province of Ontario. Work permits may be required for activities related to filling, construction and alteration to lands in flood plain areas.
- **Fisheries Act**
  - 
  - Significant changes to the Federal Fisheries Act came into effect on November 25, 2013. These changes shift the focus of protection from "fish habitat" to "fisheries".
  - The new Act has changed its regulatory perspective. Under the old Act, the habitat and deleterious substance provisions were used as primary protection for the environment. The old section 35 habitat provisions prohibited the harmful alteration, disruption or destruction (HADD) of fish habitat, unless a person had an authorization to do so. A HADD without an authorization was a punishable offence. The new section 35 says:
    - "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."
    - Serious harm is defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat."
  - The Act is invoked at any point when a person carries on or proposes to carry on any work, undertaking or activity that results or is likely to result in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, or in the deposit of a deleterious substance in water frequented by fish or in any place under any conditions where that deleterious substance or any other deleterious substance that results from the deposit of that deleterious substance may enter any such waters.

- A deleterious substance is defined as “any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.”
- Where serious harm to fish is expected, an Authorization must first be obtained from DFO prior to start of work.
- There is now a requirement to report an occurrence that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: “Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time
  - (a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence; or
  - (b) causes or contributes to the occurrence or the danger of the occurrence.”

## IMPLEMENTATION/ STRATEGIES

- **General Approach**

- Erosion control should be viewed as the primary means in preventing the degradation of downstream aquatic resources, whereas sediment control should be viewed as a contingency measure. As such, emphasis should be placed on erosion control, although most construction sites will require both sediment and erosion controls to an extent. The two most common modes of sediment transport are through water and wind.
- Erosion and sediment controls require flexibility and should be routinely monitored throughout the life of the project to adapt for changing circumstances.

- **Erosion and Sediment Control Measures**

- Control measures for erosion and sedimentation can be broadly classified into two (2) categories: temporary controls, and permanent controls.
  - **Temporary Controls** – temporary control measures during the construction phase which will be removed upon completion of project. Temporary controls are typically put in place prior to the start of project. Examples include installing silt fences and straw bale barriers, rock check dams, turbidity curtains, and sediment ponds.
  - **Permanent Controls** – permanent control measures are incorporated during the design stages of the project to address long-term, post-construction erosion and



sediment control. Permanent controls are typically put in place towards the completion of the project. Examples include gabions and earth dykes.

- **Erosion and Sediment Control Planning**

- Successful erosion and sediment control planning requires a robust understanding of the principles behind the processes both by the designers and by the contractors. Control measures vary on a case-by-case basis, based on site conditions. Elements which dictate the controls to be taken may include:
  - **Project design** – project drawings and site specifications should be consulted to identify important information such as project scope, natural and post-construction topography, watercourse and sensitive eco-system locations, road and ditch alignments, material storage areas, and storm water collection systems.
  - **Soil Type** – information such as soil erodibility factor is used to determine the erosion potential of the site. Generally, soil with a high silt and fine sand content is most susceptible to erosion. Geotechnical reports can be consulted for more data regarding soil description, thicknesses, moisture contents, and water table levels. Attention should be paid to the amount of topsoil available for restoration purposes, as well as the types of soil that will be exposed at various stages of construction.
  - **Aerial Photographs** – aerial photographs can provide valuable information such as vegetation cover and drainage patterns. The preferred scale for air photos is 1:5,000, although smaller scales (1:10,000 and greater) may also be used. Aerial photographs can be obtained through the National Air Photo Library, provincial agencies, local municipalities or academic and public libraries.
  - **Climate and Hydrology Information** – climate and hydrology data is crucial in erosion and sediment control design. They provide valuable information such as precipitation data, which can be used to estimate runoff quantities. Site topography and existing drainage systems allows for efficient use of existing watercourses. Other information such as runoff sources are required in order to implement successful mitigation measures to prevent sediment depositions. The Ontario Ministry of Transportation's *Drainage Design Standards* can be consulted for further information.
  - **Vegetation Information** – information on existing vegetative cover are useful in directing post-construction re-vegetation efforts. Large-scale vegetation cover maps can be obtained through Environment Canada, Agriculture Canada, or the Ministry of Natural Resources and are used to determine the type and extent of vegetation, drainage patterns, and soil types. As regulators or the owner may require post-construction vegetation to meet or exceed the original conditions, it is necessary to document the pre-construction state through documentation and photographs taken during site inspections. Soil tests may also be required to

determine the proper types of soil amendments (e.g., types of fertilizers) to ensure successful re-vegetation efforts.

- **Fish and Fish Habitat Information** – if a watercourse supports fish and/ or fish habitat, the potential consequences of work in the area with respect to erosion and sediment control are high. Factors such as restrictive timing windows need to be understood in order to properly determine the level of erosion and sediment control. For more information, refer to Ontario Ministry of Transportation’s *Environmental Guide for Fish and Fish Habitat*.
  - **Other Biological Information** – additional biological information such as data related to migratory waterfowl, wetlands, terrestrial wildlife, species at risk and rare plants may be required to evaluate the overall project disturbance, and can have an influence on erosion and sediment control measures.
  - **Regulatory Standards** – regulatory requirements must be considered in the planning of erosion and sediment control. Early contact with regulatory agencies such as Fisheries and Oceans Canada (DFO), the Ministry of Natural Resources (MNR), the local/ regional municipality and the local Conservation Authority is highly recommended to ensure a complete understanding of project-specific requirements and to take full advantage of the data and advice that they may be able to provide.
- **Elements to Consider in an Erosion and Sediment Control Plan**
    - Proper planning is instrumental in creating a successful erosion and sediment control plan. As the environment for each site varies, it is crucial to develop individual plans based on unique site conditions. There are, however, some common fundamental considerations that are applicable to all plans. These requirements are summarized in the table below:

**Table 1: Minimum Best Practices to be considered for Erosion and Sediment Control Planning**

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Minimizing exposed soil	X	X	X	X	Minimizing the amount of disturbed soil decreases the erosion potential and requires fewer erosion and sediment control measures during construction.	May require efficient scheduling of topsoil/ seeding of completed areas prior to stripping of new areas.

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Operate during fisheries windows	X	X	X	X	Minimizes potential negative impacts on aquatic wildlife.	May affect scheduling of work during construction.
Maximizing favourable weather	X	X	X	X	Minimizes wet and undesirable work conditions, and thus decreasing the potential for erosion and sediment loss.	May require additional resources during favourable weather during construction.
Implement control measures early	X	X	X	X	Early implementation of ESC controls minimizes sediment losses and promotes good housekeeping.	May result in traffic access problems if not planned properly during construction.
Early topsoiling and seeding	X	X	X		Cover exposed soil by topsoiling and seeding early to reduce erosion potential during construction.	N/A
Surface Roughening (Slope Texturing)	X		X	X	Texturing of soils along contours reduces erosion potential by as much as 10%.	Equipment costs need to be considered during the design phase.
Preserve and use existing drainage systems	X	X	X	X	Preserve existing vegetation and drainage systems.	Care must be taken to observe drainage direction during design and construction.
Control construction traffic				X	Proper planning of traffic routes avoids disturbing sensitive areas.	May increase disturbances in high-traffic areas.
Clear signage	X	X	X	X	Clear labels (e.g., indicating sensitive and not-to-be-disturbed areas) ensures all workers on-site are aware of site restrictions during construction.	Costs of signage need to be considered during the planning stage.

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Work scheduling	X	X	X	X	Proper planning and schedule avoids confusion and ensure project efficiency. Plan for topsoil and seeding to occur throughout the construction phases.	Requires resources. May require completion of one area prior to starting the next. Needs to be considered during the planning stage.
Stockpile control				X	During construction, stockpiles should be located away from watercourses and away from environmentally sensitive areas.	May result in longer haul distances. Needs to be considered during the planning stage.
Surface water flow	X	X	X	X	Maintain surface water flows on-site to reduce potential for erosion and sedimentation off-site.	May require additional control measures such as diversion ditches.

(Source: adapted from Alberta Transportation's *Erosion and Sediment Control Manual*, Section 7 and Ontario Ministry of Transportation *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, dated February 2007)

- **Ontario Ministry of Transportation's BMP for Erosion and Sediment Control**
  - The MTO has published a number of Fact Sheets to provide technical guidance on a number of erosion and sediment control measures. Refer to **Appendix B** and Appendix C for a list of the document titles. These fact sheets can be accessed through the MTO's website and are incorporated herein by reference.

## REFERENCES

- Greater Golden Horseshoe Area Conservation Authorities, *Erosion and Sediment Control Guideline for Urban Construction*, December 2006.
- Ontario Ministry of Transportation (MTO), *Drainage Design Standards*, January 2008.
- Ontario Ministry of Transportation (MTO), *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, February 2007.
- Ontario Ministry of Transportation (MTO), *Environmental Guide for Fish and Fish Habitat*, June 2009.
- Transportation Association of Canada (TAC), *National Guide to Erosion and Sediment Control on Roadway Projects*, May 2005.

## Appendix B: MTO List of BMPs During Construction

To obtain a copy of the BMPs listed below, refer to Ontario Ministry of Transportation's *Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects, Appendix E: Fact Sheets*.

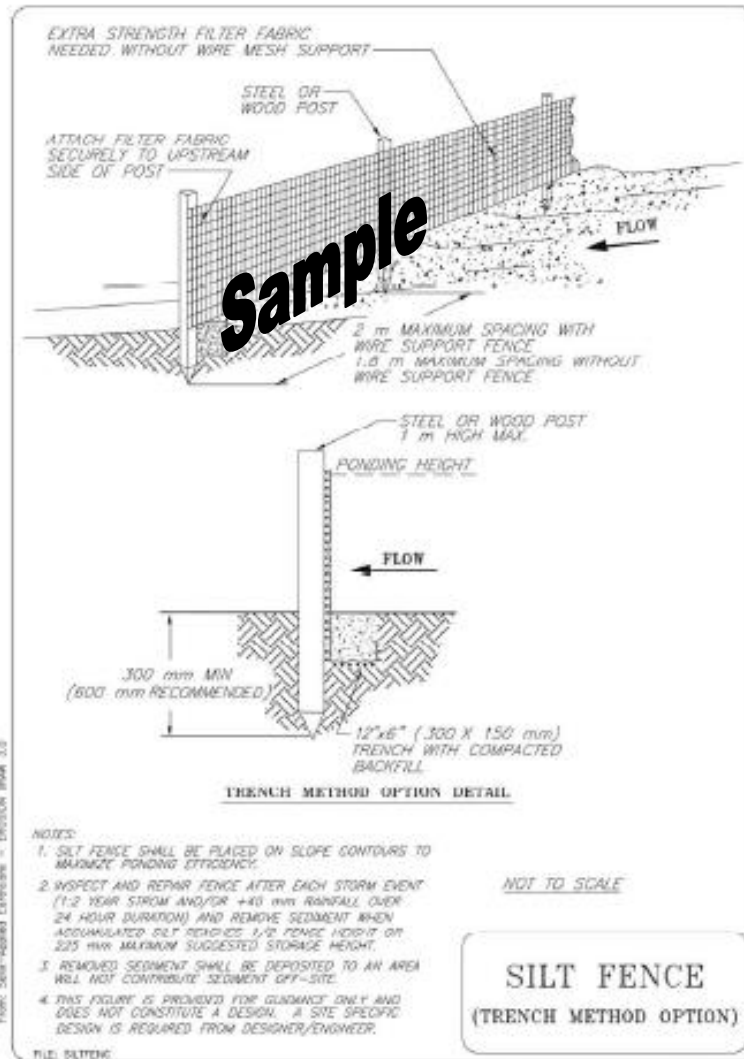
Fact Sheet/ BMP Number	Topic
1	Topsoiling
2	Seeding
3	Mulching
4	Hydroseeding – Hydromulching
5	Sodding, Sod Buffer Strips
6	Riparian Zone Preservation
7	Riprap/ River stone Armouring
8	Gabions
9	Aggregate Cover
10	Stabilized Worksite Entrance
11	Rolled Erosion Control Products (RECP)
12	Plastic Sheeting
13	Cellular Confinement System
14	Chemical Stabilization
15	Slope Texturing/ Grading
16	Slope Flattening
17	Slope Serration
18	Slope Drains
19	Groundwater Control
20	Synthetic Permeable Barrier
21	Silt Fence Barrier
22	Straw Bale Barrier
23	Berm (Earth dyke) Barrier
24	Brush or Rock Berm Barrier
25	Sand Bag Barrier
26	Check Dam (Rock, Sandbag, Log, Straw Bales, Silt Fence)
27	Fibre Rolls and Wattles
28	Diversion Ditch
29	Temporary Stream Diversions
30	Coffer Dams
31	Energy Dissipators
32	Turbidity Curtain
33	Drain Inlet Sediment Barrier
34	Continuous Berm
35	Sediment Traps and Basins
36	Storm Sewer Protection
37	Pumped Silt Control Systems

# Appendix C: Example of a MTO Fact Sheet

## Silt Fence

Sediment Control

**BMP21**



BMP 21-6



# EROSION & SEDIMENT CONTROL: ESC-2

## Erosion Control - Temporary

### PURPOSE

- The purpose of this section is to describe general erosion control strategies. Effective erosion controls are important techniques in preventing pollution and soil loss.
- There are a number of erosion control measures that can be implemented to reduce erosion potential. These measures can be categorized into two general types: protection of exposed surfaces, and control of runoff. A partial listing of these measures is provided in **Table 2**.

### APPLICABILITY

- This procedure applies to the engineering, installation and maintenance of temporary erosion controls during the construction phase of the project.
- Applicable for areas that are susceptible to erosion. Refer to **ESC Planning (ESC-1)** for a list of applicable activities.

### KEY REQUIREMENTS

- **Contract Specifications**
  - The client or designer may have specified erosion and sediment control measures for all or part of the contract.
  - The contract may include the construction of permanent ESC measures, which, if constructed early, could assist in ESC during the project.
- **Ontario Provincial Standards**
  - A number of OPSS describe erosion control requirements. Example of such standards include:
    - OPSS 804 – Construction Specification for Seed and Cover
    - OPSS 805 – Temporary Erosion and Sediment Control Measures
- **Ontario's Environmental Protection Act**
  - The Ontario EPA places a general prohibition on the discharge of a contaminant to the natural environment in a form that causes or has the potential to cause an adverse effect.
- **Ontario Water Resources Act**
  - Like the Ontario EPA, the OWRA places a general prohibition on the discharge of any material of any kind into or in any waters or on any shore or bank or into or in any place that may impair the quality of water. "Waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.

- **Conservation Authorities Act**
  - Individual watershed-based conservation authorities are empowered to administer resource conservation programs in partnership with municipalities and the province of Ontario. Work permits may be required for activities related to filling, construction and alteration to lands in flood plain areas.
- **Fisheries Act**
  - 
  - Significant changes to the Federal Fisheries Act came into effect on November 25, 2013. These changes shift the focus of protection from “fish habitat” to “fisheries”.
  - The new Act has changed its regulatory perspective. Under the old Act, the habitat and deleterious substance provisions were used as primary protection for the environment. The old section 35 habitat provisions prohibited the harmful alteration, disruption or destruction (HADD) of fish habitat, unless a person had an authorization to do so. A HADD without an authorization was a punishable offence. The new section 35 says:
    - “No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery.”
    - Serious harm is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat.”
    - The Act is invoked at any point when a person carries on or proposes to carry on any work, undertaking or activity that results or is likely to result in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, or in the deposit of a deleterious substance in water frequented by fish or in any place under any conditions where that deleterious substance or any other deleterious substance that results from the deposit of that deleterious substance may enter any such waters.
    - A deleterious substance is defined as “any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.”
    - Where serious harm to fish is expected, an Authorization must first be obtained from DFO prior to start of work.
    - There is now a requirement to report an occurrence that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: “Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that



results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time

(a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence; or

b) causes or contributes to the occurrence or the danger of the occurrence.”

## IMPLEMENTATION / STRATEGIES

- **Protection of Exposed Surfaces**

- The purpose of protecting exposed surfaces is to shield from rain splash, surface runoff flow, and wind. Cover is the single most effective control for preventing erosion. Cover can include topsoiling in conjunction with one or more of the following: seeding, mulching, hydroseeding, sodding, spray on erosion control blankets, turf reinforcement matting riprap, gabion mat, aggregate cover and paving.
- An overview of the options available for the protection of exposed surfaces is presented in the table below. Note that on most contracts this is addressed by the designer/owner:

**Table 2: Typical Erosion Control Measures – Protection of Exposed Soil**

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Topsoiling	X	X	X	X	Placing topsoil provides an excellent medium for vegetation root structure. The organic content also promotes further plant growth.	Must be used with seeding to be effective, must allow sufficient time for plant growth. Dry topsoil surfaces are susceptible to wind erosion, and surface is susceptible to erosion prior to establishment of vegetation. Other erosion control measures may be required until vegetation cover is established.

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Seeding	X	X	X	X	Inexpensive and relatively effective erosion control measure. Effectiveness increases with time as vegetation develops. Can be aesthetically pleasing, and can enhance terrestrial and aquatic habitat.	Must be applied over prepared surface (topsoiled), grasses may require periodic maintenance (mowing), uncut dry grass may be a fire hazard, seeding for steep slopes may be difficult, seasonal limitations on seeding effectiveness may not coincide with construction schedule, freshly seeded areas are susceptible to runoff erosion until vegetation is established, reseeding may be required for areas of low growth. Other erosion control measures may be required until vegetation cover is established.
Mulching	X	X	X	X	Used alone to protect exposed areas for short periods, protects soil from rain splash erosion, preserves soil moisture and protects germinating seed from temperature extremes, relatively inexpensive measure of promoting plant growth and slope protection.	Application of mulch on steep slopes may be difficult, may require additional specialized equipment not commonly used in typical highway construction.
Hydro-seeding Hydro-mulching	X	X	X	X	Economic and effective on large areas, mulch tackifier may be used to provide immediate protection until seed germination and vegetation is established, allows re-vegetation of steep slopes where conventional seeding/mulching techniques are very difficult, relatively efficient operation, also provides dust and wind erosion control.	Site must be accessible by hydro seeding-hydro mulching equipment (usually mounted on trucks with a maximum hose range of approximately 150m), may require subsequent application in areas of low growth as part of the maintenance program. Timing is important. Other erosion control measures may be required until vegetation cover is established.

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Sodding	X	X	X	X	Provides immediate vegetation and protection, instant buffer strip and/or soft channel lining, can be used on steep slopes, relatively easy to install, may be repaired if damaged, aesthetically pleasing.	Expensive, labour intensive to install (hand installation), sod may not be readily available in all areas of the province, relatively short "shelf-life".
Riprap Armouring	X	X			Most applicable as channel lining with geotextile underlay, used for soils where vegetation is not easily established, effective for high velocities or concentrations, permits infiltration, dissipates energy of flow from culvert inlets/outlets, easy to install and repair, very durable and virtually maintenance free, flexible lining for ditches with ice build-up.	Expensive, may require heavy equipment to transport rock to site and place rock, may not be feasible in areas of the province where appropriate rock is not readily available, may be labour intensive to install (hand installation); generally thickness of riprap is higher when compared to gabion mattress.
Gravel Blankets	X	X			Stabilizes soil surface with rock lining, thus minimizing erosion, permits construction traffic in adverse weather, may be used as part of permanent base construction of paved areas, easily constructed and implemented, can be used to stabilize sewage piping erosion of slope.	Expensive, may not be feasible in areas of province where gravel is not readily available, areas of high groundwater seepage may require placement of non-woven geotextile underlay and additional drainage measures.

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Rolled Erosion Control Products (RECP)	X	X			Provides a protective covering to bare soil or topsoiled surface where degree of erosion protection is high, can be more uniform and longer lasting than mulch, wide range of commercially available products.	RECP use must be based on design needs and risk assessment of site, certification on QA/QC of RECP products must be issued by supplier, requires certification of physical properties and performance criteria, labour intensive to install, temporary blankets may require removal prior to restarting construction activities, not suitable for rocky slopes, proper site preparation required to seat RECP onto soil properly, high performance is tied to successful vegetation growth.
Cellular Confinement System	X	X		X	Lightweight cellular system and easily installed, uses locally available soils or grout for fill to reduce costs.	Expensive, installation labour intensive (by hand). Not suitable for slopes steeper than 1H:1V.
Planting Trees and Shrubs	X		X	X	Establishes vegetative cover and root mat, reduces flow velocities on vegetative surface, traps sediment laden runoff, aesthetically pleasing once established, grows stronger with time as root structure develops, usually has deeper root structure than grass.	Expensive, may be labour intensive to install, re-vegetated areas are subject to erosion and requires watering until plants are established, plants may be damaged by wildlife. Timing will need to be considered, as well as indigenous plants.
Chemical Stabilization	X	X		X	Increase cohesion of soil, and thus reduces soil evaporation and erosion. Easily applied, may be applied in conjunction with hydroseeding- hydromulching, longevity increases as application rate increases.	Not commonly used in road building projects, may be expensive, site must be accessible to spraying equipment, may require specialized equipment, temporary measure only, higher application rates may prevent seed germination and growth, crust-forming chemical stabilizers may crack during freeze-thaw cycles, requires specialized design.

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Riparian zone preservation	X	X	X	X	Preserve a native vegetation buffer to filter and slow runoff before entering sensitive high risk areas, most effective natural sediment control measures, slow runoff velocity, filters sediment from runoff, reduces volume of runoff on slopes.	Stipulate construction activities with careful planning to include preservation areas, freshly planted vegetation for newly created riparian zones requires substantial periods of time before they are effective as established vegetation at controlling sediment
Slope Texturing	X			X	Roughens slope surface to reduce erosion potential and sediment yield; suitable for soils with clay qualities.	Additional cost; not suitable for silty and sandy soils; not practical for slope length <8m for dozer operation up/down slope
Proper Scheduling	X	X	X	X	Identifies protection issues and plans for efficient, orderly construction of best management practices; minimizes bare soil exposure and erosion hazard; allows early installation of perimeter control for sediment entrapment; early installation of runoff control measures; good construction practices.	Requires time and resources.

(Source: adapted from Alberta Transportation's *Erosion and Sediment Control Manual*, Section 7 and Ontario Ministry of Transportation *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, dated February 2007)

- **Control of Runoff**

- In combination with the protection of soil through surface cover, measures can be taken to manage and control runoff. Such measures can include: modification of slope surfaces, reduction of slope gradients, controlling flow velocity, diverting flows around the disturbed areas, and providing storage for runoff.
- An overview of some of the appropriate management practices for control of runoff is presented in the **Table 3** below:

**Table 3: Erosion Control Measures – Control of Runoff**

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Slope texturing	X		X	X	Contouring and roughening (tracking) of slope face reduces runoff velocity and increases infiltration rates; collects sediment; holds water, seed and mulch better than smooth surfaces; promotes development of vegetation.	May increase grading costs, may cause sloughing in sensitive (wet) soils, tracking may compact soil, provides limited sediment and erosion control and should not be used as primary control measure.
Offtake Ditch	X		X	X	Collects and diverts sheet flow or runoff water at the top of a slope to reduce downslope erosion potential, incorporated with permanent drainage systems.	Channel must be sized appropriately to accommodate anticipated flow volumes and velocities, lining may be required, may require design by qualified personnel, must be graded to maintain positive drainage to outlets in order to minimize ponding.
Energy Dissipater	X	X			Rip rap, sandbags, or other methods slow runoff velocity and dissipate flow energy to non-erosive level in relatively short distances, permits sediment collection from runoff.	Small diameter rocks/ stones can be dislodged; grouted rip-rap armouring may breakup due to hydrostatic pressures, front heaves, or settlement; may be expensive, may be labour intensive to install; may require design by qualified personnel for extreme flow volumes and velocities.
Slope (Down) Drains	X				Directs surface water runoff into drain pipe, and thereby avoiding flow over exposed soils of slope face.	Pipes must be sized appropriately to accommodate for anticipated flows, erosion can occur at inlet/ outlet if protection is not incorporated into the design, slope drain must be anchored to slope.

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Gabions		X			Relatively maintenance free, permanent drop structure, long lasting (robust), less expensive and less thick than rip-raps, allows smaller diameter rock/stones to be used, relatively flexible, commercially available products, commonly used in highway construction projects, suitable for resisting high flow velocity.	Construction and removal may be labour intensive (installation by hand), extra costs associated with gabion basket materials.
Rock Check Dam		X		X	Permanent drop structure with some filtering capability, cheaper than gabion and can armour entire channel, easily constructed, commonly used in highway construction activities.	Expensive in areas of limited rock source, not appropriate for channel draining areas of larger than 4 acres, requires extensive maintenance after high flow storm events, susceptible to failure if water undermines or outflanks structure.
Aggregate Filled Sand Bag Check Dam		X		X	More effective as a mechanism for slowing flow velocities, cheaper than gabions or armouring the entire ditch, easily constructed and reusable.	Not appropriate for channels and drainage areas larger than 5 acres, requires extensive maintenance after high flow storm events, low filtering capabilities, labour intensive to install (hand installation), temporary measure only.
Log Check Dam		X			Equally effective as silt fences for sediment trapping and straw bale barriers as drop structure, may include timber salvaged from site during clearing operations, most applicable at clearing/ grubbing stages of construction.	May be expensive, not commonly used after stripping stage, not appropriate for channels drainage areas larger than 10 acres, labour intensive to construct, gaps between logs may allow sediment laden runoff to escape, logs/ timbers will rot over time (not permanent).

Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Straw Bale Check Dam		X		X	Temporary drop structures appropriate for channel slopes with 3% to 5% grades, straw bales are readily available in most areas of the province, biodegradable.	Temporary measure only; not appropriate for channel drainage areas larger than 5 acres, channels steeper than 5% and/ or flow velocities greater than 0.3 m/s; requires extensive maintenance after high flow storm events, must be installed by hand with keying and staking; maximum height of one straw bale.
Synthetic Permeable Barriers		X			Reusable/ moveable, reduces flow velocities and dissipate flow energy; retains some sediments; used as grade breaks in conjunction with sturdy permanent drop structures along steep grades.	Not to be used as check structures, must be installed by hand in conjunction with a RECP, becomes brittle in winter and are easily damaged by construction equipment or recreational vehicles, only partially effective in retaining some sediment, primarily used for reducing flow velocities and energy dissipation.
Groundwater Control (Subsurface Drain)	X				Relief subsurface groundwater seepage and winter ice build-up; lower groundwater table to minimize piping erosion; enhance slope stability performance.	Requires design by a geotechnical engineer; can be a slope instability issue.
Fibre Rolls and Wattles	X				Function well in freeze-thaw conditions, low cost solution to sheet flow and rill (narrow and shallow incision into topsoil layers) erosion on slopes, low to medium cost flow retarder and silt trap, can be used on slopes too steep for silt fences or straw bale barriers, biodegradable.	Labour intensive to install (by hand), designed for slop surfaces with low flow velocities, designed for short slope lengths with a maximum slope of 2H:1V, not widely used on highway construction projects.



Management Practice	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Scheduling	X	X	X	X	Identifies protection issues and plans for efficient, orderly construction of best management practices; minimizes bare soil exposure and erosion hazard; allows early installation of perimeter control for sediment entrapment; early installation of runoff control measures; good construction practices.	Requires time and resources.

(Source: adapted from Alberta Transportation's *Erosion and Sediment Control Manual*, Section 7 and Ontario Ministry of Transportation *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, dated February 2007)

- **Other Considerations**

- To the extent practicable, disturbance should follow topographic contours to reduce erosion. Periodically apply additional aggregate on gravel roads to reduce erosion. Roads should be paved as soon as possible after grading. Temporary gravel roadway or parking area should be considered during wet weather. To the extent practicable, keep heavy equipment off exposed soil during rainy seasons.

- **Minimize disturbance**

- Minimize disturbances to soil where possible. Minimize the disturbance footprint, disturbing only the amount of land that is absolutely necessary.

- **Inspection and Maintenance**

- Periodic inspection and maintenance activities for temporary and permanent erosion and sediment control measures are essential in ensuring such measures are effective. Any deficiencies must be identified and corrected. Example of maintenance efforts may include replacing and/or removal of accumulated sediments and periodic dredging/cleaning of sediment basins. Inspect all erosion control measures weekly, before or after each rain event.
- An example of an inspection and maintenance form, adapted from Alberta Transportation's *Field Guide for Erosion and Sediment Control*, is provided as Appendix A.
- All inspection records must be maintained and filed accordingly in project files.
- Repair any eroded areas immediately. Inspect ditches and berms for washouts. Additional erosion control measures should be considered for areas damaged by runoff.
- Small bare spots may need to be re-sodded

- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction
- **Early Re-vegetation**
  - Re-vegetation requirements may be specified in contract agreements.
  - Re-vegetate early as vegetation can prevent erosion. Consider re-vegetation in stages throughout the project. Where possible, allow sufficient time for plants to root before frost. Refer to **Project Planning (GSM-1)**.
  - Species selections include a number of factors such as soil type, slope, climate, and existing vegetation in surrounding area.
- **Stabilized Construction Entrance**
  - A stabilized pad of aggregate underlain with filter cloth is typically put in place at the point where traffic is likely to enter or leave the construction zone.
  - Stabilizing the construction entrance can significantly reduce the amount of sediment (dust, mud) tracked off-site.
  - Construct on level ground where possible, and provide ample turning radii.
  - Replace gravel material when surface voids are visible.
- **Protection of Stockpiles**
  - Stockpiles are meant for temporary storage of materials only. Provisions should be made for permanent storage for stockpiled material.
  - Stockpiles can become a significant source of erosion and sediment.
  - Earth dikes or other diversions can be used to keep runoff away from stockpiles.
  - Silt fences and tarps can be provided to mitigate runoff during rain events. Traps can also serve as weather protection in addition to sediment control.
  - Silt basins can be utilized where required.

## REFERENCES

- Alberta Transportation, *Erosion and Sediment Control Manual*, June 2011.
- Alberta Transportation, *Field Guide for Erosion and Sediment Control*, June 2011.
- Greater Golden Horseshoe Area Conservation Authorities, *Erosion and Sediment Control Guideline for Urban Construction*, December 2006.
- Ontario Ministry of Transportation (MTO), *Drainage Design Standards*, January 2008.
- Ontario Ministry of Transportation (MTO), *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, February 2007.
- Ontario Ministry of Transportation (MTO), *Environmental Guide for Fish and Fish Habitat*, October 2006.
- Transportation Association of Canada (TAC), *National Guide to Erosion and Sediment Control on Roadway Projects*, May 2005.

- Ontario Provincial Standard Specification. *OPSS 802 – Construction Specification for Topsoil.* November 2010.
- Ontario Provincial Standard Specification. *OPSS 803 – Construction Specification for Sodding.* November 2010.
- Ontario Provincial Standard Specification. *OPSS 804 – Construction Specification for Seed and Cover.* November 2010.

# Appendix A: Example of an Inspection and Maintenance Form

AT Contract Number: \_\_\_\_\_  
 Construction Site Location: \_\_\_\_\_  
 Heavy Equipment on Site: \_\_\_\_\_  
 Date: \_\_\_\_\_ mm of rain in last week: \_\_\_\_\_  
 Date of Last Inspection: \_\_\_\_\_ mm of rain in last 24 hours: \_\_\_\_\_

Contractors on Site: \_\_\_\_\_  
 Construction Activities on Site: \_\_\_\_\_  
 Current Weather: \_\_\_\_\_  
 Weather Forecast: \_\_\_\_\_

Type of Measure (BMP)	Location on Construction Site	Intended Function	Sediment Levels	General Condition	General Performance	Maintenance Required	Type of Maintenance Required	Site Manager Notified	Date Repairs to be Completed By
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	
			0 – 1/4 - 1/2 – 3/4 Full not applicable	poor fair good	poor fair good	yes no		yes no	

Notes: \_\_\_\_\_

Inspectors Signature: \_\_\_\_\_ Inspectors Name: \_\_\_\_\_  
 Copies to: AT Designated Inspector: \_\_\_\_\_ Contractors Site Designate: \_\_\_\_\_ ESC Plan Designer: \_\_\_\_\_  
 \_\_\_\_\_

(Source: Alberta Transportation's *Field Guide for Erosion and Sediment Control*, Part II Table 9)



# EROSION & SEDIMENT CONTROL: ESC-3

## Sediment Control - Temporary

### PURPOSE

- The purpose of this section is to describe some of the common sediment control measures used during construction activities.
- Sediment control is a practice or device designed to keep eroded soil from washing off site and entering natural waterways or the municipal wastewater systems. Sediment control is typically employed with erosion controls, which are designed to prevent or minimize erosion and thus reduce the need for sediment control. There are two general methods of sediment control measures that are used in conjunction with erosion control: *filtering* (entrapment) and *impoundment*. A listing of possible sediment control methods is provided in **Table 4**.

### APPLICABILITY

- This procedure applies to the engineering, installation and maintenance of temporary sediment control features during the construction phase of the project.
- Applicable for areas that are susceptible to sedimentation. Refer to **ESC Planning (ESC-1)** for a list of applicable activities. Read this procedure in conjunction with Erosion Control (ESC-2).

### KEY REQUIREMENTS

- **Contract Specifications**
  - The client or designer may have specified erosion and sediment control measures for all or part of the contract.
  - The contract may include the construction of permanent ESC measures, which if constructed early, could assist in ESC during the project.
- **Ontario Provincial Standards**
  - A number of OPSS describe erosion control requirements. Example of such standards include:
    - OPSS 804 – Construction Specification for Seed and Cover
    - OPSS 805 – Temporary Erosion and Sediment Control Measures
- **Ontario's Environmental Protection Act**
  - The Ontario EPA places a general prohibition on the discharge of a contaminant to the natural environment in a form that causes or has the potential to cause an adverse effect.
- **Ontario Water Resources Act**

- Like the Ontario EPA, the OWRA places a general prohibition on the discharge of any material of any kind into or in any waters or on any shore or bank or into or in any place that may impair the quality of water. "Waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.
- **Conservation Authorities Act**
  - Individual watershed-based conservation authorities are empowered to administer resource conservation programs in partnership with municipalities and the province of Ontario. Work permits may be required for activities related to filling, construction and alteration to lands in flood plain areas.
- **Fisheries Act**
  - 
  - Significant changes to the Federal Fisheries Act came into effect on November 25, 2013. These changes shift the focus of protection from "fish habitat" to "fisheries".
  - The new Act has changed its regulatory perspective. Under the old Act, the habitat and deleterious substance provisions were used as primary protection for the environment. The old section 35 habitat provisions prohibited the harmful alteration, disruption or destruction (HADD) of fish habitat, unless a person had an authorization to do so. A HADD without an authorization was a punishable offence. The new section 35 says:
    - "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."
    - Serious harm is defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat."
    - There is now a requirement to report an occurrence that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: "Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time
      - (a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence; or
      - (b) causes or contributes to the occurrence or the danger of the occurrence."

## IMPLEMENTATION / STRATEGIES

- **Filtering (Entrapment)**

- Soil particles suspended in run-off can be filtered through porous media consisting of natural and artificial materials. They are most effective when applied to inlets of permanent or temporary drainage systems, as well as in outlets of sediment ponds. Filtering requires constant monitoring and maintenance to prevent sedimentation build-up. They are commonly used in stream banks and perimeters surrounding areas with high erosion potential. Filters should be placed perpendicular to the direction of flow.
- The most common form of filtering (entrapment) is through silt curtains or fences. These are most effective for trapping particle sizes of fine, medium sand to coarse silt, depending on the mesh size used, for low flow velocity ( $<1.0\text{m}^3/\text{sec}$ ) and gentle grade ( $<3\%$ ). This method should only be used when there are small runoff flow rates and volumes. Check dams and other barriers can be used for steeper grades where high flow velocities are anticipated.
- The following table summarizes the various filtering (entrapment) options:

**Table 4: Sediment Control Measures**

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Silt Fence	X		X	X	Economical, most commonly used method for sediment control; filter sediments from runoff while allowing water to pond and settle; more effective than straw bale barriers; can be used for perimeter control.	May fail under high runoff events; applicable for sheet flow erosion only; limited to locations where adequate space is available to pond collected runoff, sediment build-up needs to be removed on a regular basis; damage to filter fence may occur during sediment removal.
Sand Bag Barrier	X	X			Promotes sedimentation; best suited for check dams or as a perimeter; more permanent than silt fences or straw bales and allows for easy relocation to meet changing needs during construction.	Best suited for drainage areas of no more than five (5) acres, and should be installed on a level contour; sediments should be removed when it reaches six (6) inches in depth.
Riparian Zone Preservation	X	X	X	X	Preserve a native vegetation buffer to filter and slow runoff before entering sensitive high risk areas, most effective natural sediment control measures, slow runoff velocity, filters sediment from runoff, reduces volume of runoff on slopes.	Stipulate construction activities with careful planning to include preservation areas, freshly planted vegetation for newly created riparian zones requires substantial periods of time before they are effective as established vegetation at controlling sediment
Straw Bale Barrier		X	X	X	Relatively inexpensive if bales are locally available. Biodegradable, more cost effective and easier to install than other forms of barriers.	Short service life due to biodegradation, straw bales may not be readily available in all areas of the province, maximum barrier height of one straw bale, requires extensive maintenance after high flow storm events, and requires proper keying and staking.
Brush or Rock Filter Berm	X	X	X	X	More effective than silt fences, can utilize timber and materials salvaged from site during clearing and grubbing stages, can be wrapped and anchored with geotextile fabric envelope.	More expensive than silt fences, temporary measure only, not effective for diverting runoff, expensive to remove, cannot be used in channels or ditches with high flows.



Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Fibre Rolls and Wattles	X				Function well in freeze-thaw conditions, low cost solution to sheet flow and rill (narrow and shallow incision into topsoil layers) erosion on slopes, low to medium cost flow retarder and silt trap, can be used on slopes too steep for silt fences or straw bale barriers, biodegradable.	Labour intensive to install (by hand), designed for slope surfaces with low flow velocities, designed for short slope lengths with a maximum slope of 2H:1V, not widely used on highway construction projects.
Pumped Silt Control Systems (Silt Bags)		X			Filter bag is lightweight and portable, simple to set up and easily disposed; sediment-laden water is pumped into and contained within the filter bag for disposal; different aperture opening sizes available; used in emergencies only under overflow conditions.	May be expensive; requires special design needs for use; not readily used in most highway construction projects; requires a pump and source of power; suitable for short periods of time and small volumes of sediment laden water; can only remove particles larger than aperture opening size.
Earth Dyke/Barrier			X	X	Easy to construct; relatively inexpensive as local soil and material is used; can easily be converted to sediment pond/basin.	Geotechnical design required for fill heights in excess of 3m; may not be suitable for all soil types; riprap spillway and/or permeable outlets may be required.
Gabions		X			Relatively maintenance free, permanent drop structure, long lasting (robust), less expensive and less thick than rip-raps, allows smaller diameter rock/stones to be used, relatively flexible, commercially available products, commonly used in highway construction projects, suitable for resisting high flow velocity.	Construction and removal may be labour intensive (installation by hand), extra costs associated with gabion basket materials.
Rock Check Dam		X		X	Permanent drop structure with some filtering capability, cheaper than gabion and can armour entire channel, easily constructed, commonly used in highway construction activities.	Expensive in areas of limited rock source, not appropriate for channel draining areas of larger than 4 acres, requires extensive maintenance after high flow storm events, susceptible to failure if water undermines or outflanks structure.

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Aggregate Filled Sand Bag Check Dam		X		X	More effective as a mechanism for slowing flow velocities, cheaper than gabions or armouring the entire ditch, easily constructed and reusable.	Not appropriate for channels and drainage areas larger than 5 acres, requires extensive maintenance after high flow storm events, low filtering capabilities, labour intensive to install (hand installation), temporary measure only.
Log Check Dam		X			Equally effective as silt fences for sediment trapping and straw bale barriers as drop structure, may include timber salvaged from site during clearing operations, most applicable at clearing/ grubbing stages of construction.	May be expensive, not commonly used after stripping stage, not appropriate for channels drainage areas larger than 10 acres, labour intensive to construct, gaps between logs may allow sediment laden runoff to escape, logs/ timbers will rot over time (not permanent).
Straw Bale Check Dam		X		X	Temporary drop structures appropriate for channel slopes with 3% to 5% grades, straw bales are readily available in most areas of the province, biodegradable.	Temporary measure only; not appropriate for channel drainage areas larger than 5 acres, channels steeper than 5% and/ or flow velocities greater than 0.3 m/s; requires extensive maintenance after high flow storm events, must be installed by hand with keying and staking; maximum height of one straw bale.
Synthetic Permeable Barriers		X			Reusable/ moveable, reduces flow velocities and dissipate flow energy; retains some sediments; used as grade breaks in conjunction with sturdy permanent drop structures along steep grades.	Not to be used as check structures, must be installed by hand in conjunction with a RECP, becomes brittle in winter and are easily damaged by construction equipment or recreational vehicles, only partially effective in retaining some sediment, primarily used for reducing flow velocities and energy dissipation.
Continuous (earth-filled geotextile) Berm	X		X	X	Serves as a temporary measure; flexible shape and design; no trenching required.	Requires specialized machine.

Best Management Practices	Applications				Comments	
	Slopes	Ditches and Channels	Large Flat Surface Areas	Borrow and Stockpile Area	Advantages	Limitations
Storm Drain Inlet/ Sediment Barrier			X		Temporary measures; easy to install and remove.	Limited sediment entrapment capacity; requires regular clean-out maintenance; clogged filter fabric or stone filters that have been clogged must be replaced immediately.
Scheduling	X	X	X	X	Identifies protection issues and plans for efficient, orderly construction of best management practices; minimizes bare soil exposure and erosion hazard; allows early installation of perimeter control for sediment entrapment; early installation of runoff control measures; good construction practices.	Requires time and resources.

(Source: adapted from Alberta Transportation's *Erosion and Sediment Control Manual*, Section 7 and Ontario Ministry of Transportation *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects*, dated February 2007)

- **Impoundment**

- Impoundment promotes the removal of sediment by reducing the flow velocity of surface runoff. This technique is most often applied to concentrated flow within the permanent or temporary drainage system of a site. Ideally, impoundment measures should be located within the site near the sediment source. Sediment basins/ traps/ ponds should ideally be installed at the perimeter of the site, especially avoiding adjoining sensitive environmental areas. Regular maintenance and sediment removal would be required to ensure that adequate capacity and drainage is maintained.
- Sediment basin/ traps are impoundment controls used for large runoff areas; temporary filter barriers such as silt fences, synthetic weave barriers, and rock dams are used along ditch or slope toe areas.

- **Inspection and Maintenance**

- All erosion control measures will require inspection during the life of a project at regular intervals and prior to and after precipitation. Some of the above listed controls will require regular and/or periodic maintenance to ensure that they remain effective during the length of the project.

## REFERENCES

- Ontario Provincial Standard Specification. *OPSS 805 – Construction Specification for Temporary Erosion and Sediment Control Measures*. November 2010.
- Ontario Provincial Standard Specification. *OPSS 804 – Construction Specification for Seed and Cover*. November 2010.
- Ontario's *Environmental Protection Act*
- *Ontario Water Resources Act*
- *Conservation Authorities Act*
- *Fisheries Act*

## EROSION & SEDIMENT CONTROL

☑	Checklist	Comments
<b>Erosion &amp; Sediment Control Planning</b>		
	Review the permanent erosion and sediment control plan. What permanent measures are in place? (e.g., gabions, earth dykes)	
	What temporary controls are in place? This may include installing silt fences and straw bale barriers.	
	If job site is close to a watercourse that supports fish and/ or fish habitat, are fisheries windows being considered? This may affect scheduling of work.	
	Is work being scheduled during favourable weather months where possible? Avoid work in wet conditions to decrease potential for erosion and sediment loss.	
	Monitor daily the erosion and sediment controls that are in place – are they effective?	
	Are traffic routes planned to avoid sensitive areas?	
	Is there proper signage (e.g., not-to-be-disturbed areas) to indicate sensitive areas?	
	Are surface water flows properly controlled to limit erosion and sedimentation off-site?	

☑	Checklist	Comments
<b>Erosion Control</b>		
	Are exposed surfaces covered and protected?	
	Are runoffs being properly controlled?	
	Is re-vegetation being implemented as soon as possible to prevent erosion?	
	Is a stabilized pad of aggregate underlain with filter cloth placed at the point of traffic entry and exit to reduce the amount of sediment (i.e., dust, mud) tracked off-site?	
	Are stockpiles located away from watercourses and environmentally sensitive area?	
	Are stockpiles being used only as a temporary measure? Provisions should be made for permanent storage of stockpiled material.	
<b>Sediment Control</b>		
	What sediment control practices are in place?	
	Are sediment control practices monitored weekly, or after each rainfall, to ensure effectiveness?	



# NOISE, DUST & AIR EMISSIONS: AIR-1

## Noise and Vibration

### PURPOSE

- The purpose of this section is to describe strategies for reducing noise and vibration on a project. Both noise and vibration are considered “contaminants” by the Ministry of Environment, and must be managed. The management strategies described in this section do not supersede contract requirements - all contractors are responsible for complying with contract design requirements.
- **Noise** is defined as “unwanted sound”, and can disturb the comfort and convenience of the people and animals around it. Loud or prolonged periods of noise can lead to hearing loss. Noise often results from vibration, which is a mechanical phenomenon associated with operating equipment and moving parts. **Vibration** is mostly undesirable, and can result in damage to equipment, surrounding buildings, roads, and railways.
- “**Nuisance noise**” is defined any noise that is injurious to health, indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. In environmental law, nuisance noise may constitute an “adverse effect.”
- Contaminants in general include noise, dust, and air emissions.

### APPLICABILITY

- Applicable to road building activities, such as:
  - Pile driving;
  - General construction activity;
  - Vehicle use;
  - Equipment and material handling;
  - Diesel generators;
  - Crushing;
  - Asphalt production;
  - Aggregate production;
  - Equipment operation;
  - Drilling and Blasting; and,
  - Highway maintenance activities.

### KEY REQUIREMENTS

- **Contract Requirements**

- Refer to the contract for any specific requirements regarding permitted noise levels, hours of operations, etc. Contracts may also stipulate required mitigation.
- **Ontario Ministry of Transportation Environmental Protection Requirements (EPR) – Noise-1**
  - The requirements under EPR Noise-1 stipulate that potential noise impact must be investigated where highway construction project is proposed through or adjacent to a Noise Sensitive Area (NSA). The objective of the assessment is to determine the changes in ambient noise level due to the highway. Typically this would have been completed at the design phase. Refer to the contract for requirements.
- **Ontario Ministry of Transportation Environmental Protection Requirements (EPR) – Noise-2**
  - EPR Noise-2 requires that construction projects be undertaken in a manner that minimizes noise level. A process for dealing with public complaints during construction must also be developed.
  - Pile driving and blasting operations must be conducted in accordance with OPSS 120, *General Specification for Use of Explosives*, and MOE Publication NPC-119.
- **OPSS 120 & MOE NPC-110**
  - Ontario Provincial Specification Standard OPSS 120, *General Specification for Use of Explosive*, describes the requirements that must be taken into consideration for the use of explosives on Contracts.
  - MOE’s NPC-119, *Blasting*, is applicable to sound and vibration due to blasting operations.
- **Municipal By-Laws**
  - Refer to the local municipality/ regional By-Laws for additional restrictions. These restrictions typically include time frame prohibitions (e.g., no operation of construction equipment on weekends and holidays).
- **Ontario’s Occupational Health & Safety Act – occupational noise exposure limit**
  - The occupational noise exposure limit for Ontario is at 85dBA for 8 hours. Workers exposed to sound levels over the exposure limit will require hearing protection.
- **Ontario’s Environmental Protection Act**
  - Noise and vibration are both listed contaminants. Ontario’s EPA prohibits the discharge of a contaminant that causes or may cause an adverse effect.

## IMPLEMENTATION/ STRATEGIES

- Mitigation measures may include:
  - Acoustical barriers;
  - Berms;
  - Vertical and Horizontal Alignments; and



- Pavement Surfaces.
  - Mitigation must attempt to achieve levels as close to, or lower than, the objective level (i.e., future predicted ambient without the proposed improvements).
- **Equipment Placement**
  - Where equipment is placed can influence the level of noise generated. Take advantage of natural depressions, which provide a degree of noise control. Where safe to do so, select a low lying area to set up noisy equipment. The use of existing vegetation as a natural screen can also be effective in diffusing noise.
- **Maintenance of Equipment**
  - Properly maintained equipment and tools can reduce vibration and noise levels. Establish a preventative maintenance program to ensure equipment is functioning properly.
- **Noise Monitoring**
  - For areas where noise is a potential concern, establish a noise monitoring plan and procedure. Identify the monitoring frequency, person responsible, monitoring instrument, and record keeping requirements. Train employees to know the noise specification/ baseline level for equipment that is a source of noise. Ensure monitoring is completed on a regular basis and document the results. It is helpful to establish baseline (background) noise conditions prior to starting construction, to support a review of responsibility in the event of complaints or enforcement.
- **Pile Driving**
  - A pile driver is a mechanical device used to drive piles into soil to provide foundation support for buildings or other structures. The dominant noise is caused by the impact of the hammer on the pile, or the impacts between components of the hammer. A vibratory pile driver can be used as a noise mitigating measure in lieu of a conventional pile driver. The feasibility of using vibratory pile drivers should be evaluated when the project work is in close proximity to residences, office buildings or other potentially sensitive receptors.
  - Other noise mitigating measures may include:
    - Attach acoustical insulation to the fence around the perimeter of the site
    - Use of high frequency vibratory hammer (to replace low frequency hammer)
    - Use movable acoustic curtains to shield the pile driver hammer and pile
    - Only conduct pile driving activities during certain time windows
  - Refer to OPSS 120 and MOE's NPC-119 for more information.
- **Hot Mix Operations**
  - Refer to Section 3.1.4 and Section 4.4 of Ontario Hot Mix Producers Association's (OHMPA's) *Environmental Practices Guide* for more information.
- **Ready-Mix Concrete**

- Refer to Chapter Seven of Canadian Ready-Mixed Concrete Association's (CRMCA's) *Recommended Guideline for Environmental Management Practices* for more information.
- **Communications**
  - Develop a communications policy to notify nearby community/ businesses which may be impacted by construction activities.
    - By ensuring impacted parties are aware of the purpose and duration / schedule of the activities, it may significantly reduce the number of complaints.
    - Indicate in your communications any mitigation efforts.
  - Ensure there is a process in place to address public enquiries or complaints.

## REFERENCES

- Canadian Ready-Mixed Concrete Association. *Recommended Guideline for Environmental Management Practices*. May 2004.
- Ontario Hot Mix Producers Association. *Environmental Practices Guide*. Fourth Edition. April 2010.
- Ontario Ministry of the Environment and Energy. *NPC-119 Blasting*. 1978.
- Ontario Ministry of the Environment and Energy. *NPC-206 Sound Levels Due to Road Traffic*. October 1995.
- Ontario Ministry of Transportation. *Environmental Guide for Noise*. July 2008.
- Ontario Ministry of Transportation. *Environmental Protection Requirements for Transportation Planning and Highway Design, Construction, Operation and Maintenance, Section 6 Noise*. October 2006.
- Ontario Provincial Standard Specification, OPSS 120, *General Specification for Use of Explosives*, April 2008.
- Ontario Road Builders' Association. *Guidelines for Safe Blasting in Ontario Highway Construction Operations*.
- Toronto Municipal Code. *Chapter 591 – Noise*. Amended August 2010.



# NOISE, DUST & AIR EMISSIONS: AIR-2

## Dust Control

### PURPOSE

- The purpose of this section is to describe dust control strategies to minimize the potential for adverse effect associated with emissions of particulate material. Dust is considered a “contaminant” by the Ministry of Environment, and must be managed.
- **Dust** consists of particulates in the atmosphere, mostly silt-sized material, which is usually windblown or kicked up by vehicle movement or other mechanical means. Road dust in particular is a significant source of particulate material, as are earth moving and screening activities. Dust can originate from many construction activities. The greatest dust emissions are typically from truck traffic.
- Uncontrolled airborne dust can result in a number of issues. These concerns may include:
  - Creating health problems, particularly for those with respiratory problems;
  - Creating problems with highway visibility;
  - Damage or dirty property and belongings;
  - Creating unsafe working conditions; and
  - Increasing sedimentation in surface water, disrupting standing vegetation.

### APPLICABILITY

- Applicable to road building activities such as:
  - Concrete saw cutting;
  - Clearing and grading activities;
  - Construction vehicle traffic on unpaved roads;
  - Drilling and blasting activities;
  - Sediment tracking onto paved roads;
  - Soil and debris storage piles;
  - Batch drop from front-end loaders;
  - Crushing;
  - Drilling and blasting (especially bridge rehab blasting activities);
  - Asphalt production;
  - Aggregate placement;
  - Pulverizing;
  - Highway maintenance activities; and
  - Concrete production.



## KEY REQUIREMENTS

- **Contract Requirements**
  - Contracts may specify permitted dust levels and detail any required monitoring measures.
- **OPSS 506 Construction Specifications for Dust Suppressants**
  - Provides specifications for water and chemical dust suppressants on travelled surfaces.
- **Ontario's Environmental Protection Act**
  - Dust is a contaminant. Ontario's EPA prohibits the discharge of a contaminant that causes or may cause an adverse affect, unless approved under an Environmental Compliance Approval. In Ontario, an adverse affect includes anything that may result in harm or material discomfort to any person, affect the health of any person, result in loss of enjoyment of normal use of property, or inter with the normal conduct of business.
  - The Ontario Air Pollution – Local Air Quality Regulation 419/05 sets new and updated air standards represented as point of impingement limits for contaminants that are released, even from temporary works. The Regulation also sets out requirements for compliance assessments and the use of air dispersion models. Compliance with the air standards is demonstrated through the preparation of an Emission Summary and Dispersion Modelling (ESDM) Report which summarizes all air emissions from a project and assesses their impacts against the Ministry of the Environment (MOE) air standards.
  - For example, dust emissions from stockpiling or conveying are considered an air contaminant and must be permitted under Section 9 of the EPA. Dust emissions, including those associated with stockpile operations, must be included in an ESDM Report prepared in support of an ECA (Air) application. As a condition of any ECA (Air), it is likely that the development of a Fugitive Dust Control Best Management Practices Plan (BMPP) will be required for the project.
  - Certain waste materials may be used as a dust suppressant. The use of a waste for dust suppression will require the approval of the Ministry of Environment, by way of an Environmental Compliance Approval. Refer to MOE Guideline C-9, *Approval of Waste Management Systems for Dust Suppression* for more information.

## IMPLEMENTATION/ STRATEGIES

- **General**
  - Where dust is anticipated to be a problem, prepare a Dust Control Plan. A documented dust control plan prepared prior to start of construction activity will identify potential dust sources and mitigation measures. That plan should contemplate the mitigation measures described herein, and should be communicated to all workers and contractors

whose activities could result in the generation of dust or influence the effectiveness of the mitigation measures.

- Equipment required for dust control typically includes water tankers and spreader trucks.
- When implementing dust control measures, anticipate the direction of prevailing winds to minimize impact of dust. Oil should not be used for dust control since it may migrate into drainways and/ or seep into the soil. Also, be aware of any sensitive neighbours surrounding the site (e.g., schools, hospitals).
- Other measures such as reducing the speed limit on unpaved roads can also minimize dust.

- **Erosion Control**

- Proper erosion control measures can significantly reduce the potential for dust generation. Refer to **ESC Planning (ESC-1)** for more information.

- **Dust Suppression**

- For heavily travelled and disturbed areas, wet suppression (watering), chemical dust suppression, and haul truck covers are some measures that can be employed to control dust. Permanent or temporary vegetation, mulching and sand fences can also be utilized for areas of occasional or no construction traffic.

- Most dust control involves the use of water, a chemical dust suppressant or covering of exposed surfaces to stabilize and minimize airborne particulates (dust). Water is a temporary dust control measure, whereas chemical dust suppressants like calcium chloride provide a longer-term dust control. NOTE: Some contracts prohibit the use of chemical dust suppressants. If you plan to use a chemical dust suppressant, ensure that its use is permitted under permit and regulation.

- Many products are available for chemically stabilizing gravel roadways and stockpiles. Due to potential adverse effects from the use of such chemicals, dust control through chemical means is generally not recommended and should be done with caution. Improper storage of dust suppressant chemicals can also result in environmental impact – refer to **Chemical and Fuel Management (CFM-1)** for more information.

- **Dust from Bridge Rehabilitation Activities**

- Special attention should be paid to dust and particulates generated from bridge construction/ rehabilitation activities. Dust may result in increased sedimentation in surface waters, and may impact surrounding standing vegetation. Proper dust control can prevent particulates from entering surface water.

- **Vehicular Tire Wash**

- Tire wash stations can be an effective dust control measure for vehicles entering and leaving construction sites. Discharges from the wash stations must be directed to a sediment control device. Refer to **Sediment Control (ESC-3)**.

- **Power Washing and Sweeping of Asphalt Surfaces**
  - Power washing and sweeping of asphalt surfaces can effectively remove Fine Particulate Matter (FPM) from both construction and public traffic and is considered a best management practice.
- **Watering**
  - Watering prevents dust for short periods of time and should be applied daily (or more often) to be effective. Do not over-water, as it may lead to erosion.
  - Active dirt construction roads are commonly watered three or more times per day during dry season.
  - A Permit to Take Water from the Ministry of the Environment is required for anyone who takes more than 50,000L of water a day from a lake, river, stream or groundwater source. Refer to section **Water Taking and Dewatering (WW-2)** for more information.
- **Minimize drop height and cover materials**
  - Significant dust can be released from the movement and handling of loose, unconsolidated material (soil, cement, fly-ash, etc.).
  - Where practicable:
    - Minimize drop heights from conveyors and front end loaders.
    - Cover stockpiles of materials, and place stockpiles in areas that are protected from wind erosion.
    - Cover conveyors, and provide water-sprays at transfer points.
- **Concrete Saw Cutting**
  - Cutting paving slabs, curb stones or other concrete or stone products produces enormous amounts of dust. This dust will contain some very fine dust that can cause serious health concerns.
  - The decision of cutting wet or dry is dependent on the job type:
    - Dry cutting eliminates the need to handle wet slurry and the need to equip saws with water tanks and hoses. Wet cutting reduces the dust level but requires some measure of slurry containment. Do not use on saws that are electrically operated. Studies have shown that a minimum flow rate of about 0.5 Litres per minute is required to optimize dust suppression.
    - In addition to wet suppression through the use of water, local exhaust ventilation can be used as a second means for dust suppression. This is typically in the form of an exhaust hood (or shroud) that surrounds the blade. The hose is connected to an industrial vacuum cleaner by flexible hose.
- **Maintenance**
  - Majority of dust control measures require frequent (often daily) maintenance. An organized job site can also help in reducing dust levels. Refer to **GSM-2 Housekeeping**.

- **Communications**

- Develop a communications policy and notify nearby community/ businesses which may be impacted by construction activities.

**REFERENCES**

- Ontario Ministry of Environment, Guideline C-9, *Approval of Waste Management Systems for Dust Suppression*. March 2012.
- Ontario Ministry of Transportation, *Environmental Reference for Contract Preparation - Dust Control*, February 2007.
- OPSS 506 Construction Specifications for Dust Suppressants





# NOISE, DUST & AIR EMISSIONS: AIR-3

## Odour

### PURPOSE

- The purpose of this section is to describe potential odour problems that could arise from construction activities, and strategies for managing them.
- **Odour** problems associated with construction are typically regarded as a nuisance, but can also cause undesirable health effects. However, unusual odour can also serve as a warning sign for potential leaks or soil/ water contamination. An odorous emission can consist of a single substance/source, or could be the result of a mixture of contaminants from multiple sources. Odours are not generally addictive in the same way as noise: a “new” odour cannot be added to an existing background or “ambient” odour level to give a “total figure” for odour.

### APPLICABILITY

- Applicable to activities such as:
  - Asphalt paving and production
  - Painting and solvents – varnishes, coatings, adhesives
  - Engine exhaust
  - Equipment – diesel exhaust
  - Decaying/rotting vegetation
  - Standing water
  - Domestic waste storage
  - Liquid transfer

### KEY REQUIREMENTS

- Contract requirements
- Ontario’s *Environmental Protection Act*
  - Odour is defined as a “contaminant”. Ontario’s EPA prohibits the discharge of a contaminant that causes or may cause an adverse effect, unless approved by the Minister. In Ontario, an adverse effect includes anything that may result in harm or material discomfort to any person, affect the health of any person, result in loss of enjoyment of normal use of property, or interfere with the normal conduct of business.

### IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - It is important to remember that the lack of complaints does not necessarily imply there is an absence of odour problem. The response to exposure to an odour is

subjective – each individual will make his own subjective assessment as to whether the offensive odour leads to a feeling of annoyance, or is considered acceptable. Prevention is key – minimize activities which may result in odour issues where reasonable and practicable. This can be achieved by simple measures such as closing lids to solvent or paint drums.

- If you anticipate that the project could result in odour complaints, perhaps through the excavation of odourous materials or the use of chemicals containing volatile organic compounds, an Odour Control Plan should be developed.

- **Source Identification and Monitoring**

- It is important to identify the source in order to address any odour concerns. A number of methods can be used to assist in potential source identification:
  - Odour descriptions – quality/characteristic, intensity;
  - Knowledge of chemicals/ activities on-site which may cause odour;
  - Wind directions and area map; and
  - Past complaint logs.
- Odour monitoring is most often based on human observations, as the human nose is the most sensitive and flexible instrument from which odour data can be gathered. Odour monitoring can take the form of regular inspections or patrols. Ideally, such monitoring would take place at the time of arrival at site, as odour sensitivity drops when exposed to odour for a significant time. In the event of persistent complaints or confirmed issues, more quantitative measures may be required. Note that unless the odour is particularly strong, ambient sampling is unlikely to detect any odour issues. For most situations, it is advisable to sample at the source and undertake a computer dispersion modelling to determine the likely level at a sensitive location. The disadvantages to quantitative measurements may include costly sampling, waiting several days for lab results, and

- **Chemical and Waste Storage**

- Chemicals such as oils, fuels, solvents, paints, and fuming acids are a source of odour. Containers should be kept covered when not in use.
- Similarly, waste receptacles should be covered and regularly emptied.

- **Diesel Fumes**

- Large diesel-powered vehicles are frequently present during construction activities. Diesel-related odours from vehicle exhausts are typically not a concern, unless the vehicle operates or idles close to a building air intake or pedestrian areas. Diesel odour is persistent and is a confirmed source of discomfort and sickness. Minimize idling where practicable.

- **Hot Mix Operations**

- For information regarding odour in hot mix operations, refer to Section 3.1.3 of Ontario Hot Mix Producers Association's (OHMPA's) *Environmental Practices Guide*.
- **Communications**
  - Develop a communications policy and notify nearby community/ businesses which may be impacted by construction activities.
    - By ensuring impacted parties are aware of the purpose and duration of the activities which may lead to odour issues, it may significantly reduce the number of complaints.
    - Indicate in your communications any mitigation efforts.
  - Ensure there is a process in place to address public enquiries or complaints.

## REFERENCES

- Ontario's *Environmental Protection Act*
- Ontario Hot Mix Producers Association's (OHMPA's) *Environmental Practices Guide*



# NOISE, DUST & AIR EMISSIONS: AIR-4

## Greenhouse Gases

### DESCRIPTION

- The purpose of this section is to provide a general overview of greenhouse gases and what actions members can take to reduce their GHG emissions.
- **Greenhouse Gases** (GHGs) are air contaminants that result from the combustion of fuel in road vehicles, construction equipment, generators, etc. The contaminants include carbon dioxide (CO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), water vapour (H<sub>2</sub>O), methane (CH<sub>4</sub>), and Ozone (O<sub>3</sub>). GHGs are associated with the warming of the atmosphere.
- How roads and highways are designed and built can have a significant impact on the amount of GHGs emitted – not only during construction, but over the lifespan of the roadway.
- In terms of construction activity, GHG-reducing measures will influence the overall carbon footprint of the project and provide additional benefits such as improved worker health and comfort. In addition, by reducing emissions, fuel consumption is reduced, and that means financial savings.

### APPLICABILITY

- This section is applicable to all road building activities that require the use of fuel-burning equipment and result in the combustion of hydrocarbon fuels.

### KEY REQUIREMENTS

- **Municipal By-Laws – idling restrictions**
  - Refer to municipal by-laws for any idling restrictions

### IMPLEMENTATION/ STRATEGIES

- **Vehicle Size and Type**
  - Depending on the type of road building activity involved, light duty pickup trucks may be sufficient over heavy duty trucks. In general, large vehicles have lower fuel efficiency ratings, and should only be used where necessary.
  - Hybrid engine vehicles can also be investigated for activities with frequent stop-and-go traffic conditions or situations where trucks need to be powered or idling on a jobsite.
  - Purchasing the correct type of tire and keeping tires inflated can also reduce fuel consumption. Low-rolling resistance tires are designed to create less friction and less heat, which makes the vehicle move more smoothly along the road.
- **Route Planning**

- Route planning can have a significant impact on fuel consumption, especially for long-term construction projects where significant distances must be travelled between work locations.
- **Vehicle Traffic and Idling**
  - Vehicle idling can cause unnecessary emissions of greenhouse gases. Reduce idling where possible. Refer to the Municipal By-Laws for any idling restrictions. As an example, the City of Toronto prohibits idling for more than one minute in a 60-minute period.
- **Non-Highway Diesel Equipment**
  - In addition to GHGs, diesel combustion engines are also a source of other air pollutants including volatile organic compounds and particulates. Most new equipment is built to comply with strict US Environmental Protection Agency (EPA) emission standards for non-road diesel engines. Ensure that diesel generators meet US EPA standards and are well maintained.
  - The Canadian Off-Road Compression-Ignition Engine Emission Standards was promulgated in 2005 and requires diesel engines modelled 2006 and later to adopt emissions reducing technologies that are compatible with the tiered emissions-reduction plan introduced by the US EPA. When sourcing equipment, consider obtaining information from suppliers on the fuel efficiency features of comparable pieces of equipment, and look for equipment with more fuel efficient features.
- **Proper Maintenance**
  - Ensuring a robust preventative maintenance program is in place for road building related equipment (e.g., excavators, loaders, pavers, trucks, etc.) can maximize efficiency and reduce fuel use, while improving worker comfort and performance at the same time. Properly maintained equipment can also reduce the level of noise and vibration, and prevent potential odour problems from leaking diesel or gasoline.
  - All trucks and equipment should be maintained as per manufacturer's recommendations, and daily checks should include truck walk-around and greasing of equipment where required.

## REFERENCES

- Municipal By-Laws – idling restrictions

## NOISE, DUST & AIR EMISSIONS

☑	Checklist	Comments
<b>Noise and Vibration</b>		
	Have business owners/ communities been informed, prior to the commencement of work, of any potential noise impacts?	
	Is there a general noise monitoring program?	
	Have employees been trained to identify potential noise issues and mitigation opportunities?	
	Has there been any noise complaint? Is there a process for addressing public complaints?	
	Have activities that could result in high levels of noise and vibration been evaluated and identified?	
	Is work being completed only during permissible hours? Refer to By-Law restrictions.	
	Have noise mitigation measures been considered?	
	Is equipment that is associated with high noise levels placed in areas away from sensitive receptors?	
<b>Dust Control and Particulate</b>		
	Has a Dust Control Plan been prepared, and is it reviewed regularly?	
	Has the Dust Control Plan been communicated to Site workers, contractors and neighbours? Is there a process for addressing public complaints about dust?	

	Has the prevailing wind direction been taken into consideration when implementing dust control measures?	
	Is the speed limit reduced on unpaved roads to minimize dust?	
	Are dust control measures implemented, and monitored regularly to ensure effectiveness?	
<b>Odour Control</b>		
	Have activities that could result in odour been identified?	
	Are control measures put in place to prevent odour? E.g., keeping the lid of chemical containers closed when not in use, reduce engine idling, etc.	
	Is work area inspected daily for potential odour issues?	
	Has there been any odour complaint? Is there a process for addressing public complaints?	
<b>Greenhouse Gases</b>		
	Have by-law requirements been reviewed to identify potential idling restrictions?	
	Have you considered any opportunities to reduce travel distances through route planning?	
	Are all vehicles and equipment on a preventative maintenance schedule? Properly maintained equipment can maximize efficiency and reduce fuel consumption.	



# EXCESS MATERIALS: Soil, Concrete, Rock, Wood

EM-1

## PURPOSE

- The purpose of this section is to describe general strategies for the management of excess materials (i.e., soil, concrete, rock, wood), including environmental concerns related to excess materials, soil testing, and peat/ muskeg management.
- **Excess material** means material removed during construction and includes surplus and unsuitable materials. The management of excess material covers the proper storage and re-use/disposal of materials that are not, by definition, waste since they can be wholly reused/ recycled.
- Where road construction proceeds through peat deposits, detailed consideration must be given at all planning stages to the management of any excess material.

## APPLICABILITY

- Typical excess materials associated with road construction activities include:
  - Topsoil, Peat/Swamp materials, Subsoil
  - Concrete, Masonry
  - Rock
  - Wood
- Improper storage and management of excess materials can lead to a number of environmental concerns. These may include fire hazards resulting from improper storage of slash logs, cleared vegetation and used building materials. Improper management and stockpiling of excess materials may also impact vegetation and associated wildlife.
- Wastes and excess materials from demolition of structures can contain solvents, oils, paints and other substances that can cause contamination if not handled properly.
- Stockpiling of excess materials can lead to dust concerns if not handled properly. Refer to **Dust Control & Particulates (AIR-2)**.
- Erosion and sediment control is also a concern during the management of excess soil and clean-out material – refer to **ESC Planning (ESC-1)**.

## KEY REQUIREMENTS

- **Contract specific requirements**
  - Refer to the project contract for any specific requirements for managing excess materials.
- **OPSS 180 – General Specification for the Management of Excess Materials**
  - The Ontario Provincial Standard Specification describes the expected standard of care for the management of excess materials on construction projects in Ontario.



Notification of site selection and property owner release forms are required to be submitted to the Contract Administrator and the property owner at least two weeks prior to the use of the property.

- When excess material is managed by disposal as non-hazardous solid industrial or commercial waste:
  - A copy of the weigh ticket or receipt provided by the disposal site operator shall be submitted to the Contract Administrator on a weekly basis.
  - Within three (3) weeks of the completion of disposal activities, provide a completed copy of the form OPSF 180-5 *Waste Quantity Report* to the Contract Administrator.
- Forest Resource licensees identified in the Contract Documents must be notified prior to commencement of any open burning.
- Excess material audit or inventory may be imposed by conditions specified in the Contract documents.
- When an excess material is a mixture of materials, it should be managed in compliance with the most stringent conditions that apply to any one of the materials in the mixture.
- Disposable fill - the use of excess material as disposable fill, including side-casting of swamp materials, will usually be specified in the Contract documents.
- Opening burning - open burning of excess materials is only permitted when specified in the Contract documents. A permit from the Ministry of Natural Resources (MNR) or the local municipality may also be required. If the contractor plans any open burning of wood waste, contact the local office of the MNR and the local/ regional municipality to confirm any permit requirements.
- Stockpiling - stockpiling of excess materials will usually be specified in the Contract documents and may be subjected to conditions, often a stockpile limitation of no more than 120 days.
- **Ontario's Management of Excess Soil – A Guide for Best Management Practices**
  - The Ministry of Environment (MOE) issued a guideline titled Management of Excess Soil – A Guide for Best Management Practices in January 2014. Those managing excess soils are being encouraged to follow the guideline. The Guide provides the following guidance:
    - It is “not intended to be applied to small, low-risk construction or maintenance activities that are limited to single-dwelling residential properties, or activities associated with minor municipal road work or sewer/ water main construction or repair. However, those involved in these smaller-scale projects and smaller-scale soil management activities are encouraged to consider whether the best practices may be useful.” It applies only to soil, not to engineered fill products, asphalt, concrete, re-used or recycled aggregate product, etc.

- The source and receiving sites must have a written Soil Management Plan and Fill Management Plan, respectively, prepared under the supervision of a Qualified Person (QP) under Reg. 153/04.
  - Each source site's soils must be deposited in a distinct, documented area, so that it can be found afterwards if needed.
  - Temporary soil storage sites will be permitted, but require appropriate site-specific controls, such as tarping and paved surfaces, to prevent adverse effects.
- **Ontario Regulation 347 – General Waste Management**
    - Ontario's Regulation 347, promulgated under the *Environmental Protection Act*, defines "waste" and describes the requirements of the management of waste. If the excess material is to be wholly used or recycled, it is not a waste and is not subject to the registration or other requirements of Regulation 347.
    - If the material is deemed a waste – in other words if it is not able to be wholly reused or recycled, a permit or authorization from the Ontario Ministry of the Environment may be required before that material can be managed on-site or moved off-site. The Ontario MOE requires a Certificate of Approval for a Waste Management System, in the event that a "waste" is stored on the project site for more than 270 days.
    - Refer to **WM-3 Management of Contaminated Soil** for information on the management of potentially contaminated soils.

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Excess materials that fall within the scope of this procedure include soil, concrete, rock, wood, and peat/ muskeg. Other excess and/ or waste materials, such as asphalt, manufactured and natural wood materials, used oil and operating fluids from equipment and machinery, fabricated metal and plastic products, etc. are considered in **WM-1 Non-Hazardous Waste**, **WM-2 Hazardous Waste** or **WM-3 Management of Contaminated Soil**.
  - It is important to consider the nature and amount of excess material on a project site during the planning stages, preferably at pre-design when the cost and schedule implications of managing the material can be identified. This is also the time to identify the receiving sites for excess materials. The physical and chemical characteristics of the excess material will, in many situations, dictate what can be done with it and so it is important to understand at the outset of the project what the material consists of.
  - Approval may be required to dispose of excess materials on Crown Land or off the right-of-way. That approval would be required from the owner of the land.

- The following lists the management options available for excess materials, as recommended by OPSS 180:
  - Re-use
  - Disposable fill
  - Open burning
  - Disposal as non-hazardous solid waste
  - Stockpiling
  - Disposal as subject waste
- Refer to Table 1 and Table 2 from OPSS 180 - *General Specification for the Management of Excess Materials*, for a list of management options (e.g., reuse, disposable fills, stockpiling) for each corresponding types of excess materials. Always respect the separation distances required for disposal of fill adjacent to water, wells and residences.
- **Soil Testing**
  - Any property being considered for acquisition or disposition for the purposes of highway construction is screened for potential site contamination during the design phase. Refer to OPSS 180, *General Specification for the Management of Excess Materials*, for more information. This may include soil testing and other assessment activities. Road construction projects are subject to environmental assessment, which will include an evaluation/ screening for potentially contaminated soils. Identify, and then segregate any impacted soil (refer to **WM-3 Management of Contaminated Soil**). At construction, identify location and segregate as required.
- **Peat/ Muskeg**
  - Peat is an accumulation of partially decayed vegetation, and is typically found in wetland conditions, where flooding obstructs flows of oxygen and reduces rate of decomposition.
  - Excess peat must be managed properly, as leachates from peats are acidic and the coloured discharges from peat stockpiles can have adverse effects on receiving waters.
  - Where road construction proceeds through peat deposits, detailed consideration must be given at all planning stages to the management of any resulting surpluses.
  - A separate environmental assessment and/ or work permits may be required. Consult with the Ministry of Natural Resources to obtain further information for the proper management of excess peat.
  - Certain types of swamp materials may be used as disposable fill. Such uses must be specified within the Contract documents, and should be covered by at least 300mm of earth or topsoil. Refer to OPSS 180, *General Specification for the Management of Excess Materials*, for more information.



**Table 1: Excess Material Management Conditions (from OPSS 180 – General Specification for the Management of Excess Materials)**

EXCESS MATERIAL DESCRIPTION	Subsection in This Specification				
	Conditions on Management by Re-Use	Conditions on Management as Disposable Fill	Conditions on Management by Open Burning	Conditions on Management by Disposal as Non-hazardous Solid Industrial or Commercial Waste	Conditions on Management by Stockpiling
EARTH	Yes	Yes	n/a	Yes	Yes
SWAMP MATERIAL	Yes	Yes TABLE 2	n/a	Yes	Yes TABLE 2
AGGREGATE	Yes	Yes	n/a	Yes	Yes
ROCK	Yes	Yes	n/a	Yes	Yes
BITUMINOUS PAVEMENT	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
CONCRETE	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
MASONRY	Yes TABLE 2	Not Permitted	n/a	Yes	Yes
MANUFACTURED WOOD	Yes	Not Permitted	Not Permitted	Yes	Yes TABLE 2
NATURAL WOOD	Yes	Yes TABLE 2	Yes	Yes	Yes TABLE 2
DEBRIS FROM OPEN FIRES	n/a	Yes TABLE 2	n/a	Yes	Yes TABLE 2
METAL/PLASTIC POLYSTYRENE PRODUCTS	Yes	Not Permitted	Not Permitted	Yes	Yes
SUBJECT WASTE	Subject waste shall be managed as specified in the subsection for Conditions on Management by Disposal as Subject Waste.				
MATERIALS SUSPECTED OF BEING CONTAMINATED	When excess materials that were not generated by the Contractor's operations and are not listed in form OPSF 180-4, Subject Waste Classification, are suspected of being contaminated, direction on their management shall be obtained from the Contract Administrator.				
OTHER MATERIALS	Excess materials that are not listed above shall be managed as specified in the subsection for Conditions on Management by Disposal as Non-Hazardous Solid Industrial or Commercial Waste, unless prior alternative management conditions are approved in writing by the Ministry of Environment of Ontario.				

**Table 2: Excess Material Management Distance Separation Requirements (from OPSS 180 – General Specification for the Management of Excess Materials)**

ADJACENT FEATURE	MINIMUM DISTANCE SEPARATION
Groundwater	2 m (Above)
Waterbodies	30 m
Water Wells	100 m
Residences	100 m

- **Topsoil**
  - Topsoil is the uppermost layer of soil capable of growing and supporting vegetation. Topsoil contains the essential microorganisms, nutrients, organic matter, and physical characteristics necessary to grow and sustain permanent vegetation.
  - Stockpiling topsoil will result in the disruption and loss of beneficial soil microorganisms, and if stockpiled over a length of time (+/- 6 months), may result in total or partial loss of soil microorganisms.
  - It is strongly encouraged for operators to save enough topsoil for final reclamation purposes.
- **Subsoil**
  - Subsoil contains a lower organic matter and plant nutrient content than topsoil, and can be rendered unusable if exposed to uncontrolled ingress of water. This can be prevented by the following practices:
    - Leaving the topsoil in place for as long as possible
    - Excavate, where possible, in dry conditions
    - Providing gradients on the compacted subsoils to rapidly remove any surface water.
- **Rock**
  - Excess rock can be reused or recovered as embankments, noise barriers, culvert headwalls, channel linings, rock trap bunds and so on. It can also be processed to form aggregates. The coarser form of these materials can also be used in road drainage systems.
  - Rock processing can also be conducted on-site, with the use of mobile crushers and screens, to provide aggregate materials that can be reused on-site. Characteristics of the materials needs to be investigated to better understand the material type and to identify reuse options. Note that the operation of a mobile crusher requires approval from the Ontario Ministry of Environment, by way of a Certificate of Approval/ Environmental Compliance Approval. Refer to **Dust Control & Particulates (AIR-2)** for more information.
- **Wood**
  - Many municipalities require permits and/ or compensation plans for the removal of live trees. Contact the local municipality and local Conservation Authority to determine their requirements and expectations.
  - Depending on the age and quality, wood can be sold for architectural salvage. Wood from demolition can also be composted or recycled through chipping. If there are large quantities of wood to be chipped, an on-site chipping machine may be considered.
- **Concrete**

- Concrete can typically be crushed and recycled. Smaller pieces of concrete are used as gravel for new construction projects. Larger pieces of crushed concrete can be used for erosion control, such as rip-rap. Refer to **Erosion Control (ESC-2)**.
- Refer to Canadian Ready-Mixed Concrete Association's *Recommended Guideline for Environmental Management Practices for Canadian Ready Mixed Concrete Industry*.

#### **ADDITIONAL INFORMATION**

- Canadian Ready-Mixed Concrete Association. *Recommended Guideline for Environmental Management Practices for Canadian Ready Mixed Concrete Industry*. May 2004.
- Ontario Ministry of Agriculture, Food and Rural Affairs. *Fact Sheet: Universal Soil Loss Equation (USLE)*. May 2000.
- Ontario Ministry of Environment. *Soil Management – A Guide for Best Management Practices (DRAFT)*. Posted for public consultation on November 19, 2012.
- Ontario Ministry of Transportation. *Environmental Reference for Contract Preparation. Section 8: Management of Waste and Excess Materials*. February 2007.
- Ontario Ministry of Transportation. *Environmental Standards and Practices User Guide. Section 9: Contaminated Property and Excess Materials Management*. December 2006.
- Ontario Provincial Standard Specification. *General Specification for the Management of Excess Materials*. Metric OPSS 180. November 2011.

## EXCESS MATERIALS CHECKLIST

☑	Checklist	Comments
<b>Soil, Concrete, Rock, Wood</b>		
	Have excess materials been identified during the planning phase? (e.g., soil, concrete, rock, wood)	
	Has the management of such excess materials been discussed? Have re-use or recycle opportunities been identified?	
	Has the storage of these excess materials been discussed? Improper storage of excess materials could lead to environmental contamination.	
	Are storage areas inspected weekly?	
	Are there areas where contaminated soil is suspected? If so, are these materials are segregated from non-contaminated soil?	
	Will live trees or shrubs be removed? Has a permit been obtained from the local municipality/ Conversation Authority?	
	Are there any security measures in place to prevent theft of excess material? E.g., cameras, locks, signage. Inspect security measures weekly.	





# CHEMICAL & FUEL MANAGEMENT:

## Storage of Bulk Non- Fuel Chemical CFM-1

### PURPOSE

- The purpose of this section is to describe general strategies for the storage of bulk non-fuel chemicals, including Personal Protective Equipment (PPE), material use and training, and maintenance and inspection. This procedure describes the management practices for most commonly stored chemicals. Fuels and flammable liquids are considered separately (**CFM-2 Bulk Fuel Storage and Handling**) due to different regulatory requirements.
- Proper storage of liquid chemicals and wastes can prevent impacts to soil, groundwater or storm water, and injury to workers or visitors. It is important to practice good housekeeping and ensure all staff are aware of the hazards and risks associated with improper storage and handling of chemicals used at the job site, and the proper method for handling and storage.

### APPLICABILITY

- The following chemicals are commonly stored on road construction sites:
  - Pesticides and herbicides
  - Fertilizers
  - Detergents
  - Winter maintenance chemicals
  - Petroleum products such as lubricants, oils and grease
  - Acids, glues, paints, solvents, and curing compounds

### KEY REQUIREMENTS

- **Contract requirements**
  - Road salts enter the environment through losses at salt storage and snow disposal sites and through runoff and splash from roadways. The Ministry of Transportation (MTO) *Road Salt Management* and Environment Canada's *Salt Management Code of Practice* describes methods to ensure environmental protection while maintaining roadway safety. One or both documents may be incorporated by reference into project contracts.
- **WHMIS**
  - The Workplace Hazardous Materials Inventory System (WHMIS) Regulation, promulgated under the *Hazardous Products Act*, outlines the roles and responsibilities of the employer, the supervisor, and the employee in the

workplace with respect to hazardous materials. It places duties on these persons to ensure that the worksite is safe and healthy.

- WHMIS also requires that Material Safety Data Sheets (MSDS) are readily available and accessible to all staff on the job site.
- Chemical containers must be properly labelled (i.e., supplier labelling, or workplace labels).
- **Transportation of Dangerous Goods**
  - Any person who handles, prepares for transport or carries a dangerous good must be trained and certified. Training is valid for three years, after which an employee must be re-trained. The TDG certificate must be kept with or near the employees at all times when dangerous goods are being offered for transport or transported, and be readily available at the request of an inspector.
  - Dangerous goods are separated into a series of classes (1-9) and include compressed gases, acids, and caustics (corrosives), flammable liquids and other substances that can harm the environment or general public in the event of a spill.

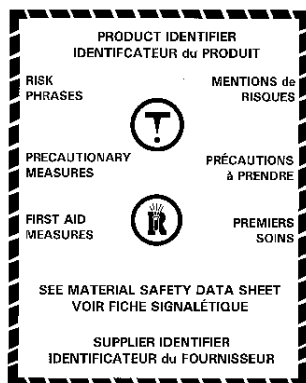


Figure 2: Example of WHMIS Supplier Label

(Source: Health Canada)

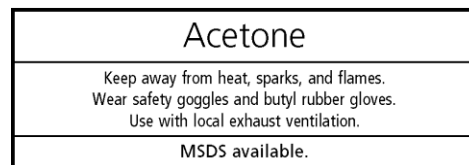


Figure 1: Example of Workplace Label

(Source: WorkSafeBC)

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Designate areas for material delivery and storage, which is away from waterways. Avoid transport, handling or storage near drainage routes. Designate an area for chemical storage and transfer, and surround the area with earth berms or other means of containment. Where possible, store liquid chemicals and other potentially hazardous materials inside a building, trailer or other secure location (for example, a flammable storage cabinet) designed to ensure the stability of the container and to prevent spills from reaching the soil, sewers or surface waters. If stored in the open, consider storing materials in a covered, paved area to protect

against the weather. Materials should be piled, stacked, or otherwise stored to prevent tipping and collapsing. Keep containers closed when not in use.

- Do not accept chemicals that arrive in damaged or defective containers.
- Storage of flammable and combustible materials, including fuels, is regulated under Part 4 of the Ontario Fire Code, and the *Technical Standards and Safety Act*. Refer to **CFM-2 Bulk Fuel Storage and Handling** and **CFM-3 Small Quantity Containers of Flammable Liquids** for more information.
- Keep an accurate and current inventory of materials delivered and stored on-site. Minimize supply of chemicals to prevent overstocking.
- Ensure spill clean-up procedures are posted and have been communicated. Refer to **Spills Preparedness & Prevention (SM-1)** and **Spills Response & Reporting (SM-2)**.
- **Storage of Winter Maintenance Chemicals**
  - Storage areas for winter maintenance chemicals such as salt brines should be inspected regularly for leaks or potential leaks. Secondary containment is required for brine, especially outdoors, to contain the salt or precipitation exposed to the salt.
  - Large volumes of solid salt and sand-salt should be stored in an enclosed building, or covered with waterproof tarps to prevent the generation of salt-contaminated runoff and the need for runoff collection and disposal.
  - A number of salt management guides/ documents are available. Sources include, but are not limited to:
    - Ontario Road Salt Management Group (ORSMG);
    - Ministry of Transportation (MTO) *Road Salt Management*;
    - Environment Canada's *Road Salt Code of Practice*; and,
    - Transportation Association of Canada's *Primer on Road Salt and Snow and Ice Control*.
- **Personal Protective Equipment (PPE)**
  - Suitable PPE must be worn when handling hazardous chemicals. Refer to the MSDS for more information on PPE requirements. At minimum, gloves should be worn when handling chemicals. Note that PPE requirements for normal operations may differ from the PPE required under emergency situations.
- **Material Use and Training**
  - Where possible, choose the less hazardous material (e.g., a less concentrated chemical). Follow manufacturer's instructions regarding use, protective equipment, etc. Refer to the MSDS. Train employees and contractors on proper material handling and use.
- **Maintenance and Inspections**

- Maintain storage areas in a clean and well organized manner. Conduct weekly inspections and ensure spill response materials are readily available. Check for external corrosion of containers and any signs of leakage.

## REFERENCES

- Health Canada. *Workplace Hazardous Materials Information System (WHMIS)*. <http://www.hc-sc.gc.ca>.
- *Hazardous Products Act (R.S.C. 1985, c. H-3)*
- Transportation of Dangerous Goods Regulation SOR/2001-286
- Ontario Road Salt Management Group (ORSMG);
- Ministry of Transportation (MTO) *Road Salt Management*;
- Environment Canada's *Road Salt Code of Practice*; and
- Transportation Association of Canada's *Primer on Road Salt and Snow and Ice Control*.



# CHEMICALS & FUEL MANAGEMENT:

## Bulk Fuel Storage & Handling CFM-2

### PURPOSE

- The purpose of this section is to describe requirements for bulk liquid fuel storage and handling, including general strategies for delivering, dispensing, and management of storage areas.
- The transportation, storage, and handling of fuel are governed by a number of Federal and Provincial Acts, Codes and Regulations. This section summarizes good management practices for bulk fuel storage and handling, reflecting the requirements of these various statutes.

### APPLICABILITY

- This section is applicable to fuel handling activities and storage of fuel. Bulk storage is generally defined as containers >230 L. This section is applicable to fuels stored for use in mobile equipment, and in back-up power generators.

### KEY REQUIREMENTS

- **Ontario Regulation 213/01 Fuel Oil and Fuel Oil Code**
  - The Fuel Oil Regulation and associated Code (B139 Installation Code for Oil Burning Equipment), promulgated under Ontario's *Technical Standards and Safety Act*, is applicable to the storage and handling of fuel oil or diesel fuel used in emergency or back-up power generators.
- **Ontario Regulation 217/01 Liquid Fuels and Liquid Fuels Handling Code**
  - The Liquid Fuel Regulation and associated Liquid Fuels Handling Code is applicable to facilities where gasoline or an associated product is handled, loaded or dispensed to be used as a fuel in a motor vehicle.
- **Ontario Regulation 213/07 Fire Code**
  - The Ontario Fire Code, promulgated under Ontario's *Fire Prevention and Protection Act*, is applicable to the storage and handling of flammable and combustible liquids, including gasoline and diesel fuel, used as a motive fuel or to power stationary equipment.
- **Ontario Water Resources Act**
  - Section 53 of the OWRA prohibits the discharge of a pollutant to the water environment unless the discharge is approved by the Director, under an Environmental Compliance Approval (ECA).
- **Ontario's Environmental Protection Act**
  - The Ontario EPA provides a general prohibition on the discharge of a contaminant into the natural environment that causes or may cause an adverse effect.



## IMPLEMENTATION/ STRATEGIES

- **Fuel Delivery**

- The accidental release of fuel during handling or dispensing activities can have an adverse impact on the environment, and result in costly and time consuming clean-up.
- Delivery of fuel to the site should only be conducted by licensed and approved fuel supplier, operating under a license issued by the Technical Standards and Safety Authority. Delivery is generally made into on-site mobile refueling tanks, or directly into the equipment. In some cases the fuel supplier may set up storage tanks at longer term or permanent locations.
- The transfer of fuel from supply trucks into an on-site tank must follow the requirements set forth in the *Liquid Fuels Handling Code* (for gasoline or diesel), the *Fuel Oil Code* (for fuel oil) and the *Ontario Fire Code* (for all flammable or combustible liquids).

- **Fuel Dispensing**

- Proper dispensing equipment is required to avoid accidental spills due to overfilling or siphoning. Use only approved dispensers (e.g., by ULC, CSA). The dispensing process must be attended by an individual who is aware of these fuel handling procedures to minimize the risk of a spill, and who shall continuously scan the area adjacent to the fuelling operations for possible leaks or spills.
- Absorbent pads should be placed around the fuel inlet prior to dispensing.
- A spill response kit must be readily available in the area, and a copy of the spill response procedure posted.
- When unreeling the fuel transfer hose and nozzle, the nozzle must be in the upright position. The nozzle shall be kept clear of the ground when returned to the reel or storage position.
- The operation of moving equipment in the immediate area of a fuelling operation should be suspended. Welding and/or burning operations within 3m of the fuelling area should also be suspended.
- As part of work planning, designated fuel dispensing area(s) should be identified.
- Dispensing shall not take place within:
  - A building
  - 30 m of a stream, river, lake or water body
  - 3 m of a property line
  - 4.5 m of a building opening
  - 3 m of a source of ignition

- **Store away from Surface Water**

- Move fuel storage and dispensing activities away from surface water where possible, with a minimum separation distance of no less than 30m (100 feet).

- **Storage Area**

- Use only approved tanks (e.g., by ULC, CSA). Storage tanks are designed for fuels, and should be selected based on proposed use. If the storage tank is rented or leased, or provided by a fuelling contractor as part of a service contract, ensure that the tank is appropriate for the proposed use. The specification plate on the tank should clearly identify its ULC/ CSA code, and permitted use.
- Ensure the storage tank is clearly labeled, with signage visible from all sides of the tank.
- Secure fuel storage by locking fill caps after each use, and if electrically powered, shut power off to the dispensing pump after each use.
- Mobile fuelling trucks must be placed in an area that is protected from equipment or vehicular impacts.
- Use double-walled storage tanks. If the tank is single-walled, provide secondary containment that affords containment of 110% of the capacity of the tank (or largest storage container).
- Fire extinguishers must be made available in the area, and must be of a size and type appropriate to allow for the safe evacuation of workers. Workers that may require the use of a fire extinguisher must be trained in its use.
- A “No Smoking” sign must be posted in the area where fuelling activities occur. “No Hot Work” shall take place within 3m of a fuel storage area.
- **Inventory Control**
  - Bulk storage tanks for liquid fuels should be inspected and dipped weekly, and checked for water daily, with contents reconciled against receipts and consumption records on a weekly basis. Records of inspection and reconciliation should be maintained in a log book.
- **Spills Preparedness**
  - Fuel dispensing areas must have access to spill response equipment. Refer to **Spills Preparedness & Prevention (SM-1)** and **Spills Response & Reporting (SM-2)** for more information.

## REFERENCES

- Ontario Regulation 213/01 *Fuel Oil and Fuel Oil Code*
- Ontario Regulation 217/01 *Liquid Fuels and Liquid Fuels Handling Code*
- Ontario Regulation 213/07 *Fire Code*
- Transportation of Dangerous Goods Regulations SOR/2001-286
- *Ontario Water Resources Act*
- *Ontario’s Environmental Protection Act*





# CHEMICALS & FUEL MANAGEMENT

## Small-Quantity Flammables Storage

## CFM-3

### PURPOSE

- The purpose for this section is to describe the requirements for the storage of small-quantity containers of flammable and combustible liquids, including general strategies for storage, proper ventilation, dispensing practices, good housekeeping, and waste handling.
- This procedure covers the storage and handling of small quantity (<230 L) containers of flammable and combustible liquids. **Flammable liquids** have a flashpoint below 37.8°C (100°F), and **combustible liquids** have a flashpoint above 37.8°C (100°F), but below 93.3°C (200°F). Combustible liquids generally do not catch fire as easily as a flammable liquid due to its higher flashpoint.

### APPLICABILITY

- Road building construction activities involve the use of various flammable and combustible liquids. Example of flammables and combustibles include:
  - Solvents, paints, paint thinners;
  - Cleaning agents;
  - Gasoline;
  - Acetone;
  - Diesel fuel; and
  - Kerosene.
- Larger quantities of fuel, stored in tanks (>230 L) are subject to regulation under the *Technical Standards and Safety Act* and are addressed by **CFM-2 Bulk Fuel Storage and Handling**.
- The characteristics of the chemical (flammability) are always described on the Material Safety Data Sheet (MSDS).

### KEY REQUIREMENTS

- **WHMIS/ MSDS**
  - Flammables and combustibles are classified under the WHMIS regulations. The material may be a solid, liquid or gas which makes up the different divisions that fall under this class. Common examples include: propane, butane, acetylene, ethanol, acetone, turpentine, toluene, kerosene, Stoddard solvent, spray paints and varnish. The symbol for this class is a flame with a line under it inside a circle.



Figure 3: Class B Flammables and Combustibles

- **Transportation of Dangerous Goods Regulations SOR/2001-286**
  - Any person who handles, prepares for transport or carries dangerous goods must be trained and certified. Training is valid for three years, after which an employee must be re-trained. The TDG certificate must be kept with or near the employees at all times, and be readily available at the request of an inspector. Flammable liquids are classified as a Class 3 Dangerous Good. There are certain small quantity exemptions for the transport of dangerous goods, thresholds below which the provisions of the Act and Regulation do not need to be followed. Typically passengers are not allowed in vehicles that are transporting dangerous goods.
- **CSA B376-M Portable Containers for Gasoline and Other Petroleum Fuels**
  - This CSA Standard applies to portable containers up to and including 25 L (~5 gallons). The Standard describes general requirements such as container colour (red), container shape (handle shall be provided), and labelling requirements (caution word PETROLEUM FUEL – FLAMMABLE – DANGER). Refer to the standard for additional requirements.
- **Ontario Fire Code**
  - Part 4 of Ontario Regulation 213/07 *Fire Code*, made under Ontario's *Fire Protection and Prevention Act*, describes the requirements for the storage, handling, transportation and use of flammable or combustible liquids, including those in small containers.

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Provide secondary containment for storage containers of flammable/combustible liquids.
  - Provide training to staff on WHMIS and the hazards of flammable and combustible liquids, at the time of hiring, and at least every six (6) months.
- **Storage**
  - Store flammables and combustibles away from ignition sources. Ignition sources may include:
    - Sparks from electrical tools and equipment;
    - Sparks, arcs and hot metal surfaces from welding and cutting;
    - Smoking;
    - Open flames from portable torches and heating units;
    - Sparks from grinding and crushing operations;
    - Sparks caused by static electricity from rotating belts, mixing operations or improper transfer of flammable or hot combustible liquids.

- Always store flammables and combustibles away from open flames, spark-producing equipment, or work areas avoid accidental contact with incompatible materials. Post “no-smoking” signs around storage areas.
- It is a general good practice to keep no more than one day’s supply of flammable and combustible liquids in the immediate work area.



Figure 4: No Smoking Sign  
(source: Welco Workplace)

- **Ensure Proper Ventilation**

- In any storage areas for flammables and combustibles, always ensure there is proper ventilation to remove flammable vapours from the work area.

- **Dispensing Practices**

- Take care when dispensing or transferring flammable and combustible liquids. Dispense only one container at a time. Close containers after dispensing to prevent buildup of hazardous vapours and to avoid accidental spills. Ensure metal containers are bonded and grounded when dispensing. Never dispense by pressuring the container with air, as the pressure may damage drums or create a flammable atmosphere inside the containers. Dispensing areas should be marked with the appropriate signage.

- **Good Housekeeping and Spill Response**

- As with storage of all chemicals, practice good housekeeping by keeping area clear of materials that can burn. Use only containers and dispensing equipment that are approved for use with flammable liquids.
- Keep storage areas cool and dry.
- Report spills and leaks immediately. Contain and clean up spills as soon as possible.

- **Waste Handling**

- Store waste flammables and combustible liquids in the same way as other liquid wastes. Refer to **Hazardous Waste (WM-2)** for more information.

## REFERENCES

- Canadian Centre for Occupational Health & Safety. *WHMIS Quick Facts: Flammable and Combustible Liquids*. 2006.
- CSA B376-M *Portable Containers for Gasoline and Other Petroleum Fuels*
- Ontario Fire Code Part 4
- Transportation of Dangerous Goods Regulations SOR/2001-286

# CHEMICALS & FUEL MANAGEMENT

☑	Checklist	Comments
<b>Storage of Bulk Non-Fuel Chemicals</b>		
	Has a list of chemicals being used or stored on-site been compiled and updated as necessary?	
	Are Material Safety Data Sheets (MSDS) for all chemicals readily available at the job site and accessible to all workers?	
	Is the workplace inspected to ensure all drums and containers are properly labelled with either the WHMIS supplier label or a workplace label?	
	Do all workers who handle regulated chemicals have a valid TDG certificate? Is the certificate available with them at all times?	
	Are chemical storage areas inspected weekly?	
<b>Bulk Fuel Storage &amp; Handling</b>		
	Where required, are absorbent pads placed around the fuel inlet prior to dispensing?	
	Is there a spill response kit near the fuel dispensing area and in the storage area?	
	Is delivery of fuel to the site only conducted by licensed haulers?	
	Is the individual who is dispensing fuel aware of the requirements under the <i>Liquid Fuels Handling Code</i> and the <i>Ontario Fire Code</i> ?	
	Are operations of moving equipment in the immediate area of a fuelling operation suspended?	
	Are storage tanks equipped with secondary containment with 110% capacity?	

	Is there a fire extinguisher in the fuel storage area?	
	Is there a “no smoking” sign posted in the area where fuelling activities occur and around storage areas?	
	Is the spill response procedure clearly posted in the area of fuel storage and dispensing, and have operators been trained on it?	
	Are water dips performed daily on bulk storage tanks for liquid fuels? Are the tanks dipped for fuel level, and contents reconciled on a weekly basis?	
	Are workers trained on TDG, WHMIS, and to the hazards of flammable and combustible liquids?	
	Are flammables and combustibles stored away from open flames and other chemicals?	
<b>Small-Quantity Containers of Flammable Liquids</b>		
	Is no more than one day’s supply of flammable and combustible liquids stored in the immediate work area?	
	Is there proper ventilation to remove flammable vapours from the flammable and combustible storage areas?	
	Are metal containers grounded and bonded when dispensing?	
	Are dispensing areas marked with the appropriate signage?	
	Are storage areas inspected weekly for good housekeeping practices?	
	Are storage areas kept cool and dry?	



# WASTE MANAGEMENT: Non-Hazardous Waste

WM-1

## PURPOSE

- The purpose of this section is to describe general strategies for the management of non-hazardous wastes.
- There are two (2) broad categories of waste currently described by Ontario law: subject waste and non-hazardous solid waste.
- “Subject waste” is waste that is subject to the manifesting and registration requirements of Ontario Regulation 347/90 (as amended), and includes liquid industrial and hazardous wastes (refer to the Hazardous Waste Information Network (HWIN) at <https://www.hwin.ca/> for further information on waste classification). The focus of this section is on non-hazardous wastes – that is waste material that is neither hazardous, nor industrial. While non-hazardous, these wastes must still be managed in a responsible manner.

## APPLICABILITY

- Types of non-hazardous wastes typically associated with road building activities:
  - Recyclable wastes – e.g., asphalt, pavement, cardboard, concrete aggregate (asbestos-free), electronic equipment, glass, green waste, metals, wood, etc.
  - Construction & demolition (C&D) waste – some materials originating from the demolition of roads, buildings, or other structures. E.g., brick, wood, masonry, plaster, metal, etc.
  - Inert fill material – e.g., earth, soil, rock, rock-like materials. Refer to **Excess Materials (EM-1)**.
  - Properly contained asbestos wastes can be managed as non-hazardous wastes.

## KEY REQUIREMENTS

- **Contract Requirements**
  - Refer to the project contract for any specific contract requirements.
- **3Rs Regulation**
  - Ontario’s 3Rs (Reduce, Reuse, Recycle) Regulations, made under Ontario’s *Environmental Protection Act*, aim to assist Ontario in achieving its goal of increasing diversion and minimizing the amount of waste being sent to landfill. The regulations, introduced in 1994, require the industrial, commercial, and institutional (IC&I) sector, including the C&D industry, to divert more waste from disposal by reducing, reusing and recycling. The Regulations do not strictly apply to road building projects. However, there are a number of good practices that are described by the Regulations and associated guidance.

- **Ontario Regulation 103/94**
  - Describes source separation (recycling) programs for specified wastes for all construction and demolition projects. Materials to be source separated in construction projects include: brick and Portland cement concrete, cardboard, unpainted drywall, steel, and wood (not including painted or treated wood or laminated wood).
  - Further details regarding the 3Rs regulations are outlined in the Ontario Ministry of the Environment's *Guide to Waste Audits and Reduction Work Plans for Construction and Demolition Projects* and *A Guide to Source Separation of Recyclable Materials for Industrial, Commercial, and Institutional Sectors and Multi-Unit Residential Buildings*.
- **Municipal By-Laws**
  - Local requirements regarding waste diversion and prohibitions should be checked prior to each project. These requirements or prohibitions are usually specified in municipal By-Laws.
- **Asbestos Waste**
  - While the Ministry of the Environment has classified properly contained asbestos wastes as non-hazardous, asbestos is hazardous from an occupational health and safety perspective. The Ministry of Labour website contains further information and requirements for the safe handling of asbestos materials.
  - Waste asbestos containing material (ACM) is only deemed non-hazardous from an environmental waste management standpoint IF it is properly bagged and contained. Otherwise, it must be managed as a hazardous waste.
  - Precaution should be taken to prevent asbestos waste from becoming airborne. Containers for asbestos dust and waste must be:
    - Dust tight;
    - Suitable for the type of waste;
    - Impervious to asbestos;
    - Identified as asbestos waste; and
    - Cleaned with a damp cloth or vacuum equipped with a HEPA filter before being removed from the work area.
  - Asbestos waste must be handled by an appropriately licensed waste hauler and the disposal site should be notified prior to the delivery of waste so that necessary preparations can be made to receive the material.
  - Every person handling asbestos waste must wear the appropriate protective clothing and personal respiratory equipment while so doing.

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Effective waste management not only helps protect the environment, but can generate economic savings through



reduction in waste disposal costs. It is also a major factor in project aesthetics. A well maintained project site with good housekeeping can benefit from enhanced public perception and pride.

- Incorporate 3Rs (reduce, reuse, and recycle) strategy. Minimize waste where possible.
- If the budget/timeline allow, develop a Waste Reduction Workplan to identify the project-specific management strategy for non-hazardous solid waste.
- Ensure subcontractors are responsible for their own solid waste management.
- Accept only water-tight dumpsters and inspect regularly for leaks.
- **Reduce**
  - Avoid over-ordering by careful balancing of the materials being ordered against what is required to carry out work.
  - Ensure proper waste segregation to avoid inert materials from being contaminated by general site garbage (e.g., mixing of sub-soils and top soil, contamination of clean materials such as concrete and bricks with excavation wastes).
  - Ensure proper storage and handling procedures are being followed to avoid damage.
  - Clear site signage to indicate appropriate locations for materials and waste storage.
- **Reuse**
  - Utilize a “cut-and-fill” philosophy. Where feasible, match excavating quantities from a project with the requirements for the construction of embankments and other landscaping elements.
  - Demolition of buildings in the line of a road development offers opportunities for materials reuse. Certain materials (such as cut stones) can be sold as architectural salvage.
- **Recycle**
  - Designate a dedicated waste collection area. Proper inventory management and waste segregation are keys to effective recycling. Examples of materials that can be recycled include waste timber, waste concrete, or waste asphalt.
  - Where possible, shield recycling bins from the weather. Bins with lids or covers are preferred and can keep rain out and/or to prevent loss of wastes in windy conditions.
- **Disposal**
  - Materials that cannot be reused or recycled will require disposal.
  - Separate contaminated clean-up



Figure 5: Example of Good Waste Segregation  
(Source: National Roads Authority)



materials from C&D wastes. Contamination may be from hazardous substances, friable asbestos, waste paint, solvents, sealers, adhesives, etc. **Refer to WM-2 Hazardous Waste.**

- Clean up any spills immediately. Refer to **Spills Response & Reporting (SM-2).**
- Ensure contracts made with disposal companies state that all removed materials are transported to permitted facilities.

## REFERENCES

- Ontario Regulation 103/94, *Industrial, Commercial and Institutional Source Separation Programs.*
- Ontario Regulation 347, *General- Waste Management.*
- Ontario Provincial Standard Specification. *General Specification for the Management of Excess Materials.* Metric OPSS 180. November 2011.
- Ontario Ministry of the Environment's *Guide to Waste Audits and Reduction Work Plans for Construction and Demolition Projects.*
- Ontario Ministry of the Environment's *Guide to Source Separation of Recyclable Materials for Industrial, Commercial, and Institutional Sectors and Multi-Unit Residential Buildings.*



# WASTE MANAGEMENT: Hazardous Waste

WM-2

## PURPOSE

- The purpose of this section is to provide an overview of hazardous waste management requirements in Ontario (under Ontario Regulation 347/90, as amended), and general approaches to the responsible management of hazardous wastes.
- There are two (2) broad waste categories currently recognized under Ontario law: subject waste and non-hazardous solid waste. Subject waste is that waste subject to the manifesting and generator registration requirements of Regulation 347. A subject waste, under the definition of Regulation 347, includes liquid industrial waste, wastes that are specifically scheduled (listed) in the Regulation, and waste that has one or more hazardous characteristics. Refer to the Hazardous Waste Information Network (HWIN) at <https://www.hwin.ca/> for further information on waste classification.

## APPLICABILITY

- Types of hazardous wastes typically associated with road building activities will include:
  - Corrosives (acids, caustics, batteries)
  - Toxic wastes (contaminated soils that are leachate toxic)
  - Paints & solvents
  - Petroleum products (contaminated soils, fuels, grease)
  - Used oils, lubricants and greases from vehicle and equipment maintenance, and oil / grease contaminated materials (rags, clothes, absorbent, etc.).
- Generally speaking, any liquid industrial waste is “subject” to the generator registration and manifesting requirements of the regulation. Solid wastes may be subject, depending on the nature of the waste. For the most part, these will be solid materials that have been contaminated by a chemical or liquid. A licensed waste management company can help to classify the waste, but a good rule of thumb is to consider the solid waste hazardous if it has been significantly contaminated by one of the liquids / chemicals noted in the list above.

## KEY REQUIREMENTS

- **Ontario Regulation 347/90 (as amended)**
  - Ontario Regulation 347 outlines the waste registration, handling and disposal requirements for generators of subject waste. Generator registration is completed through HWIN.
  - The Regulation requires that every generator of hazardous or liquid industrial waste:
    - Submit a Generator Registration Report to the Director detailing the type and amount of subject waste the generator produces, collects, handles or stores;

- Establish an electronic Hazardous Waste Information Network (HWIN) account; and
  - Ensure that registration information be updated annually on or before February 15 and that a fee be submitted to the MOE for each shipment of subject waste.
- The Waste Generator Number (ONXXXXXXX) must be used for all transfers of subject waste from the generating facility. The transfer of a subject waste to a waste transportation system without a waste number for that waste is prohibited.
- Manifests where subject wastes are being shipped must be signed by a person with current training in the Transportation of Dangerous Goods.
- Common wastes such as waste batteries destined for a waste battery recovery facility, common mercury waste destined for a common mercury waste recovery facility, and waste electrical and electronic equipment that is intact and is destined for a site at which it is to be processed for the recovery of materials do not require manifesting or registration. However, generating facilities must be able to demonstrate that the receiver (the waste recovery facility) agrees to accept the waste.
- The first time that a subject waste is stored for more than 90 days, a notice must be given to the Regional Director of the Ministry of Environment, providing information about the stored waste and future plans with respect to storage and disposal of the waste. Further written notice must be given to the Regional Director within five (5) business days only if there is any change in the original information submitted, or if the waste generation facility closes. Subject waste cannot be stored for more than 24 months unless an application for approval of a waste management system has been made to the Ontario Ministry of Environment.
- **OPSS 180**
  - Refer to the contract documents for specific requirements, including the applicability of OPSF 180-4.
  - The following text highlights the General Specification as described within OPSS 180:
    - For each waste listed in the form OPSF 180-4, *Subject Waste Classification* that is being shipped from the working area to a waste disposal site, the Contract Administrator is to be notified at least 24 hours prior to the shipment of subject waste.



Figure 6: Example of MOE Waste Manifest Form  
(Source: Environmental Control Systems)

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Where there is a mixture of materials, the most stringent/ hazardous characteristic will prevail (i.e., if there are small quantities of hazardous wastes mixed in with non-hazardous wastes, and there is no easy means of separation, the entire mixture is to be classified based on the most hazardous component of the mixture). So – try to avoid mixing wastes.
  - To determine if the waste is potentially hazardous, check the container label for warning signs, or refer to the Material Safety Data Sheets (MSDS). Leachate tests [(Toxicity Characteristic

Leaching Procedure (TCLP)] may be required where the hazardous characteristics of the waste are unknown or uncertain. All records of test samples and sample dates must be kept. Where the waste characteristics are unknown or uncertain, contact a licensed waste hauler who can help you determine the correct classification.

- In order to minimize the amount of hazardous waste generated, use the entire product prior to disposing the container.
- Do not remove the original product label, as it contains important safety and disposal information.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, etc.
- **Hazardous Waste Storage Areas**
  - Identify designated hazardous waste collection areas. Hazardous materials and wastes should be stored in covered containers and protected from the elements and vandalism. Liquid hazardous waste containers should have secondary containment to prevent leaks or spills from migrating away from the storage area and contaminating the surrounding environment.
  - Hazardous waste storage areas should be protected from unauthorized access. Outdoor chemical and waste storage area should be fenced or otherwise protected in such a manner as to discourage entry into the compound. Additional security measures may include increasing the distance from fence-line to the containers, lighting, locks, and security cameras.
  - Refer to **General Storage of Chemicals (CFM-1)** for more information on the proper storage and handling of chemicals. These suggestions for chemical storage apply equally to liquid industrial wastes.
  - Secondary containment systems in an outdoor environment should be visually inspected at least weekly or after each significant precipitation event to ensure that the containment is free of debris, rainwater, snow or other materials that could compromise the capacity and integrity of the containment system. Rainwater / snowmelt can be drained to the ground from secondary containment systems, but only after a visual inspection to confirm that the water is not contaminated. Ensure that valves on secondary containment systems remain in the closed position when not being used.
- **Waste Flammable and Combustible Liquids (fuels, solvents)**
  - Store waste flammable and combustible liquids (fuels, engine oils, used solvents, etc.) the same way as you would store new flammable and combustible liquids. Refer to **Flammables and Combustibles (CFM-3)** for more information on storage <http://www.justriemfg.com/pix/Originals/09200.jpg> requirements.
  - Clean drums made of compatible materials can be used to store waste liquids if they are vented, grounded and bonded.
  - Clothes, paper, and other solid materials that are soaked with flammable and combustible liquids must be stored only in designated disposal containers. Do not dispose of them as regular non-hazardous materials as it may easily ignite.



Figure 7: Example of approved Oily Rag Containers

Approved disposal containers are metal containers with self-closing lids, and are typically red or yellow in colour.

- Containers that are not fully empty may still contain enough vapour to cause an ignitable atmosphere. Do not perform any work such as welding or cutting on “empty” flammable and combustible containers.
- **Waste Oils and Lubricants**
  - Waste oils and lubricants are subject to the manifesting and generator registration requirements of Ontario Regulation 347/90 (as amended). As long as they are not mixed or contaminated with other liquid wastes, they can be shipped off-site through a licensed waste hauler as a waste oil. Liquid industrial wastes, including waste oils, are not classified as dangerous goods and are therefore not subject to the Transportation of Dangerous Goods Regulation (TDGR). This means that the shipping manifest does not need to meet the documentation requirements of the TDGR. However, they are still “subject wastes” according to Regulation 347 and must be manifested and handled like any other hazardous waste.
- **Small Quantities**
  - Regulation 347/90 contains small quantity exemptions for “subject” wastes – this means that small quantities of hazardous and liquid industrial waste are not subject to registration and manifesting. These threshold quantities are 25 litres or 25 kilograms per month. However, they must still be managed in a responsible manner (i.e. disposed of to a licensed disposal facility) and so it is recommended that the guidance in this procedure be followed for all hazardous and liquid industrial wastes, regardless of the quantity generated.

## REFERENCES

- Ministry of Environment. Fact Sheet *Waste Storage, Mixing and Processing Requirements Effective March 31, 2006*. April 2006.
- Ministry of Environment. *Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities*. May 2007.
- Ontario Provincial Standard Specification. *General Specification for the Management of Excess Materials*. Metric OPSS 180. November 2011.
- Ontario Regulation 347/90 (as amended) *General – Waste Management*



# WASTE MANAGEMENT:

## Contaminated Soil

WM-3

### PURPOSE

- The purpose of this section is to describe the identification, notification and disposal process for the handling of contaminated soil.
- Previous industrial usage, undetected spills or leakages, or underground storage tank leaks are some things that can contribute to soil contamination.
- The potential presence of contaminated soil is often identified through an environmental assessment process. For Provincial and Municipal road building projects, a Record of Site Condition (RSC) may exist to summarize the environmental conditions of a property and to ensure that any contaminants that are present meet the soil, sediment and groundwater standards applicable to the proposed use. However, it is not uncommon to encounter contaminated soil that was not previously identified after construction has begun.
- There are a number of legal (and likely contractual) requirements that apply to the handling of contaminated soils, and the costs to comply with these requirements are not incidental. Therefore, it is important to understand the legal and contractual requirements that apply to the management of contaminated soil.

### APPLICABILITY

- This section is applicable to construction activities where potentially contaminated soil is encountered, typically during excavation.
- This section also provides guidance for the pre-design and at-design stages of the project.

### KEY REQUIREMENTS

- **Ontario's Environmental Protection Act**
  - Ontario's *Environmental Protection Act* stipulates the requirements for Records of Site Condition. Many municipalities require the filing of a RSC in advance of construction. A Record of Site Condition will describe the condition of the property, based on the results of environmental site assessment and comparison to the Ministry's *Soil, Sediment and Groundwater Standards for Use under Part XV.1 of the Environmental Protection Act*. Ontario Ministry of Environment, April 15, 2011. This is typically addressed in the design phase of the project.
  - Contaminated soil that is identified on a project site, whether pre-design or during construction, must be properly characterized according to Ontario

Regulation 347/90 (as amended) to determine if it possesses any hazardous characteristics, which would by definition classify it as a waste. This is usually undertaken through a Toxicity Characteristic Leaching Procedure (TCLP) test, the results of which will determine the next steps.

## **IMPLEMENTATION/ STRATEGIES**

- **General Approach**
  - Conduct daily inspections of excavated areas for evidence of contaminated soil.
  - Regularly inspect hazardous waste and chemical storage areas and receptacles.
  - Prevent leaks and spills to the maximum extent practicable, as contaminated soil can be expensive to treat and/or dispose of properly.
- **Common signs of soil contamination**
  - Proliferation of bees (associated with natural gas leaks)
  - Overly lush or particularly sparse vegetation
  - Soil discolouration or staining
  - Unusual odours from soil
  - Presence of abandoned underground tank or pipes
  - Presence of refuse or buried debris, evidencing historical landfilling or dumping
- **When suspected contaminated soil has been discovered**
  - Stop activity (e.g. excavation)
  - Fence off/ isolate area of concern
  - Notify site supervisor
  - Segregate any excavated, or suspected impacted soils from other soils. Ideally, place these soils on a non-permeable surface and cover them with a tarpaulin.
  - Contact the project owner to determine next steps, which will likely include the sampling and laboratory testing of the walls and floor of the excavation, and of the excavated and segregated material, to confirm its characteristics and disposal options.
- **Disposal**
  - Disposal of contaminated soil is only allowed at permitted facilities by MOE licensed carriers.
  - The receiving facility must be licensed by the Ontario Ministry of Environment (MOE) for a waste disposal site.
  - The long-term storage of stockpiled contaminated soil will require application to the Ontario MOE for approval of a waste management system.
  - Retain a copy of the carrier's Certificate of Approval (CoA) for record keeping.

## **REFERENCES**

- Ontario's *Environmental Protection Act* Part XV.1, *Records of Site Condition*
- Ontario Regulation 347/90 – *General - Waste*
- Soil, Sediment and Groundwater Standards for Use under Part XV.1 of the *Environmental Protection Act*. Ontario Ministry of Environment, April 15, 2011.



# WASTE MANAGEMENT

☑	Checklist	Comments
<b>Non-hazardous Waste</b>		
	Have opportunities for reduce, reuse, and recycle been considered?	
	Are recyclable / re-usable wastes segregated from other wastes and clearly identified?	
	Have you considered the value of developing and communicating a Waste Reduction Workplan for the project?	
	Are there any identified asbestos wastes? If yes, are they managed and disposed of by an appropriately licensed waste hauler?	
	Are subcontractors responsible for their own solid waste management?	
	Are waste storage areas inspected for good housekeeping and dumpsters checked for leaks?	
	Is there clear signage to indicate locations for materials and waste storage?	
<b>Hazardous Wastes</b>		
	Has the site registered through the Hazardous Waste Information Network (HWIN) for the generation and disposal of "subject" liquid industrial and hazardous wastes?	
	Are manifests signed by a person with current training in the transportation of dangerous goods?	
	Are subject wastes stored for more than 90 days? If yes, has a notice been given to the Ministry of Environment?	

	Are subject wastes stored for more than 2 years? If yes, has an application for the approval of a waste management system been made?	
	Are manifests being managed properly (Copy 1 sent to the MOE, match Copy 2 with Copy 6) and filed for 2 years?	
	Are waste containers labeled?	
	Are designated hazardous waste collection areas inspected weekly?	
	Are hazardous waste areas fenced or otherwise protected from unauthorized access?	
	Are rags and paper that are soaked with flammable and combustible liquids stored in designated metal containers?	
	Are waste oils disposed of as subject wastes (i.e., manifesting required)?	
	Are waste batteries and other "special" hazardous wastes being segregated and shipped off for recycling? If yes, is there documentation demonstrating that the waste hauler agrees to accept the waste batteries?	
<b>Contaminated Soil</b>		
	Is there a plan to manage potentially contaminated soils identified in the pre-design or design phase?	
	Are excavated areas inspected daily for evidence of contaminated soil?	
	Are workers aware of the process for managing contaminated soil, should it be encountered during excavation activity?	
	Is disposal of contaminated soil handled only by permitted MOE licensed carriers and have all MOE approvals been obtained?	



# WATER & WASTEWATER:

WW-1

## Working in or near Water Bodies

### PURPOSE

- The purpose of this section is to describe the various requirements governing work in or near water bodies, as well as to provide strategies and general approaches to protect water quality.
- Special care must be taken when working in or near water bodies to avoid causing serious harm to fish.
- **There are several strict requirements that apply to work in or around water bodies, mostly derived from the Federal *Fisheries Act*. There are other Provincial and local requirements, but the precautionary strategies employed to reduce the potential for impact to water bodies are largely derived from the *Fisheries Act*.**
- A deleterious substance is defined by the *Fisheries Act* as “any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.”
- What is a water body?
  - Means a well, lake, river, pond, stream, spring, reservoir, groundwater or other water or watercourse. A watercourse can be either permanent or intermittent. This can include, for example, an engineered storm water ditch that drains water into a wetland or marsh, or a stream.

### APPLICABILITY

- This section is applicable for work at or near water bodies.

### KEY REQUIREMENTS

- **Contract Requirements**
  - Refer to the contract for any specific water resource requirements.
- ***Fisheries Act***
  - The Fisheries Act requires that projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans Canada. This applies to work being conducted in or near water bodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery.
  -

- The presence of fish that are part of or that support a commercial, recreational or Aboriginal fishery must be assessed, and mitigation strategies incorporated into the roadway design before implementation of the project. Projects may be prescribed operational constraints such as timing restrictions, management practices such as erosion and sediment control, and operational measures such as storm water management.
- A permit/ Authorization under the *Fisheries Act* may be required for work in or near waterbodies.
  - The Act is invoked at any point when a person carries on or proposes to carry on any work, undertaking or activity that results or is likely to result in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, or in the deposit of a deleterious substance in water frequented by fish or in any place under any conditions where that deleterious substance or any other deleterious substance that results from the deposit of that deleterious substance may enter any such waters. Serious harm is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat.”
    - Where serious harm to fish is expected (e.g., blasting in or near water, killing fish by means other than fishing, or creating a barrier to fish migration), an Authorization must first be obtained from DFO prior to start of work.
- The fish and fish habitat Environmental Protection Requirements below are based on the *Fisheries Act* and *Species at Risk Act* requirements:
  - Aquatic Species At Risk (SAR) shall not be killed, harmed, harassed, captured, taken, possessed, collected, bought, sold or traded.;
  - Fish shall not be seriously harmed in any manner unless authorized;
  - Destruction of any part of the critical habitat of any SAR is not permitted;
  - No new barriers to fish passage shall be created unless authorized;
  - If highway construction must proceed during a period when fish are moving, safe passage shall not be restricted for an unreasonable amount of time.;
  - Fish screens, and other appropriate measures, shall be installed, maintained and inspected across water intakes;
  - Explosives shall be used in such a manner as to ensure no serious harmful effects to fish;

The image shows a screenshot of the 'NOTIFICATION FORM' for Fisheries and Oceans Canada, version 3.1. The form is divided into several sections:
 

- PROponent INFORMATION:** Fields for Name, Street Address, Phone/Fax, and Postal Code.
- CONTRACTOR INFORMATION:** Fields for Name, Street Address, Phone/Fax, and Postal Code.
- PROJECT INFORMATION:** A section with multiple checkboxes for project types such as 'Road Construction', 'Dam Construction', 'Public Beach Maintenance', etc.
- PROJECT LOCATION:** Fields for Name of water body, Coordinates, and other location details.
- Legal Description:** Fields for Description and Location.
- Proposed Start Date:** A field for the start date (YYYYMMDD).
- Proposed Completion Date:** A field for the completion date (YYYYMMDD).

 At the bottom, there is a signature line and a date field, along with a disclaimer and a 'Canada' logo.

**Figure 8: DFO Notification Form**  
(Source: Fisheries and Oceans Canada)

- There is a requirement to report an occurrence that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: “Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time
  - (a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence;
  - (b) causes or contributes to the occurrence or the danger of the occurrence.”
- **Measures to Avoid Causing Harm to Fish and Fish Habitat - DFO Canada**
  - For routine construction work activity, DFO’s guidance should be consulted to determine potential measures to be incorporated that can reduce or avoid negative impacts to fish and fish habitat. See Appendix D.
- ***Navigable Waters Protection Act***
  - This Federal Act and associated Regulations require application for permit for any works or undertaking in a river or stream that could interfere with the navigability of the waterway.
- ***Public Lands Act***
  - The beds of most lakes, rivers and streams are legally public land in Ontario. A work permit is usually required prior to proceeding with any work projects involving these areas. Activities that occur in nearshore areas on private land (e.g., dredging and filling) may also require permitting.
- ***Lakes and Rivers Improvement Act***
  - A work permit is required for any activity that increases the flow, holds back or diverts water.
- ***Conservation Authorities Act***
  - Individual watershed-based conservation authorities are empowered to administer resource conservation programs in partnership with municipalities and the province of Ontario. Work permits may be required for activities related to filling, construction and alteration to lands in flood plain areas.
- ***Ontario Water Resources Act***
  - Section 30 of the OWRA prohibits the discharge of any material of any kind into any waters or any shore or bank that may impair the quality of the water. Any person responsible for any such discharge must immediately notify the MOE.
  - Section 53 of the OWRA prohibits the discharge of a pollutant to the water environment unless the discharge is approved by the Director, under an

Environmental Compliance Approval (ECA). In addition, the OWRA requires an ECA for the construction of sewage works, unless the sewage works does not drain or discharge directly or indirectly to a ditch, drain or other watercourse. “Sewage” is defined to include drainage, storm water, commercial waste or industrial waste. A “sewage works” is any infrastructure for the collection, treatment, transmission, or disposal of sewage. Despite this exception, a Section 53 ECA is required if the design capacity of the sewage works exceeds 10,000 L per day. Section 53 also applies to sewage works for the distribution of sewage on the surface of the ground for the purpose of disposing of the sewage.

## IMPLEMENTATION/ STRATEGIES

- **General Approach**

- Identification of and compliance with your obligations is challenging, even for the most experienced legal and consulting professionals. If you have questions regarding the potential that work activity may be interfering with a natural waterbody or fish habitat, contact your local Conservation Authority.
- To the extent practicable, avoid water body encroachments where impacts are likely to occur. Generate and evaluate alternatives, and select and refine the methodology / routing in the planning stage of a project.
- Assess impacts and develop mitigation options for fish and fish habitat during the design stages. This includes the generation, evaluation, selection and refining of preferred design alternatives.
- Prevent or reduce negative residual effects on fish and fish habitat through construction-related and operational mitigation measures implemented during the construction and operation of roads. This can include operational constraints such as storm water management.
- Develop inspection and monitoring procedures, including Contingency Plans as well as general monitoring during and post-construction.
- Implement requirements and limitations for the use of confined explosives, in or near, fisheries waters.
- Prior to starting works in or around water, review the site map and locate any watercourse or groundwater access points. Identify activities that may result in a discharge of a contaminant (including sediment), and develop a plan to control or prevent these contaminants from entering water bodies.
- Prevention is key – properly maintained equipment through a robust preventative maintenance program can significantly reduce the probability of a spill or leak. Effective erosion and sediment control is also critical (**see ESC-1 Erosion and Sediment Control**). Water quality can be monitored through routine sampling.

- **Permits/ Authorizations**

- For many projects that occur in close proximity to a natural water body, a permit/ Authorization will be required under the *Fisheries Act*. Typically, the project owner will be responsible for obtaining the permits. Check the contract requirements for Permits already issued, or issued in draft. Ensure sufficient time is budgeted for any required/ additional permitting and approval process to avoid project delays.
- A Permit to Take Water (PTTW) may also be applicable if you are abstracting water from a stream, pond or lake, or groundwater. Refer to **WW-2 Water Taking / Dewatering**.

- The Conservation Authority may stipulate additional constraints or requirements, such as the time of year when work may be done. These requirements and restrictions should be communicated to all staff on the site and built into the project schedule. If all the conditions cannot be met, contact the authority with jurisdiction immediately.
- In situations where a work permit is not necessary, there are a number of good management practices that should be followed for working in and around water bodies. These have been described below and elsewhere in this Manual – for example, **CFM-2 Bulk Fuel Storage and Handling**.

- **Timing Window**

- Restricting activity to certain times can be used to protect fish and fish habitat when carrying out work in or around water. The purpose of restricting activity timing is to ensure work is not performed in or around water during spawning mitigations and other crucial life history stages.
- In Ontario, the Ministry of Natural Resources (MNR) is responsible for setting timing window guidelines. If the timing windows listed in the DFO guidance\* differ from the windows identified in MNR or DFO permits/ Authorizations, the timing windows identified in those permits/ Authorizations shall take precedence. \*<http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/on-eng.html>

Fish Species	Northwest Region	Northeast Region	Southern Region
Walleye	April 1 to June 20	April 1 to June 20	March 15 to May 31
Northern Pike	April 1 to June 15	April 1 to June 15	March 15 to May 31
Lake Sturgeon	May 1 to June 30	May 1 to July 15	May 1 to June 30
Muskellunge	May 1 to July 15	May 15 to July 15	March 15 to May 31
Large/ Smallmouth Bass	May 15 to July 15	May 15 to July 15	May 1 to July 15
Rainbow Trout	April 1 to June 15	April 1 to June 15	March 15 to June 15
Other/Unknown Spring Spawning Species	April 1 to June 15	April 1 to June 15	March 15 to July 15

**Figure 9: Example of Timing Windows**  
(Source: Fisheries and Oceans Canada)

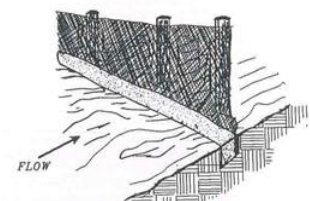
- 

- **DFO Fact Sheets**

- DFO has developed a number of *Fact Sheets* to provide information and best management practices on work around water. These topics range from Obtaining a *Fisheries Act* Authorization to Fish Habitat & the Effects of Silt and Sediment. Refer to **“Appendix D: DFO – Projects Near Water”**.

- **Shoreline Stabilization and Erosion/Sediment Controls**

- Design and implement erosion and sediment controls to contain the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to the water body throughout construction. Ensure site and all areas in the vicinity of the water body are stabilized prior to removal following construction. Refer to **ESC Planning (ESC-1)**.
- Changes or disruptions to shoreline areas can threaten the survival of aquatic organisms. Methods to limit shoreline erosion can typically



**Figure 10: Silt fence**

(source: Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant)



be categorized into two (2) approaches: “soft” methods include stabilizing the shoreline by planting native deep-rooted vegetation along with bioengineering, and “hard” methods include installing armoured embankments and retaining walls. Typically soft methods are preferred over hard methods.

- A sediment or silt screen or curtain may be required surrounding the entire work area. The screen should only be removed upon completion of work, and only after sediments have sufficient time to settle. To minimize disruptions and disturbances of the silt screen by waves, only work in water on calm days. Inspect sediment and silt screens daily.
- Where possible, use detergents and soaps that are low in phosphates, as excessive phosphate levels cause increased growth of aquatic plants and algae.
- Once work is completed, the area should be re-vegetate as soon as possible to protect the riparian or buffer zone along the water.
- **Protect Water Quality**
  - To every extent possible, keep equipment away from water bodies, and do not fuel within 30 m of water areas.
  - At minimum, efforts should be taken to ensure all equipment and materials that must go into water are clean and free of oils, grease, dirt, and other potential contaminants.
  - Manage all water from dewatering operations to prevent erosion and/or release of sediment-laden or contaminated water to the water body (e.g., using appropriately designed and sited temporary settling basin, filter bag, energy dissipation measures).
- **Storm Drain Inlet Protection**
  - Storm drain inlet protection measures prevent soil and debris from entering storm drain inlets. These measures are temporary and should be implemented prior to disturbances to the Site. In general, storm water inlet protection measures are practical for areas receiving relatively clean runoff that is not heavily laden with sediment. The following describes several methods of protection:
    - Excavation around the perimeter of the drop inlet - excavating a small area around the inlet creates a settling pool that removes sediments.
    - Fabric barriers around inlet entrances – erecting a barrier made of porous fabric around an inlet creates a shield against sediment while allowing water to flow into the drain.

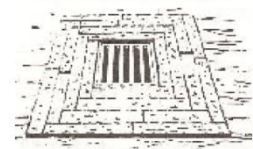


Figure 11: Sod inlet protection  
(Source: US EPA)

- Block and gravel protection – standard concrete blocks and gravel can be used to form a barrier to sediments that permits water runoff to flow through select blocks laid sideways.
- Sandbag barrier and catch basin covers – both can be used to create temporary sediment barriers at the inlets.
- Sod inlet protection – a permanent inlet protection measure. Sod protections should not be considered until the entire surrounding drainage area is stabilized.
- **Groundwater Well Protection**
  - Any open groundwater well around a work site should be capped to prevent contamination.
  - The minimum separation distances between a well and any potential sources are specified in Section 12 of Regulation 903 under the Ontario Water Resources Act. In general, the potential for well water contamination decreases as distances between the well and the source of contaminant increases. Maintain as much separation distance as possible between water well and potential contaminant sources.
- **Washout Areas**
  - Perform washout of trucks off-site or in designated areas only. For on-site truck washout, locate washout area at least 50 feet (15.24m) from storm drains, open ditches, or water. Avoid runoff by constructing a temporary pit or bermed area.
  - Line the temporary wash out pit with plastic to prevent seepage of the wash water into the ground. Collect wash water and all concrete debris in a concrete washout system bin. Refer to **Erosion & Sediment Control (ESC-1)**.
  - Do not wash sweepings from exposed aggregates into the street or storm drain. Collect and dispose of appropriately, according to the characteristics of this waste. Refer to **Non-Hazardous Waste (WM-1)**.
- **Containment Plan**
  - Design and implement an Isolation / Containment Plan to isolate temporary in-water work zones to maintain clean flow around the work zone at all times. The design should:
    - use only clean materials free of particulate matter;
    - site or otherwise manage flow withdrawal and discharge to prevent erosion and sediment release to the water body; and
    - ensure the work zone is stabilized against the impacts of high flow events.
- **Excess Materials**
  - All materials used or generated (e.g., organics, soils, woody debris, temporary stockpiles, construction debris such as concrete, sheet pile, wood forms, etc.) during site preparation, construction and clean-up should be handled in a manner that prevents their entry to the water body, including temporarily storing and

stockpiling materials a safe distance from the water body. Refer to **Excess Materials (EM-1)**.

- **Spills Management**
  - Ensure a Spills Plan (including materials, instructions regarding their use, education of contract personnel, emergency contact numbers) is on-site at all times for implementation in event of an accidental spill during construction. Refer to **Spills Preparedness & Prevention (SM-1)**.
- **Vegetation Removal**
  - Minimize riparian vegetation removals and if removal is necessary, use proper clearing techniques and protect retained vegetation.
- **Chemicals Management**
  - Use only specified amounts and types of fertilizer in areas draining to water bodies. Avoid use of chemical dust suppressants and pesticides/herbicides in areas near or draining to water bodies. Refer to **General Storage of Chemicals (CFM-1)** for more information.
- **Maintenance Plan**
  - Any management plans implemented to protect water quality (e.g., washout areas, containment plans, etc.) must be regularly maintained and inspected. Refer to **Erosion & Sediment Control (ESC-1)**.

#### **ADDITIONAL INFORMATION/ REFERENCES**

- Federal *Fisheries Act*
- Fisheries and Oceans Canada Operational Statements
- *Ontario Water Resources Act*.
- Ontario Regulation 903 *Wells*
- Ontario Ministry of Transportation. *Environmental Guide for Fish and Fish Habitat*.

## **Appendix D: DFO – Projects Near Water**

Following the introduction of amendments to the Fisheries Act in Nov. 2013, DFO guidance for undertaking work near water has been updated and can be found under the heading, **“Measures to Avoid Harming Fish”** on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>

Topic categories include:

- **Project Planning**
- **Erosion and Sedimentation Control**
- **Shoreline Re-vegetation and Stabilization**
- **Fish Protection**
- **Operation of Machinery**

This guidance replaces the previously available 'DFO Operational Statements' and 'Fact Sheets.'



# WATER & WASTEWATER: Water Taking/Dewatering

## WW-2

### PURPOSE

- The purpose of this section is to describe the requirements for water taking and/or dewatering activities. This applies to the taking of water from the ground (i.e. a dug or drilled well, or dewatering an excavation, or the taking of water from a river, pond, or other surface water body. In Ontario, the taking of water is governed by the Water Taking and Transfer Regulation (O.Reg. 387/04) under the *Ontario Water Resources Act* (OWRA).

### APPLICABILITY

- Typically associated with excavation or dust suppression activities.

### KEY REQUIREMENTS

- **Contract Requirements**
  - Refer to the contract for any specific requirements.
- **OPSS 517 – Construction Specification for Dewatering of Pipeline, Utility, and Associated Structure Excavations**
  - Monitoring and contingency plans may be required to address the potential impacts to items such as, but not limited to, settlement, groundwater usage and electrical and mechanical equipment failures. Stand-by power or pumping capacity may be specified in the Contract Documents and calibration documentation may be required for flow metering systems.
- **OPSS 518 – Construction Specification for Control of Water from Dewatering Operations**
  - Disposal of water
    - Dewatering operations shall be directed to either a sediment control device (such as sediment pit or trench), or a natural attenuation area prior to discharge to watercourses. A minimum of 15 m setback shall be maintained from the receiving watercourse if natural attenuation is used.
  - Surface Drainage
    - Keep gutters clear at all times. Do not allow water to flow across or over pavements or sidewalks. Surface drainage from dewatering operations shall be intercepted and controlled to protect against adverse impacts from erosion and sedimentation.
  - Settling Ponds and Sediment Traps or Basins

- Refer to OPSS 805 for more information.
- Temporary Erosion and Sediment Control Measures
  - Refer to OPSS 805 for more information.
- Management of Excess Material
  - Refer to **Excess Materials (EM-1)**.
- **Ontario Water Resources Act**
  - Any person who takes more than **50,000 litres** of water a day from a lake, river, stream, or groundwater source must first obtain a Permit to Take Water (PTTW) from the Ministry of the Environment (MOE). MOE encourages applicants to consult with the Ministry staff to initially confirm the classification for the proposed water taking prior to submitting the application.
  - Ontario Regulation 387/04 sets up criteria that the Ministry will consider when assessing an application for a PTTW. When a PTTW is issued, the permit typically comes with terms and conditions that the permit holder must adhere to.
  - In addition to the duties prescribed within the permit, permit holders shall (O.Reg. 387/04) record the flow and volume of water taken daily, and submit the data to the MOE annually on or before March 31<sup>st</sup> for the previous reporting year (i.e. March 31 2013 for 2012).

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Determine if a Permit to Take Water (PTTW), or multiple permits are required. If so, submit the application for permitting as early as possible in the planning stage of the contract.
  - Water taking applicants are required to classify their applications into one of three categories, based on the proposed water taking's anticipated risk to existing users and the environment. Category 1 applications are unlikely to pose adverse impacts, while Category 2 and 3 applications have a greater potential to cause adverse environmental impact or interference. Category 2 and 3 applications are subject to additional application requirements and greater scrutiny by the Ministry.
  - Applicants must also submit a document that outlines the water conservation measures and practices that they have undertaken, or will be undertaking, for the duration of the permit. By using water more efficiently, every permit holder helps ensure a sustainable supply of water for the future.
  - Ensure the terms and conditions outlined in the permit are adhered to throughout the project. Inspect excavated areas daily for signs of contaminated water. Discoloration, oily sheen, or odours are typical signs of potential contamination.

- Maintain all documentation, including rates of water taking, and records of maintenance and calibration on pumps and meters.
- For more Information, refer to the Ministry's PTTW Manual and the *Guide to the Permit to Take Water Application Form*. These and other PTTW publications are available on-line at: [www.ene.gov.on.ca](http://www.ene.gov.on.ca).

- **Sediment Control, Toxics and Petroleum Products**
  - Dewatering, or the taking of water, is usually combined with water discharge – which is separately regulated in Ontario. As such, the disposal or use of the water that is pumped from excavations or for dust suppression must also be considered, and specifically the chemical quality of that water must be known.
  - There are two (2) types of contaminants that occasionally result from dewatering operations: i) sediments; and ii) chemically contaminated water (fuel, oil, etc.). Chemical contaminants are not commonly found in dewatering discharges, *unless* the surrounding area has been used for light or heavy industrial activities.
  - **Sediment Control** - filtration techniques can be used to remove sediment from a sediment trap or basin. Filtration can be accomplished with:
    - Sump pit and a perforated or slit standpipe with holes and wrapped in filter fabric. The standpipe is surrounded by stones, which acts as a filter as water collects in the pit. Wrapping the standpipe in filter fabric may require a larger suction inlet area to prevent clogging. Filters should be cleaned and maintained regularly. Floating suction hose can be used to allow cleaner surface water to be pumped out. (See **ESC-3 Sediment Control**).
    - Refer to **OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures**.
  - **Chemical Contaminants** - sample groundwater near the excavation site in areas where groundwater pollution is suspected and send the samples to a certified laboratory for analysis. The presence of contaminated water may indicate contaminated soil as well. Refer to **Management of Contaminated Soil (WM-3)**. If contamination is suspected, contact the project owner to discuss next steps.

## REFERENCES

- Ontario Ministry of the Environment. *Green Fact Sheet: Permit to Take Water*. October 2005.
- *Ontario Water Resource Act Section 34 Water Taking*.
- Ontario Regulation 387/04. *Water Taking*.
- Ontario Provincial Standard Specification. *OPSS 517 – Construction Specification for Dewatering of Pipeline, Utility, and Associated Structure Excavations*. November 2010.
- Ontario Provincial Standard Specification. *OPSS 518 – Construction Specification for Control of Water from Dewatering Operations*. November 2011.



# WATER & WASTEWATER:

## Discharges to Sewers

WW-3

### PURPOSE

- In some circumstances, road building construction activities may result in discharges of wastewater to municipally-owned sewers.
- The purpose of this section is to describe requirements for activities where there is an interaction with a municipal sanitary or storm sewer system. Requirements may include sampling, submission of a waste survey report, or a storm water management report. This section does not consider the management and discharge of storm water to the ground or a surface water – that is covered by the **Working in or near Water Bodies WW-1**
- There are two (2) distinct classes of wastewater that may be regulated by the local municipality: sanitary and storm water. Sanitary sewers typically transport wastewater to municipal treatment plants. Storm sewers capture rainwater or snowmelt and often flow directly to nearby watercourses without treatment. Combined sewers are often found in older sewer systems, and are used to collect both sanitary and storm drainages. During dry weather, combined sewers carry all contents to treatment plants. However, during wet weather, the water may by-pass the treatment plant and flow directly to natural watercourses without treatment.

### APPLICABILITY

- This section is applicable to all construction activities where there is interaction with a municipal sanitary or storm sewer.

### KEY REQUIREMENTS

- **Municipal Sewer Use By-Law Requirements**
  - Municipal By-Laws often sets pre-treatment effluent quality criteria for discharges to storm and sanitary sewers. By-Laws may also stipulate requirements for connection permits, fees, sample collection, monitoring or reporting. Always refer to the municipal by-laws if you plan to connect to a local sewer. Additional approvals may be required if the effluent has been tested and contaminants exist in concentrations that exceed the discharge criteria set forth in the By-Law.
- **Ontario Water Resources Act**
  - “Sewage” is defined to include drainage, storm water, commercial waste or industrial waste. A sewage works is “any infrastructure for the collection, treatment, transmission, or disposal of sewage.”



- Section 53 of the OWRA prohibits the discharge of a pollutant to the water environment unless the discharge is approved by the Director, under an Environmental Compliance Approval (ECA). The OWRA requires an ECA for the construction of sewage works, and in the case of connection to municipal sewers would be required in the event of the discharge of storm water to a municipal storm sewer, if the design capacity of the sewage works exceeds 10,000 L per day.
- **Ministry of Transportation (MTO) Storm water Management Requirements**
  - A storm water management report may be required to be submitted to the MTO. The report is a document that presents the data, methods, procedures and results of the design of drainage works and erosion protection measures. It is the responsibility of the drainage practitioner (a professional who is familiar with the drainage practices or applicable standards) to determine the applicability of the potential documentation requirements.
  - There are a number of checklists available in the MTO website that can be utilized. These checklists include topics such as “background information required to identify drainage issues”, “assessing impacts to the receiving drainage system”, and “construction operation and maintenance issues”.

## **IMPLEMENTATION/ STRATEGIES**

- **General Approach**
  - Determine if the Project requires connection to a municipal sewer (storm or sanitary)
  - If so, obtain a copy of the local sewer use by-law to determine permit, notification, sampling or reporting obligations.
  - Contaminated waste water should never be discharged to ground. Refer to the local sewer use by-law for discharge criteria and prohibitions.
  - Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected. The municipality must be notified and permission sought to connect to municipal sewers. The municipality may require the submission of a Waste Survey Report, which will describe the activities on-site and the potential for contaminants to impact the municipal sewer system.
  - If domestic wastewater / grey water are collected in a septic tank or “Johnny on the spot”, arrange for waste collection by a licensed hauler on a pre-arranged schedule to ensure that facilities do not overflow to the ground.

## **REFERENCES**

- Municipal Sewer Use By-Laws
- Ontario Ministry of Transportation Storm water Management Requirements
- *Ontario Water Resources Act*



# WATER & WASTEWATER

☑	Checklist	Comments
<b>Working in or near Water Bodies</b>		
	Is work being performed at or near water bodies? If yes, has the need for approvals/ permits been assessed?	
	Are project supervisors aware of any requirements that must be met? E.g., timing restrictions, routine sampling.	
	Have all approvals and permits been obtained prior to start of work?	
	Are sediment or erosion control measures inspected daily to ensure they remain effective?	
	Is potentially contaminating equipment kept at least 30m away from water bodies?	
	Are truck washout areas situated at least 50 feet (15.24m) away from storm drains, open ditches, or water?	
	Are temporary pits in truck washout areas lined with plastic to prevent seepage? Are the pits in good condition?	
	Is a spills response plan readily available?	
<b>Water Taking / Dewatering</b>		
	If 50,000L of water is expected to be taken a day from a lake, river, stream or groundwater source, has a Permit to Take Water been obtained from the MOE?	

	If a Permit to Take Water is required, is the flow and volume of water taken recorded daily?	
	Are sediment control measures and gutters inspected regularly?	
	Are excavated areas inspected daily for signs of contaminated water?	
<b>Discharges to Sewers</b>		
	Are there any connections to municipal sanitary or storm sewers? If yes, has a permit been obtained from the owner of the sewer?	
	Are project staff aware of the local municipality's By-Law requirements?	
	If contamination is suspected, does the site conduct regular monitoring?	



# SPILLS MANAGEMENT:

## Spills Preparedness & Prevention

SM-1

### PURPOSE

- The purpose of this section is to describe good practices for the prevention of and preparedness for unplanned releases of chemicals, fuels or other contaminants. Spill response and reporting requirements are described in the subsequent section (SM-2).
- A **spill** is generally defined as a sudden, unexpected or unplanned release of a pollutant in sufficient quantities to the air, water, groundwater, or land to pose a direct or indirect threat to people, environment, or property. A key element in preventing spills or hazardous substances is the concept of pollution prevention, the concept of reducing or eliminating hazardous materials at the source. Some strategies have already been described under (FM-1, CFM-2, and CFM-3).
- A spills management plan outlines procedures to take in the event of spill emergencies, and can reduce the severity a spill.

### APPLICABILITY

- Potential sources for spills include:
  - Processes – equipment and vehicle maintenance, grounds maintenance, fuelling, etc.
  - Materials – fly rocks, sediments, blasting compounds on fly rocks, petroleum, oil, lubricants, fuel, paints and solvents, pesticides and fertilizers, etc.

### KEY REQUIREMENTS

- There are a number of regulatory requirements covering spills prevention and preparedness that apply to road building projects in Ontario. Many of these requirements are described under other procedures relating to working in or around water and chemical and fuel management. The following does not represent a complete list of requirements – however, the common theme is that ***all reasonable precaution be exercised to prevent the release of a contaminant to the natural environment.***
- **Contract Requirements**
  - Review the contract and project requirements to determine associated risks.
- **Fisheries Act**
  - 
  - Significant changes to the Federal Fisheries Act came into effect on November 25, 2013. These changes shift the focus of protection from “fish habitat” to “fisheries”.
  - The new Act has changed its regulatory perspective. Under the old Act, the habitat and deleterious substance provisions were used as primary protection for the

environment. The old section 35 habitat provisions prohibited the harmful alteration, disruption or destruction (HADD) of fish habitat, unless a person had an authorization to do so. A HADD without an authorization was a punishable offence. The new section 35 says:

- “No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery.”
- Serious harm is defined as “the death of fish or any permanent alteration to, or destruction of, fish habitat.”
- There is now a requirement to report an occurrence that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: “Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time

(a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence; or

(b) causes or contributes to the occurrence or the danger of the occurrence.”

- **Ontario’s Environmental Protection Act**

- The Ontario EPA places a general prohibition on the discharge of a contaminant to the natural environment in a form that causes or has the potential to cause an adverse effect.

- **Ontario’s Spill Prevention and Contingency Plans Regulation**

- Ontario’s Spill Prevention and Contingency Plans Regulation, promulgated under the EPA, describes the required form and content of a prevention and contingency plan, where an organization wishes to invoke the Class X exemption to spill reporting (see SM-2 Spill Response and Reporting).

- **Ontario Water Resources Act**

- Like the Ontario EPA, the OWRA places a general prohibition on the discharge of any material of any kind into or in any waters or on any shore or bank or into or in any place that may impair the quality of water. "Waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.

- **Ontario Fire Code Regulation 213/01**

- The Ontario Fire Code requires the development and communication of a spill procedure, for any project where flammable and/or combustible liquids are stored

or handled. Projects requiring the storage and handling of fuels, solvents or other flammable liquids must prepare a spill procedure, provide spill protection for storage areas, and ensure that spills do not reach waterways or sewers.

## **IMPLEMENTATION/ STRATEGIES**

- **General Approach**

- Complete a risk assessment of your location and determine potential problem areas.
- Prepare and maintain a Spill Response Plan.
- Train all employees on spill identification, legislation requirements, and Spill Action Centre reporting requirements.
- Designate responsible individuals in a spill response team and train them in response.
- For activities with high risk of spills such as refueling or staging areas, select a location which offers the fewest potential impacts. Avoid areas that are close to surface waters, wells, or other high risk land features.
- Hazardous materials and wastes should be stored in covered containers and protected from weather and vandalism.
- Ensure spill kits are located in areas of probable use and complete regular inspections to ensure the kit is stocked.

- **Identify Potential Sources**

- Identify potential spill sources – this may include a review of maintenance records, inventory of chemicals stored on-site, and operations characteristics.
- Common spill sources on construction projects include:
  - Sediment spills to water course;
  - Oil/ hydraulic hose breaks;
  - Oil from generator sets;
  - Flying rocks into water course from blasting activities;
  - Blasting compounds on fly rocks; and
  - Others.
- Locate storage and transfer areas and drainage/ sewer systems on a map or site plan.
- Assess the risk of spill and the potential consequences for each to identify the priorities.

- **Develop Contingency Plans**

- A Contingency Plan is a plan of action prepared in anticipation of an emergency, and is required under regulation. Contingency Plans are essential because they

establish practical plans of action for all types of spills, such that if a spill occurs, the response will be efficient and effective.

- Basic elements of a contingency plan should include:
  - List of hazards and locations of chemical, fuel and waste storage;
  - Detection of the occurrence of a spill;
  - List of people and agencies that must be immediately notified;
  - List of immediate response actions (e.g., containment);
  - Designation of authority and chain of command;
  - List of trained spill response individuals, location and inventory of spill response equipment;
  - MSDS and other chemical properties information for products on-site;
  - Probable trajectories of released substances under different weather conditions;
  - Identify list of external spill clean-up contractors that can assist with spills that cannot be contained by internal staff;
  - Identify response procedures; and
  - Follow-up and documentation requirements.
- **Vehicle and Equipment Maintenance**
  - To prevent runoff, designate an area away from drainage courses for maintenance activities.
  - Regularly inspect vehicles and equipment for leaks, and repair immediately. Check hoses and replace hoses with signs of cracking.
  - Check incoming vehicles and equipment for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site.
  - Use secondary containment when removing or changing fluids.
  - Place drip pans or absorbent materials under paving materials when not in use.
  - Promptly transfer used fluids to the proper waste or recycling drums.
  - Oil filters disposed of in containers or dumpsters have the potential to leak. Drain excess oil into a waste oil recycling drum prior to disposal.
  - Store cracked batteries in non-leaking secondary containment. Treat dropped batteries as if it is cracked.



- **Vehicle and Equipment Fuelling**
  - Use designated areas away from drainage courses.
  - Discourage the practice of “topping-off” of fuel tanks.
  - Use secondary containment, such as drain pans or absorbent pads, to catch leaks/spills.
- **Managing Erosion and Sedimentation**
  - A properly implemented erosion and sedimentation plan can prevent sediments and other debris from spilling into water courses and other areas.
  - Refer to **Erosion and Sediment Control (ESC-1)** for more information on erosion and sediment control plans.
- **Plan Blasting Activities to Contain Debris**
  - Blasting activities should be planned with proper debris control in place to contain fly rocks and other materials.
- **Training and Mock Scenarios**
  - Employees who work regularly with hazardous materials should be trained in how to properly respond to a spill.
  - Table-top and live mock scenarios should be conducted regularly such that Spill Response Team members are comfortable in:
    - Responding quickly to a spill
    - Understanding their roles and responsibilities with respect to spill clean-up
    - Identifying gaps in the contingency plan and developing corrective actions

## REFERENCES

- Environment Canada. *COMPRO #19: Prevention, Preparedness, Response & Spill Reporting Requirements*. June 2003.
- Ontario Fire Code (O.Reg 213/07) under the *Fire Protection and Prevention Act*
- Spill Prevention and Contingency Plans (O.Reg 224/07) under the *Environmental Protection Act*
- *Ontario Water Resources Act*
- *Fisheries Act*
- Ontario Road Builders’ Association. *Guidelines for Safe Blasting in Ontario Highway Construction Operations*.



# SPILLS MANAGEMENT:

## Spills Response and Reporting

SM-2

### PURPOSE

- The purpose of this section is to describe general spills response and reporting requirements.
- To prevent contaminants from entering soil or waterways, spills must be cleaned up or contained as soon as possible, when safe to do so.
- Timely and effective response and reporting is not only good practice, but required by a number of Regulations

### APPLICABILITY

- This section is applicable to all road building activities where a spill may potentially occur.

### KEY REQUIREMENTS

- There are a number of regulatory requirements covering spills response and reporting that apply to road building projects in Ontario.
- **Ontario's Environmental Protection Act**
  - In the event of a spill or unplanned release of a contaminant to the natural environment in a form that causes or has the potential to cause an adverse effect, Part X of the Ontario EPA requires the immediate reporting of the spill to the Spills Action Centre of the MOE, the owner of the property where the spill occurred, and the municipality (if the spill impacts a municipal storm or sanitary sewer).
- **Ontario's Classification and Exemption of Spills and Reporting of Discharges O. Reg. 675/98**
  - Ontario's Classification and Exemption of Spills and Reporting of Discharges Regulation, promulgated under the EPA, describes a number of classes of spills that do not need to be reported. The Regulation provides reporting thresholds for certain contaminant, including oils and fuels, assuming certain conditions are met. These conditions are described below.
- **Ontario's Spill Prevention and Contingency Plans Regulation O. Reg. 224/07**
  - Ontario's Spill Prevention and Contingency Plans Regulation, promulgated under the EPA, describes the required form and content of a prevention and contingency plan, where an organization wishes to invoke the Class X exemption to spill reporting.
- **Ontario Water Resources Act**
  - Like the Ontario EPA, in the event of a spill or unplanned release of a contaminant to the natural environment (water) in a form that causes or has the potential to cause

an adverse effect, the OWRA requires the immediate reporting of the spill to the Spills Action Centre of the MOE. There are no reporting exemptions for spills to water. "Waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.

- ***Fisheries Act***

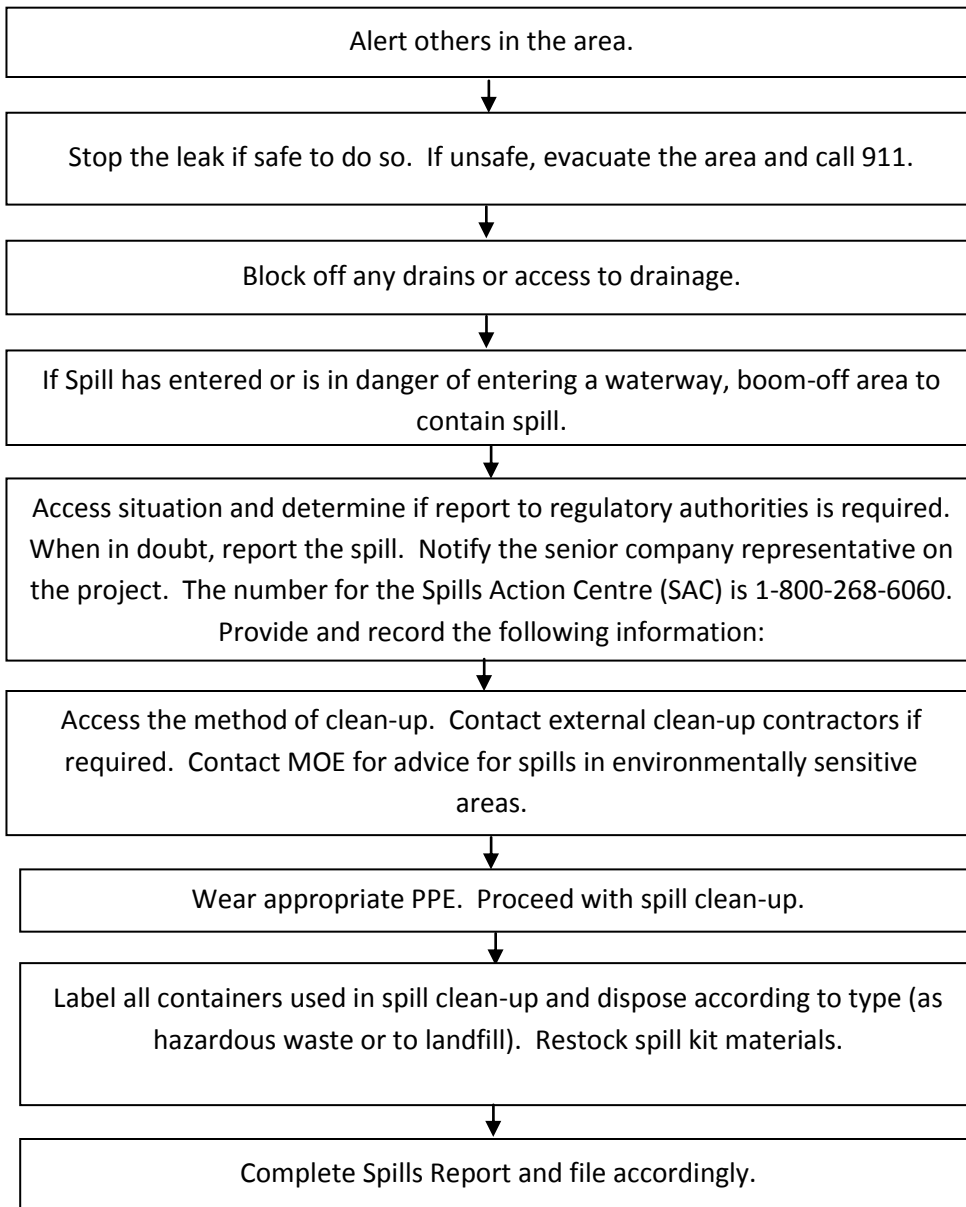
- 
- Significant changes to the Federal Fisheries Act came into effect on November 25, 2013. These changes shift the focus of protection from "fish habitat" to "fisheries".
- The new Act has changed its regulatory perspective. Under the old Act, the habitat and deleterious substance provisions were used as primary protection for the environment. The old section 35 habitat provisions prohibited the harmful alteration, disruption or destruction (HADD) of fish habitat, unless a person had an authorization to do so. A HADD without an authorization was a punishable offence. The new section 35 says:
  - "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." Serious harm is defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat."
  - There is now a **requirement to report an occurrence** that results in serious harm to fish, and also a reporting requirement if there is a serious and imminent danger of such an occurrence: "Every person shall without delay notify an inspector, a fishery officer or an authority prescribed by the regulations of an occurrence that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that is not authorized under this Act, or of a serious and imminent danger of such an occurrence, if the person at any material time
    - (a) owns or has the charge, management or control of the work, undertaking or activity that resulted in the occurrence or the danger of the occurrence; or
    - (b) causes or contributes to the occurrence or the danger of the occurrence."

- ***Federal Transportation of Dangerous Goods Act and Ontario's Dangerous Goods Transportation Act***

- In the event of an accidental release of dangerous goods from a means of containment on a public roadway, the person who has possession of the dangerous goods at the time of the accidental release must make an immediate report of the accidental release to the MOE if the accidental release exceeds the reporting thresholds defined by Transport Canada. For fuels or other flammable liquids, this threshold is 200 L. For hazardous wastes, including used oil, the threshold is 25 L.

## IMPLEMENTATION/ STRATEGIES

- **General Approach**
  - Clean up leaks and spills immediately.
  - On paved surfaces, use as little water as possible to prevent runoff.
  - For non-hazardous spills, use a rag for small spills, damp mop for general cleanup, and absorbent material for larger spills.
  - For hazardous spills, ensure appropriate PPE is worn and cleanup as per the instructions on the MSDS.
  - Dry material spills may not be hosed down or buried. Dispose of properly. Refer to **Non-Hazardous Waste (WM-1)** and **Hazardous Waste (WM-2)** for more information.
- **Spill Response**
  - The generally accepted approach for spill response is shown on the following chart.
  - Additionally, remember to:
    - Ensure public safety and environmental protection;
    - Immediately initiate containment activities;
    - Remove the spilled substance and all contaminated materials;
    - Ensure appropriate disposal of the spilled substance and all contaminated materials;
    - Remediate the site;
    - Cooperate fully with all affected parties and enforcement groups; and
    - Investigate and implement corrective actions.



- **Spills on Land or into the Water**
  - All spills on land or into the water must be immediately reported to the **Spill Action Centre (SAC) of the MOE at 1-800-268-6060**, unless the spill is classified as non-reportable, as specified under the Classification and Exemption of Spills and Reporting of Discharges (O.Reg 675/98) under Ontario's *Environmental Protection Act*. When in doubt, report. Municipal authorities must be notified as well with any discharges to sanitary or storm sewer systems.
- **Municipal Sewer Use By-Law**
  - Most municipal sewer use by-laws contain information dealing with spills and unusual discharges.
  - The Provincial Model Sewer Use By-Law, upon which most municipal sewer use by-laws in Ontario are based, states:
    - Every person who discharges or deposits or causes or permits the discharge or deposit of material which is not normally discharged regardless of quantity, must forthwith notify the municipality or agency responsible for operating the sewage works.
  - Most by-laws will require a written report to be submitted within 5 days of the spill.
  - Refer to the local municipal by-law for more information.
  - In most scenarios, discharges of flammable material (such as gasoline), to a sewer will require notification to the Fire Department and Police.
- **Damaged Silt Fencing**
  - Should a silt fence be damaged (e.g., as a result of a sudden rain event), silt may enter a watercourse. The release of silt could cause increase in turbidity and have an impact on aquatic life. As such, this could be considered an abnormal environmental discharge.
- **Information to Provide when Reporting a Spill**
  - Typically, the following information must be provided (or documented) when reporting a spill. Make sure you prepare and keep a record of the telephone call when making a spill report, documenting what you say and what you are told.
    - Nature of release (spill, leak, fire or explosion)
    - Impact on people, property, and environment
    - Date/Time/Location of spill
    - Type/Quantity of substance released
    - Brief description of site and surrounding area
    - Circumstances leading up to the event
    - Resulting contamination
    - Remedial action being taken/required
    - Steps to be taken to prevent similar events
    - Name, affiliation and phone number of person reporting the spill

- Name and affiliation of person in control of the spill response and the phone number at which that person can be immediately contacted

- **Summary of Spill Reporting**

Reporting Body	Contact	Descriptions
Spill Action Centre (SAC) of the MOE	1-800-268-6060	All spills on land or into the water must be immediately reported to the Spill Action Centre (SAC) of the MOE at 1-800-268-6060, unless the spill is classified as non-reportable, as specified under the Classification and Exemption of Spills and Reporting of Discharges (O.Reg 675/98) under the <i>Environmental Protection Act</i> . When in doubt, report.
Municipal government	Based on municipality.	Requirements under the municipal sewer use by-law.  The Provincial Model Sewer Use By-Law, upon which most municipal sewer use by-laws in Ontario are based, states: every person who discharges or deposits or causes or permits the discharge or deposit of material which is not normally discharged regardless of quantity, must forthwith notify the municipality or agency responsible for operating the sewage works.

## REFERENCES

- Classification and Exemption of Spills and Reporting of Discharges (O.Reg 675/98) under the *Environmental Protection Act*.
- Spill Prevention and Contingency Plans Regulations (O.Reg. 224/07) under the *Environmental Protection Act*.
- *Ontario Water Resources Act*
- *Fisheries Act*
- Municipal sewer use bylaws.
- Environment Canada. *COMPRO #19: Prevention, Preparedness, Response & Spill Reporting Requirements*. June 2003.
- Ontario Ministry of the Environment. *Spills Reporting – A Guide to Reporting Spills and Discharges As Required by (Ontario) Environmental Protection Act (s.92 and s.15) and Ontario Regulation 675/98 Classification and Exemption of Spills and Reporting of Discharges*. May 2007.

- Infrastructure Health & Safety Association. Civil Engineering Sector Labour-Management Health & Safety Committee. *Procedure for the Storage and Handling of Fuel on Construction Sites*. July 2008.



# SPILLS MANAGEMENT

☑	Checklist	Comments
<b>Spills Preparedness &amp; Prevention</b>		
	Has a spill response procedure been developed and is it regularly updated?	
	Have potential spill sources been identified?	
	Are workers that handle flammable and combustible materials trained in spill response within 3 months of being hired, with a refresher training every 6 months thereafter?	
	Is there a Spill Response Team? Do workers know how to contact these individuals in an emergency?	
	Are spill kits readily available and contents inspected monthly?	
	Are vehicles and equipment inspected on a weekly basis for leaks?	
	Are chemical, fuel, and waste storage areas inspected weekly for leaks?	
<b>Spills Response and Reporting</b>		
	Are members of the Spill Response Team aware of the regulatory notification requirements (e.g., when to report to MOE SAC)?	
	Are spill response PPE readily available and in good condition?	
	Are spill response procedures posted and readily available?	

	Are spill response kits readily available and fully stocked?	
<input checked="" type="checkbox"/>	<b>Checklist</b>	<b>Comments</b>
	Are workers aware of the proper disposal of spill response clean up materials?	
	Are all spills properly documented?	



# NATURAL ENVIRONMENT/ BIODIVERSITY: Sensitive Species and Habitat

NE-1

## PURPOSE

- The purpose of this section is to describe best management practices surrounding work around or near sensitive species and habitat.
- A Species at Risk (SAR) is a plant or animal that is at risk of extinction because of certain threats caused by humans. In Canada, species identified as *extirpated*, *endangered*, *threatened*, or of *special concern* are now classified as SAR and are protected under Federal and Provincial law. A committee of government and non-government experts directs the assessments and classifies species using the best available scientific, community and Aboriginal traditional knowledge. There are several hundred species in various risk categories in Canada. Of these, approximately 200 reside in Ontario, including well-known larger species such as the polar bear, woodland caribou and grey fox, but also many lesser known plant, animal and reptile species such as Fowler's toad (an amphibian), goldenseal (a plant), and gravel chub (a fish) .
- If SAR or SAR habitat are present or suspected to be present, projects may be prescribed operational constraints such as construction works occurring outside of the breeding season, hibernation periods, setback limits, and post-construction monitoring.

## APPLICABILITY

- This section is applicable during both the planning stages of the project and throughout the duration of project work. The presence of SAR/ SAR habitat is generally identified through the Environmental Assessment (EA) process, undertaken by the project owner.

## REQUIREMENTS

- **Species at Risk Act**
  - The *Species at Risk Act* (SARA) is a federal law that aims to protect all native species in Canada. It does this through both protection of the species and recovery actions for the species. Once a species is listed as threatened, endangered, or extirpated under the SARA, it is illegal to:
    - Kill, harm, harass, capture or take an individual of a SAR;
    - Possess, collect, buy, sell or trade an individual of a species, or any part or derivative of a SAR; and
    - Damage or destroy the residence (a "critical habitat") of one or more individuals of a SAR. Simply put, critical habitat is vital to the survival or

recovery of wildlife species. The habitat may be an identified breeding site, nursery area or feeding ground.

- Transportation planning and highway design must be done in a manner that avoids impact on lands that provide critical habitat for listed SAR unless certain areas are excluded by the Minister, and on other lands that provide critical habitat for listed migratory and aquatic species.
- It is your responsibility to ensure that any projects you undertake comply with SARA. The process for doing so remains as it always has been: any works—from marinas to bridges—must be reviewed by local, provincial or federal authorities and authorized through formal approvals and permits.
- **Ontario *Endangered Species Act (ESA)***
  - Ontario's *Endangered Species Act (ESA)* compliments the federal SARA. In most cases, the federal and provincial lists of species at risk are the same, but there are some differences. The ESA helps protect species and their habitats. In addition to species protection, the ESA prohibits damage or destruction of habitat for species at risk (those listed as *endangered* or *threatened* on the Species at Risk in Ontario (SARO) List). Under the ESA, permits are required for construction activities where SAR are present. Permits may be granted when:
    - The activity is necessary for the protection of human health or safety;
    - The purpose of the activity is to help protect or recover the species at risk; or
    - The activity will result in significant social or economic benefit to Ontario.
  - The permit will provide details and conditions on how the project can proceed. It may also include monitoring requirements during construction and for a specified time after construction is completed. Transportation planning and highway design, construction, operation and maintenance activities must be done in a manner that avoids impacts to the habitat for species designated by regulation under the ESA.
  - Refer to **Appendix E** for a flow chart guide to determine if a permit is required under the ESA.
- ***Planning Act***
  - A policy under the *Planning Act* called the Provincial Policy Statement (PPS) is used by land use planners and others to help make sure that species at risk are not harmed by land development. For example, the PPS states that development is not permitted in significant habitats of endangered and threatened species.
- ***Fish and Wildlife Conservation Act***
  - Transportation planning and highway design, construction, operation and maintenance activities must recognize the need to protect other wildlife species identified in the schedules in the *Fish and Wildlife Conservation Act*.
- ***Canada Wildlife Act***
  - Transportation planning must be done in a manner that avoids Migratory Bird Sanctuaries and National Wildlife Areas in Ontario. Transportation planning and highway

design, construction, operation and maintenance activities must consider the conservation of wildlife on federal public lands that are administered by the Federal Minister of the Environment, and in any protected marine areas.

- ***Migratory Bird Convention Act***
  - Transportation planning and highway design, construction, operation and maintenance activities must be carried out to prevent the destruction of migratory birds or their nests and minimize the release of oil, oil wastes or any other substance harmful to migratory birds to any waters or any area frequented by migratory birds.
- ***Ontario's Environmental Assessment Act***
  - Ontario's *Environmental Assessment Act* requires the identification and mitigation of impacts on natural habitat resulting from proposed projects, including Class Environmental Assessments on municipal projects. Unless the disturbance is specifically approved through the Environmental Assessment process, Ontario's *Environmental Assessment Act* avoids significant wildlife habitat, as defined in Ministry of Natural Resources' *Significant Wildlife Habitat Technical Guide*. Where intrusion is unavoidable (i.e., avoidance is not feasible or practical) and has been approved through the EA approval process, the highway shall be designed, constructed, operated and maintained to minimize effects on significant wildlife habitat.
  - Transportation planning and highway design, construction, operation and maintenance activities must be carried out in a manner that maintains the diversity of wildlife habitat in an area and natural connections between them, unless otherwise approved through the EA approval process.
  - Transportation planning and highway design, construction, operation and maintenance activities must have regard to policies, plans, strategies and programs at the local/regional level dealing with other wildlife species of local or regional significance. Such species and associated habitats may be identified by a local planning body such as a municipality or conservation authority, or identified as being of conservation concern through initiatives. For such resources the descending order of priority will be: 1) avoidance; 2) minimizing impact; and 3) mitigation/restoration.

## **IMPLEMENTATION/ STRATEGIES**

- **General Approach**
  - The project owner should clearly identify the applicability of the ESA, SARA or other requirements at the planning stage.
  - Carefully review contract documents for SAR-related requirements and restrictions.
  - Review related Permits for additional restrictions or requirements.
  - Collect appropriate background information. In Ontario, a SAR permit is issued through the Ministry of Natural Resources (MNR). There are a number of resources that may be

able to assist you in finding out whether SAR, their residences or critical habitat may be present in the areas in which you are operating, including:

- The Ontario Ministry of Natural Resources (MNR) website provides a list of the Species at Risk in Ontario and includes permitting information;
  - The SARA Public Registry has an “Advanced Search” tool that allows you to search for species listed under SARA based on their distribution, taxonomic group and risk category;
  - Environment Canada’s species at risk website ([www.speciesatrisk.gc.ca](http://www.speciesatrisk.gc.ca)) offers general biological information about species at risk in Canada, including their distribution and habitat requirements;
  - Environment Canada's Canadian Wildlife Service (CWS) regional offices can access databanks on species at risk found on federal lands;
  - Fisheries and Oceans Canada maintain databanks on aquatic species at risk and can also assist in correctly interpreting information from other databanks;
  - Parks Canada maintains a national database of species found in the areas it administers; and
  - NatureServe Canada provides links to the Conservation Data Centers, which in some cases offer the possibility to search for the occurrence of species at risk in particular areas of provinces or territories.
- If an EA is required for your project under Federal or Provincial legislation, any species at risk listed under SARA, or critical habitat that is likely to be affected by the project should have been identified by the project owner. If the project is likely to affect a listed species or its critical habitat, SARA requires that Environment Canada, Fisheries and Oceans Canada and/or Parks Canada Agency be notified. Potential adverse effects must also be identified. If the project is carried out, measures need to be taken to avoid or monitor and lessen those adverse effects. Such measures must be consistent with any applicable recovery strategies, action plans and management plans for those particular species.
  - It is important that workers are aware of SAR and how their presence can impact a project. Several tools to aid in recognition include development of training and worker tools such as recognition posters. Posters can include pictures of SAR and protocol for sightings in the work area.
  - Workers can be trained using tailgate meetings or through Health and Safety procedures. These would be used to familiarize workers with SAR and the protocol for protecting species and their habitat, including any requirements specified in the contract.
- **Ministry of Natural Resources**
    - MNR has put in place regulations defining the habitat for the following 11 species: Bent Spike-rush, Rapids Clubtail, Common Five-lined Skink (Carolinian population), Eastern Fox Snake (Carolinian population), Gray Rat Snake (Carolinian population), Eastern Fox Snake (Georgian Bay population), Gray Rat Snake (Frontenac Axis population), American White Pelican, Northern Barrens Tiger Beetle, Pale-bellied Frost Lichen, and Virginia Mallow.

- A Habitat Protection Summary document has been prepared by MNR for each of the above 11 species. The Summary document includes generally compatible (e.g., selective removal of a fallen or dead tree) and generally not compatible (e.g., significant removal of soils) practices.
- In addition, the MNR website provides detailed information on each of the species listed as a Species at Risk in Ontario:  
<http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276722.html>.

- **Best Practices**

- The following table lists some of the best management practices for the management of SAR:

Table 5: BMP for Species at Risk

Best Management Practices	Comments
Gather Information: Conduct a Detailed Site Inventory	Identify SAR and habitat protection requirements in contract documents.
	Determine if there are SAR on or near the proposed development site.
	Review information on terrestrial and aquatic environmentally sensitive areas on or near the development site to determine if additional measures are needed to protect specific habitat requirements and concerns for special wildlife and SAR.
	If the available information is inadequate, have a detailed bio-inventory of the site prepared by an appropriately qualified professional.
	Provide the results of the bio-inventory to the local government, and any findings of SAR to the MNR.
Design and Planning: Design the Development to Retain Important Habitats	Work with an appropriately qualified professional to plan developments near habitats of SAR.
	Do not site developments (including trails) in areas known to be important habitat for special wildlife or species at risk, nor immediately adjacent to these areas.
	Retain species-appropriate wildlife corridors through and around the development.
	Design buffer areas around important habitats.
	Clearly delineate and fence off important habitats and buffers areas on the site prior to starting work and inform site workers of their importance.
	Schedule construction activities to avoid sensitive periods such as nesting, spawning, hibernating, migration etc. The Ministry's regional websites provide some information on timing windows, and an appropriately qualified professional can provide site-specific advice.
	Provide crew training on SAR and habitat recognition, SAR reporting, stop work protocol, and live, dead or injured SAR reporting and handling protocol.

Develop species-specific deterrents, i.e., tarping of structures to avoid bird nesting in work areas.

## REFERENCES

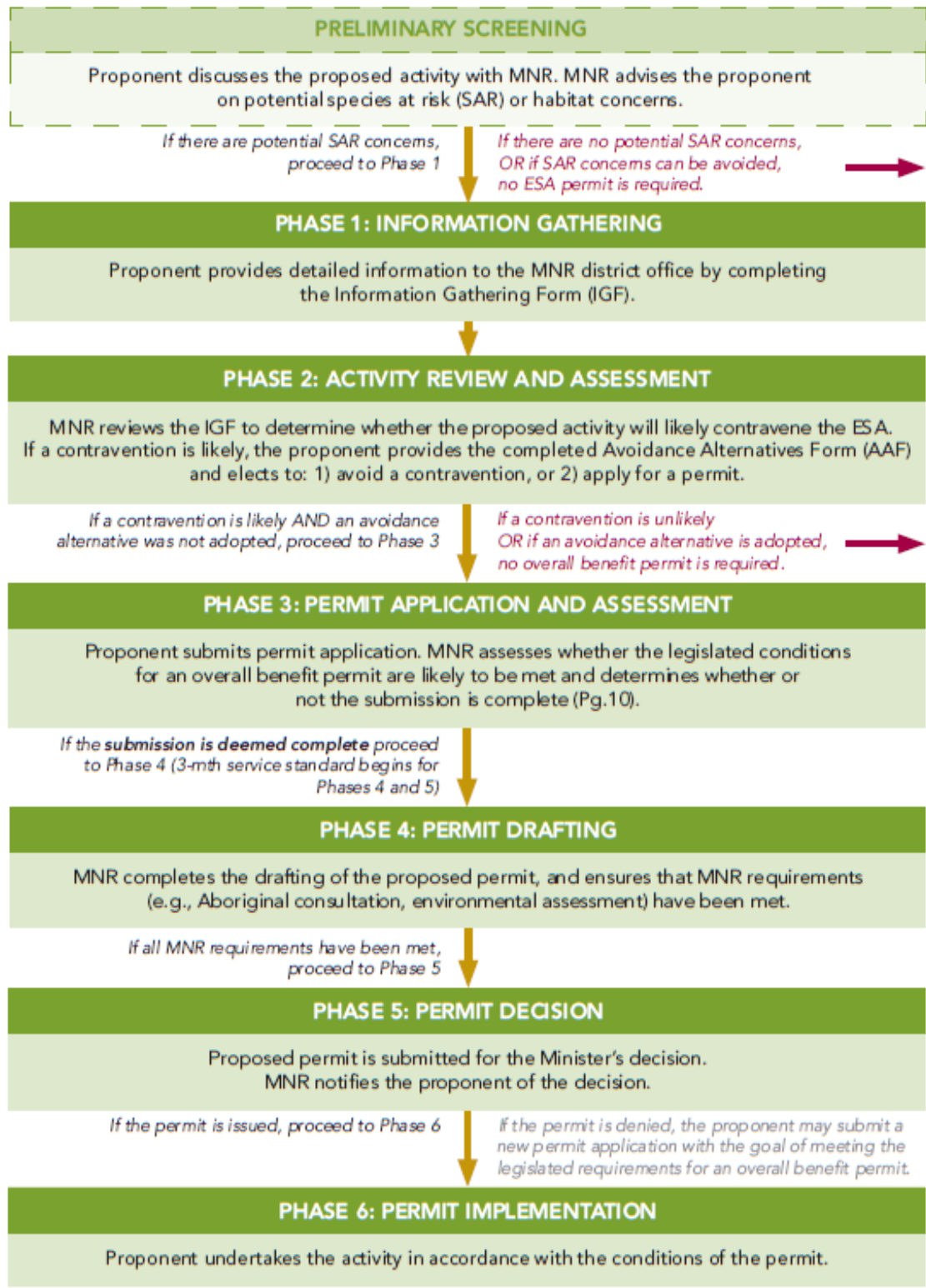
- *Canada Species at Risk Act.*
- *Ontario's Endangered Species Act.*
- *Migratory Birds Convention Act.* 1994.
- Ontario Ministry of Natural Resources. *Significant Wildlife Habitat Technical Guide.* 2000.
- *Planning Act.*
- *Fish and Wildlife Conservation Act.*
- *Canada Wildlife Act*
- *Migratory Bird Convention Act.*
- *Ontario's Environmental Assessment Act.*



# BIODIVERSITY CHECKLIST

<input checked="" type="checkbox"/>	Checklist	Comments
<b>Species at Risk</b>		
	Is the project work located in an area where Species at Risk (SAR)/ SAR habitat has been identified?	
	If required, have all permits been obtained from MNR?	
	Are workers trained on identifying SAR and response protocols?	

# Appendix E: ESA Permit / SAR Applicability Flow Chart



(Source: Ontario Ministry of Natural Resources *Permit Process Flowchart*)



# COMMUNITY RELATIONS: First Nations

CR-1

## PURPOSE

- The purpose of this section is to highlight some of the aboriginal rights and title interests that could potentially be impacted by roadway construction activity.
- Aboriginal communities have a unique and dynamic relationship with government, with rights that may extend beyond those of a typical stakeholder. In addition to constitutional requirements that underscore the duty to consult and accommodate Aboriginal communities, the broader goal of building a relationship based on respect and trust requires sustained communication and engagement.
- In making any decisions regarding a new highway project, the Ministry of Transportation (MTO) is required to meet applicable legal obligations to consult and, if appropriate, accommodate affected First Nations. There are more than 3 million hectares of reserve land across Canada, and this number is continually increasing as land claims are settled and implemented and lands are added to reserves. Any project that could affect their lands or lives requires their consent.

## APPLICABILITY

- At the early design stage, First Nations will be consulted on decisions affecting road allowance, permanent closing of roads or acquiring or disposing of interest in land over which a land claim exists, as well as if archaeological artifacts or remains are found or suspected in the area of work.
- The Crown is legally obligated to consult with Aboriginal groups concerning the possible effects of Crown actions with respect to proposed projects on Aboriginal rights, for all parties, as applicable, early engagement with Aboriginal groups can yield a number of positive results or benefits, including:
  - Enhancing relationships;
  - Promoting trust;
  - Improving the understanding by Aboriginal groups of the proposed project and its objectives; and
  - Assisting to understand the interests and concerns of those living in the affected area. With this understanding, practical strategies for maximizing positive impacts, while mitigating possible negative consequences, can be developed.

## KEY REQUIREMENTS

- ***Canadian Environmental Assessment Act***

- Federal decision maker must determine environmental affect and mitigation
  - “Environmental affect” includes affects on:
    - physical and cultural heritage
    - current use of lands and resources for traditional purposes by Aboriginal persons
    - anything of historical, archaeological significance
  - “Major projects” require an Aboriginal consultation and engagement work plan.
- **Ontario’s Environmental Assessment Act**
  - Obligation to consult with interested parties, including Aboriginal Communities, in developing Terms of Reference.
  - Terms of Reference will set out consultation during preparation of the environmental assessment.
- **Planning Act**
  - First Nations are “public bodies” for the purpose of the *Planning Act*.
  - Minister may require consultation with public bodies on policy statements, by-laws, subdivision agreements, OP policies.
  - Specifies that plans of subdivision and applications within one kilometre of a First Nation require circulation to that Nation for comment.
- **Cemeteries Act**
  - Recognizes Aboriginal burial sites and prescribes steps to be taken upon discovery of human remains.
  - Site disposition agreement to be negotiated between proponent and affected Aboriginal Community.
- **Heritage Act**
  - Proposed new standards and guidelines will require Aboriginal engagement in archaeology.

## IMPLEMENTATION/ STRATEGIES AT CONSTRUCTION

- **General Approach**
  - Obligations and actions that are necessary to comply with the requirements described above should have been identified by the project owner and clearly communicated in the tender documents and contract.
  - The project owner should disclose and incorporate into the contract any requirements for First Nations communication or engagement. Review the contract carefully, and contact the owner if you have questions about engagement obligations, or if the requirements and expectations are unclear.
  - As a contractor, consult with project owner at construction planning stage to confirm understanding / awareness of First Nations considerations, and status of requirements. Understand your role, requirements, and expectations of owners.

- **Respect First Nations Rights**
  - You should also be aware that many First Nations communities either have or assert rights to hunt animals in their traditional territories. These territories often include lands and waters outside of a First Nations reserve. As well, in some instances, project work may be conducted in close proximity to archaeological and burial sites. Aboriginal communities with an interest in such sites may include communities other than those in the vicinity of the proposed project. Consult with the project owner if you have questions about First Nations access rights or the presence of archeological and burial sites.
- **Develop a First Nations Engagement Protocol (if applicable)**
  - It is possible that the project may require the development and implementation of an engagement protocol. A First Nations Consultation Program is used to:
    - Provide information to build project awareness and understanding
    - Facilitate involvement in project assessment and review
    - Allow for input regarding potential aboriginal interests in the project area
    - Identify potential aboriginal interests and, where possible, mitigate or accommodate First Nations concerns
  - The primary purposes of Engagement Programs are to provide relevant information on the project; to actively listen and ascertain a clear understanding of the issues and concerns identified by Aboriginal people; and to work towards concluding formal agreements with affected Aboriginal communities. Some key factors for successful Aboriginal engagement include:
    - Mutual respect among parties;
    - Effective and transparent communication and information sharing between parties;
    - Commitment to the engagement process by parties;
    - Development of capacity for sustainable engagement throughout the entirety of the project;
    - Clear, open and flexible engagement plans; and,
    - A clear understanding of the values and social, economic, and political structures of the individual Aboriginal communities.

## REFERENCES

- MTO's Aboriginal Relations Unit First Nations Communications Toolkit, <http://www.aadnc-aandc.gc.ca/eng/1100100021860/1100100021862>
- MTO's Aboriginal Procurement Pilot Overview
- AANDC Public Information Status Report webpage, <http://www.aadnc-aandc.gc.ca/eng/1100100030294/1100100030295>
- Ontario Ministry of Aboriginal Affairs's Aboriginal Procurement Pilot program, <http://www.aboriginalaffairs.gov.on.ca/english/economy/procurement.asp>





# COMMUNITY RELATIONS: Archaeological Artifacts

CR-2

## PURPOSE

- The purpose of this section is to describe general requirements when working on lands containing archeological resources or areas of archaeological potential.
- Ontario has a long cultural history that begins approximately 11,000 years ago with the first settlers. The archaeological sites that are the physical remains of this lengthy settlement history represent a fragile and non-renewable cultural heritage resource. Cultural heritage and archaeological resources are valued for the important contribution they make to our understanding of the history of a place, an event, or a people.
- Archaeological resources: includes artifacts, archaeological sites and marine archaeological sites.
- Areas of archaeological potential: means areas with the likelihood to contain archaeological resources.

## APPLICABILITY

- The location of highway elements such as interchanges, lanes, temporary/ access roads, bridges and culverts, and traffic and noise barriers can encroach on areas of archaeological significance. Highway construction activities such as grubbing, excavations or erosion of soils may unearth or bury valuable artifacts.
- Encroaching upon a site of archaeological resources may also result in the loss or improper handling of potentially reverent artifacts.
- Protecting archaeological sites has become especially important in southern Ontario, where landscape change has been occurring at an ever increasing rate since 1950, resulting in substantial losses to the archaeological record.
  - The MTO ensures that archaeological surveys are undertaken in advance of all new road construction in order to ensure that no archaeological sites will be knowingly damaged or destroyed.

## KEY REQUIREMENTS

- **Ontario's Heritage Act** (O.Reg. 170/04)
  1. In terms of direct conservation and protection, the lead provincial government role has been by the Ministry of Culture (MCL).
  2. The Minister is responsible for encouraging the sharing of cultural heritage and for determining policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario.

3. Also responsible for issuing archaeological licenses to qualified individuals, without which archaeological activities involving exploration, survey or field work are illegal.

- **Planning Act and Provincial Policy Statement**

1. Development and site alteration shall only be permitted on lands containing archaeological resources or areas of archaeological potential if the significant archaeological resources have been conserved by removal and documentation, or by preservation on site.
2. Where significant archaeological resources must be preserved on site, only development and site alteration which maintain the heritage integrity of the site will be permitted.
3. Thus all decisions made during the development process must address potential heritage resource impacts.

- **Ontario's Environmental Assessment Act**

1. Applies to public sector and designated private sector projects (major projects).
2. Requires the preparation of an environmental assessment document, containing inventories, alternatives, evaluations and mitigation. It is subject to formal government review and public scrutiny, and potentially, to a tribunal hearing.

- **Ontario's Cemeteries Act**

1. Addresses the need to protect human burials, both marked and unmarked.
2. Burial locations uncovered on sites constitute "unregistered cemeteries" that are in violation of the Act.
3. Further investigation will be required to define the extent and number of interments, and either the registration of the burial location as a cemetery, or the removal of the remains for re-interment in an established cemetery.

## **IMPLEMENTATION/ STRATEGIES**

- Be mindful when working in or near areas of known archaeological sites. Reduce the footprint of the highway through flexibility in highway design standards.
- Indicate known/ suspected locations of archeological/ cultural heritage on the project site map.
- Ensure temporary protection practices during construction such as fencing, monitoring by an archaeologist, and restricting access by the contractor.
- Include awareness of archeological/ cultural heritage impacts during orientation or toolbox meetings.
- A site survey may be required, depending on the requirements of MCL or under contract obligations.
- Contractors may on occasion, through private arrangements, use areas outside of the contract limits. These areas may not have been through the archaeological assessment process. The contractor must be made aware that land-disturbance or capping activities can have impacts to archaeological resources and that archaeological clearance of the areas must be obtained from MCL.



- The following Management Practices should be followed in the event cultural heritage resources are found or suspected in your area of work:
  1. **Immediately stop work** when human remains or archaeological artifacts are uncovered on a development site to prevent damage to or destruction of the resources.
  2. Report to the project supervisor/ person-in-charge of the suspected finding.
  3. Project supervisor/ person-in-charge report to the appropriate bodies (e.g., Ministry of Culture)
  4. If required, work with the Ministry of Culture to develop a mitigation strategy.

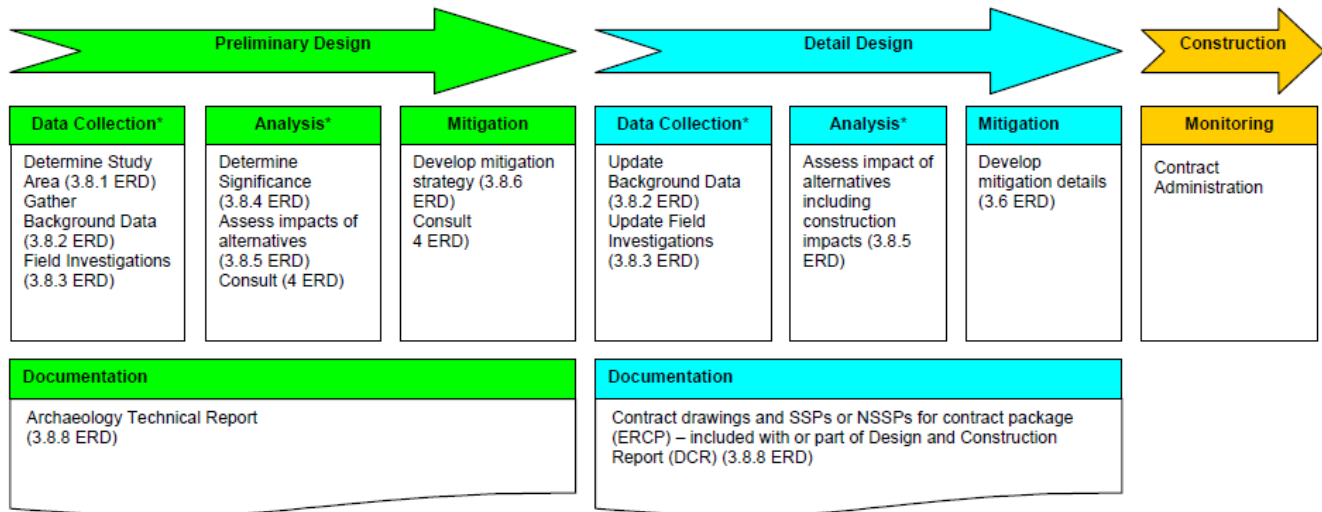
## REFERENCES

- MTO's Archaeology Environmental Standards and Practices User Guide
- MTO's Built Heritage and Cultural Heritage Landscapes Environmental Standards and Practices User Guide

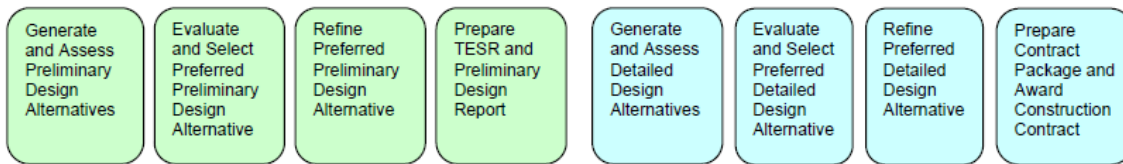
## COMMUNITY RELATIONS

☑	Checklist	Comments
<b>First Nations</b>		
	If applicable, have all relevant First Nations consultation documents and agreements been reviewed?	
	Have workers been trained to recognize any Aboriginal burial sites and the resulting stop work/ notification process?	
<b>Archaeological Artifacts</b>		
	Have all archaeological survey reports for the project site been reviewed?	
	Is there a site map highlighting known/ suspected locations of archeological/ cultural heritage designated in contract?	
	Have all workers been trained to recognize any significant archaeological/ burial sites and required stop work and notification procedures?	
	If required, has a site survey been conducted?	
	If required, are all temporary protection measures and practices (e.g., fencing) monitored daily?	

# Appendix F: Incorporating Archaeology Assessment & Mitigation into the Transportation Project Design and Construction Process



## Environmental Assessment Process



ERD refers to MTO's Environmental Reference for Highway Design.

\*denotes that activities undertaken in the various steps can differ depending on the project. See MTO's ERD section 2 for details on various options.

(Source: MTO's Archaeology Environmental Standards and Practices User Guide)