
# Waterfront Toronto
# Environmental Management Plan
# for Project-Related Activities

**January 2009**

# EXECUTIVE SUMMARY

This **Environmental Management Plan** (EMP) describes processes and procedures designed to mitigate environmental effects that might result from project-related activities in the Waterfront Toronto (WT) Development Area. It supports WT's Sustainability Framework, 2005 through the establishment of measures to prevent pollution and environmental impairment, preserve cultural and natural resources, protect wildlife habitat and ensure compliance with applicable legislation, regulations, policies and guidelines.

A key component of this EMP is the series of **Environmental Protection Plans** (EPPs) included within it. EPPs are included for:

- Air Quality and Dust Management
- Archaeological and Built Heritage Resources Management
- Contaminated Soils Management
- Erosion and Sediment Control
- Fuel and Lubricants Management
- Groundwater Management
- Methane Control
- Noise and Vibration Management
- Project-related Waste Management
- Stormwater / Surface Water Management
- Traffic Management
- Vegetation Management
- Wildlife Management

These EPPs are tailored to various types of projects likely to be carried out by WT and are generalized for these various applications That may include:

- Works In or Adjacent to Water
- Infrastructure Servicing and Utilities
- Development of Parks and Open Spaces, and
- Site Development Works.

In more sensitive areas (resulting from specific or unique conditions), site-specific EPPs may be required. Each EPP includes:

- A description of the environmental concerns and regulatory framework
- An outline of the activities or conditions that would cause the EPP to be invoked
- Details of planning and design considerations, and
- Maintenance and monitoring programs.

**Contingency and Emergency Response Plans** are also included in this EMP. These plans are necessary to address and ameliorate any consequences of unintended occurrences such as operational upsets and malfunctions. These contingencies are critical and are to be put in place before proceeding with WT projects.

All WT projects must comply with applicable regulatory requirements set out in legislation, regulations, policies, guidelines, bylaws and codes that are administered through various agencies/pubic bodies at the federal, provincial and municipal levels. Applicable requirements for WT projects are identified and discussed in this EMP and the specific EPPs set out in Section 7. Effort has been made to provide a comprehensive summary of current regulatory requirements that may apply to WT project-related activities. However, these rules may be deleted, amended or replaced at any point. It is the responsibility of construction contractors and their on-site personnel to be aware of applicable requirements and any changes that may occur. WT recommends that a review of current regulatory requirements be conducted prior to project initiation for compliance purposes and to ensure that sound management and practices are in place.

The implementation of this EMP and the EPPs is the responsibility of all parties involved in WT project-related activities. To this end, applicable general EPPs and project-specific EPPs are to be identified at the design and tender stages of contracts. Construction contractors must implement EPPs as part of their responsibility for ensuring sound environmental practices and safeguards, good housekeeping on-site, training employees in their responsibilities and keeping good records. Staff from WT and other responsible parties that are associated with each project within the WT Development Area are responsible for ensuring compliance, monitoring and documenting the effective implementation of the EPPs, along with any requirements for reporting to WT. This can be achieved through the use of technical experts and consultants to manage the environmental aspects of projects.

The EPPs describe maintenance and monitoring measures for the purpose of tracking compliance with the relevant legislation, regulations, standards, by-laws and policies. The EPP compliance tracking system draws on the monitoring and maintenance requirements for each of the EPPs that apply to active projects. Components of the tracking system will include:

- Compliance monitoring and reporting by construction contractors
- Oversight (third-party) compliance monitoring and reporting by appropriate technical experts
- Regular inspections, and
- Reporting on compliance with the EMP to or by WT or other responsible parties.

# LIST OF ACRONYMS

| | |
|---|---|
| **ACMS** | Archaeological Conservation and Management Strategy |
| **C of A** | Certificate of Approval |
| **CEPA** | Canadian Environmental Protection Plan |
| **DFO** | Department of Fisheries and Oceans |
| **EC** | Environment Canada |
| **EMP** | Environmental Management Plan |
| **EPA** | *Environmental Protection Act* |
| **EPP** | Environmental Protection Plan |
| **HADD** | Harmful alteration, disruption or destruction |
| **LEED NC** | Leadership in Energy and Environmental Design For New Construction |
| **LEED ND** | Leadership in Energy and Environmental Design For Neighbourhood Development |
| **MOE** | Ontario Ministry of the Environment |
| **MNR** | Ontario Ministry of Natural Resources |
| **MSDS** | Material Safety Data Sheet |
| **OWRA** | *Ontario Water Resources Act* |
| **TPH** | Toronto Public Health |
| **TRCA** | Toronto and Region Conservation Authority |
| **WHMIS** | Workplace Hazardous Material Information System |
| **WT** | Waterfront Toronto |

# TABLE OF CONTENTS

*SECTION* *PAGE*

## APPENDICES



## LIST OF FIGURES



## LIST OF TABLES

# 1.0 PURPOSE AND SCOPE OF THE EMP

This **Environmental Management Plan** (EMP) describes processes and procedures designed to mitigate environmental effects that might result from project-related activities in the Waterfront Toronto (WT) Development Area. It provides the framework for establishing environmental priorities, identifying potential risks, complying with industry and regulatory standards and it defines responsibilities of the various parties in WT project-related activities.

This EMP supports WT's Sustainability Framework, 2005[1] through the establishment of measures to prevent pollution and environmental impairment, preserve cultural and natural resources, protect wildlife habitat and ensure compliance with applicable legislation, regulations, policies and guidelines.

A key component of this EMP is the series of **Environmental Protection Plans** (EPPs) included in Section 7. These EPPs are tailored to various types of projects likely to be carried out in the WT Development Area and are generalized for these various applications. In sensitive areas with specific or unique conditions, site-specific EPPs may be required.

**Contingency and Emergency Response Plans** (Section 8) are also included in this EMP. These plans are necessary to address and ameliorate any consequences of unintended occurrences such as operational upsets and malfunctions. Such contingencies are crucial to effective environmental management and are to be put into place by the identified responsible parties before proceeding with WT projects.

[1] Waterfront Toronto (formerly Toronto Waterfront Revitalization Corporation), July 2005. *Sustainability Framework*.

# 2.0 PROJECTS AND ACTIVITIES SUBJECT TO THE EMP

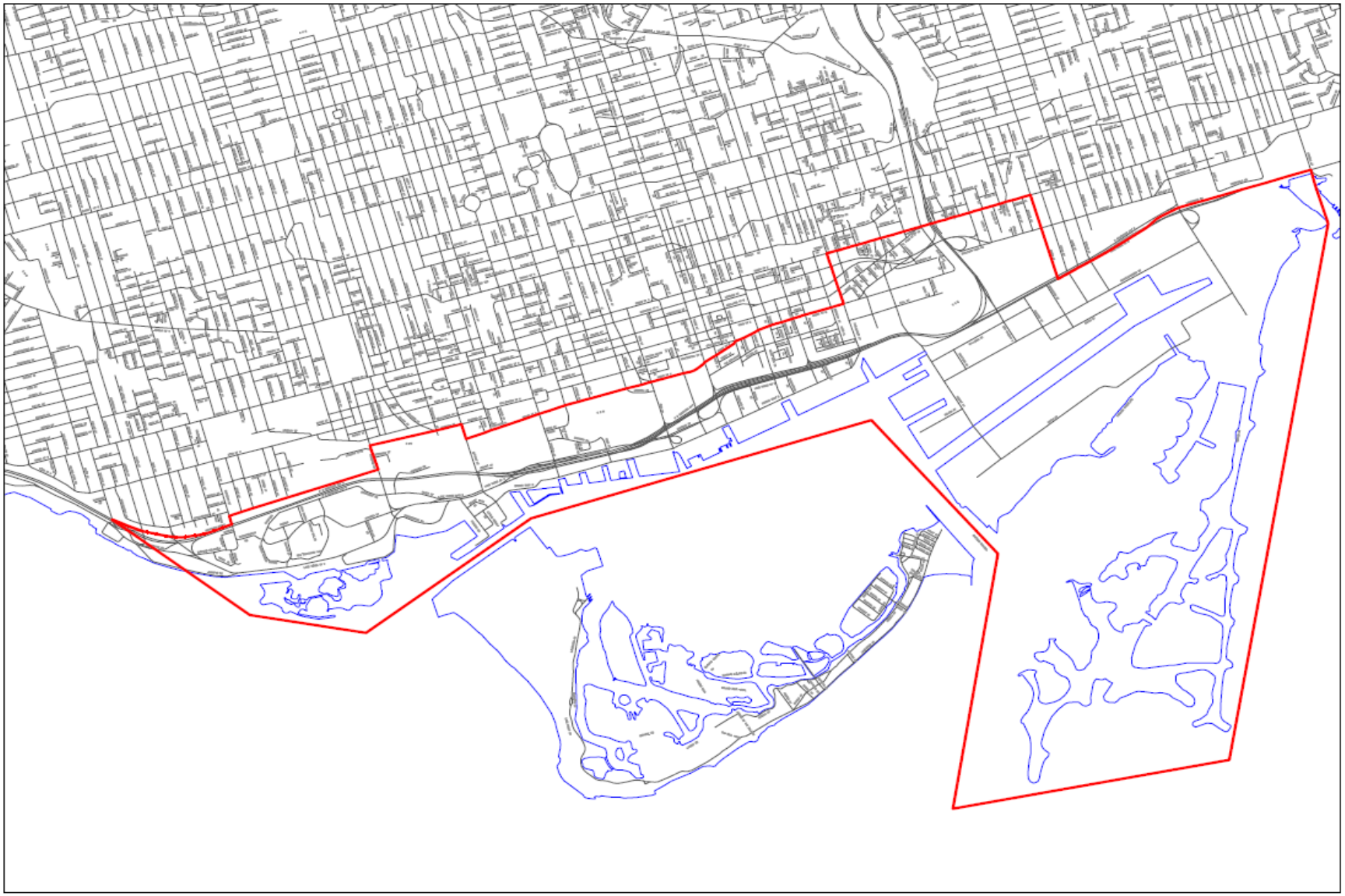
Projects and activities subject to this EMP are located in the **WT Development Area** (Figure 1) which is comprised of the following lands or activities:

- **West Don Lands** – north of the rail corridor and south of King Street East, between Parliament Street (west side) and the Don Valley Parkway (east side)
- **East Bay Front Lands** – from Lake Ontario to the rail corridor, between Jarvis Street (west side) and Parliament Street (east side)
- **Central Waterfront Lands** – from Lake Ontario north to Queen's Quay Boulevard and from Bathurst Street (west side) to Jarvis Street (east side) and projects beyond these boundaries associated with the Martin Goodman trail
- **Lower Don Lands** – from the rail corridor (north side) to the ship channel (south side) and from Parliament slip / Inner Harbour (west side) to the Don Roadway (east side)
- **Lake Ontario Park** – from Unwin Avenue (north side) to the outer harbour (south side) and from the inner harbour (west side) to Leslie Street (east side), and
- **Beautification Projects or Activities** – throughout the WT Development Area.

The project categories anticipated in the WT Development Area include:

- **Works In or Adjacent to Water** that may include dock wall repair in the Central Waterfront Lands, trail construction through the East Bay Front Lands and earthworks at Lake Ontario Park
- **Infrastructure Servicing and Utilities** that may include installation of underground services, construction of stormwater management facilities, tunnelling for the district energy project and transit improvements, extension of the LRT and road construction
- **Development of Parks and Open Spaces** that may include trail construction, landscaping and stormwater management, and
- **Site Development Works** that may include buildings, public spaces, park structures and infrastructure.

**Figure 1. Waterfront Toronto Development Area**



# 3.0 SUSTAINABLE WATERFRONT REVITALIZATION

WT's central mandate is to ensure the sustainable development and revitalization of approximately 800 hectares (or 2,000 acres) of waterfront property adjacent to Toronto's downtown core. Through its key policy document, Sustainability Framework, 2005, WT's sustainable principles are integrated into all projects within the WT Development Area.

In addition, as part of its waterfront revitalization efforts, WT requires all buildings to achieve *LEED*® (Leadership in Energy and Environmental Design) Gold certification as set out in the corporation's Mandatory Green Building Requirements. Waterfront Toronto has also achieved Stage 1 Gold certification through the *LEED*® for Neighbourhood Development (ND) pilot program with the US Green Building Council. The protocols outlined in this EMP consider these requirements to assist proponents in the inclusion of *LEED*® in all design and construction projects. Specific documentation requirements for construction related *LEED*® for Neighbourhood Development (ND) credits are outlined in this EMP. *LEED*® NC documentation will be collected under a separate protocol outlined by individual developers for buildings.

The Sustainability Framework, 2005 describes 11 interrelated themes that focus sustainable actions for WT projects. Each theme is accompanied by objectives, actions and targets to achieve WT's sustainability goals. The sustainability themes are:

1. Energy
2. Land Use
3. Transportation
4. Sustainable Buildings
5. Air Quality
6. Human Communities
7. Cultural Resources
8. Natural Heritage
9. Water
10. Materials and Waste
11. Innovation

The objectives of each theme may be applicable at any stage of development. However, three themes are of particular relevance to the construction and implementation stages of WT projects: Air Quality, Water, and Materials and Waste. Each is profiled in the sub-sections that follow. In this respect, this EMP includes specific measures to reduce environmental impacts associated with these themes.

## 3.1 Air Quality

Air pollutants contribute to an estimated 1,700 premature deaths and 6,000 increased hospital admissions each year in Toronto[2]. The EPP relating to Air Quality and Dust Management (Section 7.1) provides measures intended to control the generation of airborne particulates at project sites in the WT Development Area. The Fuel and Lubricants Management EPP (Section 7.5) and Project-Related Waste Management EPP (Section 7.9) describe means to reduce the release of other potentially harmful pollutants into the atmosphere.

[2] Toronto Public Health, 2004. *Air Pollution Burden of Illness in Toronto*.

## 3.2 Water

The EPP for Erosion and Sediment Control (Section 7.4) provides for protection against the transport of soil and particulates to water bodies that may occur during project-related activities. The Fuel and Lubricants Management EPP (Section 7.5) also provides means for control of spills and leaks which could result in impacts to groundwater and adjacent water bodies.

In some situations, past industrial activities on the waterfront lands have contributed to the degradation of groundwater quality. The EPPs for Contaminated Soils Management (Section 7.3) and for Groundwater Management (Section 7.6) are intended to reduce the potential for further degradation of the groundwater as well as to minimize potential migration of contaminated groundwater.

Further to this, the reduction and prevention of negative impacts on water in the EPPs for Erosion and Sediment Control, Contaminated Soils Management, and Stormwater/Surface Water Management (Section 7.10) must comply with the commitments set out in *LEED*® NC. Specifics regarding the requirements are discussed in each EPP.

## 3.3 Material and Waste

The EPP for Project-Related Waste Management (Section 7.9) requires that an integrated **Waste Management Plan** be prepared for demolition and construction projects. The measures incorporated into the Waste Management Plan are intended to minimize waste generation and to ensure the proper handling and disposal of waste from projects.

Further to this, construction waste management must comply with the commitments set out in WT's *LEED*® ND (Neighbourhood Development) Program. Specifics regarding the requirements are discussed in the EPP for Project-Related Waste Management.

# 4.0 APPLICABLE REGULATORY REQUIREMENTS

In addition to the WT requirements for sustainability and *LEED*® compliance, all WT projects must comply with the applicable requirements of legislation, regulations, policies and guidelines administered through federal, provincial and municipal jurisdictions. Appendix A presents a compilation of applicable environmental regulatory requirements for WT projects and identifies the EPPs relevant to each. Although this represents a comprehensive summary of current environmental regulations, it may be that other regulations also apply to WT project-related activities and the cited requirements may change.

The Toronto Green Development Standard (TGDS) is not mandatory through this EMP, but are applicable when city planning or other approvals trigger them. References in this document encourage best practice and coordination where the TGDS is applicable.

Accordingly, it is important that responsible parties, designers, consultants and construction contractors review project-related requirements at the start of and during WT projects to ensure that the regulatory requirements, including any project-specific permits are considered throughout the implementation of the project.

# 5.0 ROLES AND RESPONSIBILITIES

The implementation of this EMP is the responsibility of all parties involved in WT project-related activities in WT's Development Area. The responsible party may be WT, a development partner or an eligible recipient organization, such as TTC, TRCA or others. For those projects where WT is not the directly responsible party, implementation of the EMP will be monitored by those that are.

To ensure the EMP is implemented, applicable general EPPs and project-specific EPPs are to be identified at the design and tender stages of projects. Project managers for the responsible party will retain necessary technical expertise and implement a compliance tracking system that includes key components such as:

- monitoring and documentation
- where appropriate, third party oversight
- regular inspections, and
- reporting compliance to WT.

The technical experts such as designers and consultants retained by the responsible party are required to implement EPPs as part of their responsibilities. This may include the preparation of project specific EPPs when generic EPPs do not adequately address site sensitivities and the inclusion of EPP protocols in technical specifications for the project. The EMP and project specific EPPs must be included in tender packages.

The tender package and resulting contract documents reference the EMP and require construction contractors to implement the most stringent requirements of the EMP or technical specifications for the work.

Table 1 sets out the basic roles of WT, development partners, eligible recipients, designers, consultants and construction contractors. Some of these roles may vary, depending on land ownership and/or who controls the project and its activities.

**Table 1. Basic Roles and Responsibilities for Implementation of an EPP**

| Party | General Role and Responsibility | Stages of Development | | |
|---|---|---|---|---|
| | | Planning and Design | Implementation | Documentation |
| Waterfront Toronto | Communicate the requirements of the EMP to involved parties and ensure that the EMP is considered at the preliminary stages for all projects in the WT Development Area.<br>Monitor implementation of EMP by development partners and eligible recipients. | Assist in identifying EPPs that may apply for each project to the parties involved at the design stage (i.e., partners, designers, and consultants).<br>Include references to EPP requirements in tender and contract documents.<br>Identify sensitive projects that may require project-specific EPPs. | Where appropriate, review and update compliance tracking documentation for active projects.<br>Where appropriate, identify successes and deficiencies to designers, consultants and contractors to improve on implementation of the EMP and EPPs. | Prepare project closure documentation recording compliance with EPP maintenance and monitoring requirements. |
| Development Partners and Eligible Recipients | Adhere to the WT EMP or to a more stringent non-WT EMP (demonstrated to WT).<br>Coordinate implementation of the EMP on joint projects.<br>Communicate compliance to WT. | Comply with applicable EPPs and include references to EPP requirements in external tender and contract documents. | Maintain communication with WT for the tracking of compliance.<br>Ensure external parties are complying with implementation and tracking requirements. | Prepare project closure documentation for areas under direct control of the partner. |
| Designers, and Consultants | Consider the requirements of the EMP in the design and implementation of project-related activities. | Identify and incorporate all EPP requirements into scopes of work for investigations and in technical specifications.<br>Prepare project-specific EPPs and monitoring programs as required.<br>Communicate compliance to WT.<br>Communicate requirements to contractors and other related project consultants. | Monitor compliance with EPPs at active sites and provide interim documentation to WT , along with recommendations for improvements in mitigation and tracking. | Prepare project closure documentation recording compliance with EPP maintenance and monitoring requirements. |
| Construction Contractors | Review and implement the EMP/EPP requirements for all contracts and provide appropriately trained staff and any necessary training and education. | Include EPP requirements in their bid and assign qualified staff to implement the project EPPs.<br>Communicate compliance to contract administrators and WT. | Ensure requirements of EPPs are effectively met.<br>Record compliance with EPPs maintenance and monitoring programs.<br>Communicate compliance to contract administrators and WT. | Submit required contract documentation to record compliance with EPP maintenance and monitoring. |

# 6.0 EMP COMPLIANCE ASSESSMENT

Initiatives and projects will be assessed by the responsible party for compliance with the EMP. Where appropriate, quantitative markers representing actual measurements or observations are defined in the EPPs to assist in compliance monitoring. Where quantitative measurements are not feasible (e.g., real-time measurement of airborne particulate at a construction site), qualitative markers (e.g., visual evidence of dust) are used. It is preferred to record compliance with real-time measurements or observations rather than documenting non-compliance, after the fact.

The EPPs describe maintenance and monitoring measures for the purpose of tracking compliance with the relevant legislation, regulations, standards, by-laws and policies. It is intended that the responsible party include the EMP in tender packages and contract specifications and that the EMP be implemented by the successful construction contractor for the duration of the contract. Compliance tracking will be undertaken by the responsible parties and their consultants to ensure that contract requirements are being met. Construction contractors are responsible for retaining staff qualified in the appropriate form of monitoring at the site and for ensuring compliance with contract requirements.

For example, Ontario regulations prohibit the release of air pollutants that may affect or damage adjacent properties. This could include odorous emissions or excessive dust during demolition, excavation or construction. The Air Quality and Dust Management EPP requires construction contractors' site personnel to monitor air quality at the site on a regular basis and implement dust control measures to prevent unacceptable emissions. Depending on the sensitivity of the surrounding area and the types of contaminants that may be anticipated during the works, regular monitoring may consist of hourly or daily site inspections or perimeter sampling. In addition, the contract administrator retained by the responsible party would monitor air quality compliance through a review of reports prepared by the construction contractor and periodic site observations.

For works at some sites, more aggressive monitoring may be needed (e.g., sensitive environmental conditions on adjacent lands). In these circumstances, additional EPPs focussed on the issues at hand are to be prepared to reflect site-specific conditions. The site-specific EPPs would typically be prepared by designers and consultants retained by the responsible party and would form part of the technical specification package on which the contract is based. For very sensitive sites, a dedicated Environmental Monitor may be assigned to a project by the responsible party. Provisions for this added monitoring are included in the EPPs.

An effective tracking system for EPP compliance includes a requirement to demonstrate and document that a project is not contributing to adverse environmental effects. The tracking system will draw on the monitoring and maintenance requirements for each of the EPPs that apply to active projects. Components of a tracking system include:

- **Compliance monitoring and reporting** by construction contractors. Monthly reports are typically used to record waste diversion measurements, compliance with air quality, erosion control and noise emission requirements, and records of spills. Although these observations are compiled in monthly reports, observations and record keeping are typically conducted on a daily or weekly basis.

- **Oversight (third-party) compliance monitoring and reporting** by consultants retained by the responsible party for issues such as archaeological and heritage resource management, groundwater management, soil management and hazardous materials management. Typical reports consist of a single report for each project, at the start of the project, to document project closure, or both. On-going monitoring may be conducted throughout the project, to support the preparation of a project closure report.
- **Regular inspections and summary reports** by responsible parties to document compliance with the EMP. Based on the findings of regular inspections, targets for compliance may be reviewed and revised by WT.

# 7.0 ENVIRONMENTAL PROTECTION PLANS

EPPs are designed to eliminate or reduce the effects of project-related activities on the environment. The EPPs included in this section are tailored to the types of activities likely to be carried out in the WT Development Area. They are described to an appropriate level of generalized application and form the basic conditions from which more project-specific EPPs can be developed as unique conditions may require.

EPPs in this section address:

7.1 Air Quality and Dust Management
7.2 Archaeological and Built Heritage Resources Management
7.3 Contaminated Soils Management
7.4 Erosion and Sediment Control
7.5 Fuel and Lubricants Management
7.6 Groundwater Management
7.7 Methane Control
7.8 Noise and Vibration Management
7.9 Project-related Waste Management
7.10 Stormwater / Surface Water Management
7.11 Traffic Management
7.12 Vegetation Management
7.13 Wildlife Management

Each EPP includes:

- A description of the environmental concerns and regulatory framework associated with the subject
- An outline of the activities or conditions that would cause the EPP to be invoked and how the EPP is to be applied
- Details of design and implementation considerations, and
- Maintenance and monitoring programs.

**Appendix A** presents a summary of applicable regulatory requirements for WT projects and identifies the EPPs relevant to each while **Appendix B** presents a summary of applicable regulatory agency contacts for WT projects along with associated EPPs where these contacts may be applicable. As regulations and contact information can change, all parties should review the appended information and ensure up-to-date information is included in project documentation.

## 7.1 Air Quality and Dust Management

### *7.1.1 Environmental Concerns*

Environmental effects on air quality associated with airborne particulate typically correlate with periods of dry weather and windy atmospheric conditions. Dust emissions result from the handling of soils or aggregates, vehicle traffic on roadways and cutting, sanding and grinding associated with construction. Engine exhaust emissions may also contribute to atmospheric degradation in the vicinity of construction projects, especially in terms of very fine particulate associated with internal combustion.

Dust and other contaminants that degrade air quality can be irritants for occupants or users both on the site and on adjacent properties. Project-related dust can include contaminants such as metals and organic contaminants that bind to the soil particles and airborne emissions may contribute to adverse health effects, particularly for those individuals susceptible to breathing ailments. Dust and other airborne contaminants can be mitigated through good management practices and standard dust control measures such as misting, sweeping and tarping of materials and control of traffic routes and speeds. The effectiveness of dust control measures can be monitored visually or through air sampling.

### *7.1.2 Regulatory Framework*

Most project-related activities are governed by provincial and municipal regulations and by-laws. No federal legislation specifically addresses air quality and dust management on project sites but mitigation measures identified in project-related Environmental Assessments, both federal and provincial, may apply to air quality and dust management.

Construction projects are exempt from the provincial requirement under the *Environmental Protection Act (EPA)* to obtain a Certificate of Approval (C of A) for air and noise emissions. However, the requirements of Ontario Regulation 419/05 Air Pollution – Local Air Quality do apply. This regulation requires that emissions to the atmosphere be controlled to prevent discomfort to persons, loss of enjoyment of normal use of property, interference with normal business operations or damage to property. For construction projects, airborne contaminants including chemicals and particulate, must not be dispersed beyond the limits of the property unless every step necessary to control the emission of the contaminant is implemented.

In addition, the Toronto Green Development Standard provides an integrated set of targets, principles, and practices to encourage sustainable development. A completed Toronto Green Standard checklist may be required as part of the planning approval process. With respect to this EPP, the TGDS encourages the creation of an air and dust emissions control plan for construction activity in order to minimize air pollution from construction and demolition.

### *7.1.3 Causative Activities and Conditions*

Demolition, earthworks and construction activities (including blasting or mechanical demolition activities, excavation, transport and placement and grading of soil and similar materials, and cutting, sanding or grinding during construction) are the main activities that can contribute to poor air quality and dust generation.

In addition, during the warmer months of the year, the heat and sunlight can react with gases and fine particles in the air around the downtown waterfront area which may lead to a smog alert issued by the City of Toronto. Smog can worsen heart problems, asthma, bronchitis and other lung problems. It reduces lung function in healthy people and can also be an irritation for eyes, nose and throat. During smog alerts, added controls may be necessary for the management of air quality and dust generation.

### *7.1.4 Application*

Air quality and dust control measures are to be applied at all project sites or associated area (e.g., transport route) where causative activities or conditions can occur. Adequate dust control measures are to be in place prior to the initiation of work in order to prevent the uncontrolled generation of dust as well as to minimize a project's effect on the creation of smog.

### *7.1.5 Design and Implementation Considerations*

For most sites, dust controls address the potential for release of other air pollutants as well. Toronto Public Health may be consulted during the preparation of dust control plans to ensure methods adequately mitigate the potential for health effects from the generation of dust during demolition and construction activities. To prevent the emission of dust and other pollutants into the atmosphere, the following environmental control measures are to be implemented where applicable:

- On-site vehicle and equipment idling is to be discouraged and where practical, limited
- Dust generation from construction and demolition activities, storage piles and exposed soils/surfaces is to be controlled through the use of water sprays or similar techniques
- Tracking of earth or soil from the site on trucks is to be minimized through the use of mud mats (e.g., granular pads located at site entrance). Where a mud mat is not effective in controlling the tracking of earth or soil onto adjacent roads, the physical removal of earth from vehicles is to be implemented
- Vehicles hauling soil, aggregates or fine or dusty material are to be covered to minimize the generation of dust
- Construction activities are to be scheduled and planned to limit areas of soil exposed at any given time
- Exposed soil areas and adjacent roads are to be monitored for dust generation potential, with attention paid to areas used for pedestrian walkways and vehicle traffic
- On-site (including roadways) flushing, sweeping and cleaning are to be performed on a regular basis, with consideration for the containment and management of any wash water
- Exposed fill/stock piles that may be a source of fugitive dust are to be covered with tarpaulins, soil binders or other appropriate means, where practical
- Soil surfaces are to be restored and re-vegetated as soon as possible
- Construction activities such as cutting and grinding are to be scheduled and planned to limit the release of dust and noise to adjacent properties

- Transportation and delivery of construction materials are to be scheduled to minimize the amount of bulk construction materials stored on-site at a given time, and
- Speed limits within the site are to be 20 km/h to control dust generation.

The above noted design considerations are consistent with the requirements for *LEED*®NC Sustainable Sites Prerequisite 1, Erosion and Sedimentation Control, which provides objectives for preventing dust and particulate matter from polluting the air through the design of sediment and erosion control plans (see Section 7.4).

If workers experience symptoms such as coughing, wheezing, chest tightness and/or difficulty breathing, in particular on smog alert days, they should:

- Reduce their activity level and check the Air Quality Health Index (http://www.weatheroffice.gc.ca/airquality/pages/onaq-001_e.html) to find out how best to protect their health
- Drink plenty of water and take breaks preferably in the shade or in an air-conditioned area, and
- Contact their physician or go to the nearest hospital if further concerns about their condition arise.

### *7.1.6 Maintenance and Monitoring*

Dust control is to be monitored regularly by the construction contractor who is responsible for compliance with project specifications. At minimum, observations of compliance with air quality and dust control objectives are to be recorded in daily logs for the site.

Where there is a potential for impacts to air quality, a site-specific EPP may prescribe that an Environmental Monitor be assigned by WT or other responsible party to evaluate, audit and monitor the control measures and report any measures that are being improperly implemented or that are ineffective. For example, project sites that involve the handling of severely contaminated soil may require additional monitoring, including the collection and analysis of air samples at the property boundary to quantitatively demonstrate compliance. Measurement parameters such as the frequency of sampling or monitoring and the device used for measurements (e.g., Hi-Vol samplers) are to be determined on a project-specific basis and detailed in consultation with an air quality specialist.

Where air quality and dust management mitigation measures are ineffective or if the construction contractor is not in compliance with prescribed control measures, work on the project is to be suspended until a review of mitigation measures is completed and issues are resolved.

The City of Toronto Air Quality Information Line provides daily information on the smog alert status for the City. Construction contractors and susceptible individuals should call 416-338-SMOG (7664) for the most up-to-date information especially during smog alert days. In addition, the Air Quality Health Index (http://www.weatheroffice.gc.ca/airquality/pages/onaq-001_e.html) provides current and forecast measures of air quality in terms of health and should be checked regularly by the individual susceptible to smog.

### *7.1.7 References*

City of Toronto Public Health: Air Quality, Smog. 2008. http://www.toronto.ca/health/airquality/smog/index.htm

City of Toronto. 2007. *The Toronto Green Development Standard, January 2007.*

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

Health Canada. 2004. *Canadian Handbook on Health Impact Assessment – Volume 4: Health Impacts By Industry Sector, Section 3.1.3 Pollution Caused by Vehicle Traffic*

Ontario Regulation 419/05 Air Pollution – Local Air Quality of the *EPA*

## 7.2 Archaeological and Built Heritage Resource Management

### *7.2.1 Environmental Concerns*

The history of Toronto's waterfront is rich and varied and presents a unique opportunity for the presence of archaeological and built heritage resources. Although the majority of the lands that constitute the WT Development Area are comprised of landfill, other resources such as industrial or marine resources (i.e., wharf features and structures) may be found as deeply buried deposits when carrying out project-related activities. Any evidence of pre-contact (aboriginal) occupation along the original shoreline has likely been destroyed or submerged through the shifting water levels of Lake Ontario, combined with the intensity of nineteenth and twentieth-century land use. However, these deposits may still exist in a deeply buried context. Above ground cultural heritage resources may also be present in the form of historically significant buildings and cultural landscapes.

### *7.2.2 Regulatory Framework*

#### *Archaeological Resources*

Under the Ontario *Heritage Act*, the Ministry of Culture regulates the protection and conservation of cultural heritage including archaeological resources, while the Ontario *Planning Act* requires municipalities to address archaeological resource concerns through planning processes and land-use control. The *Environmental Assessment Act* applies to public sector projects and requires the preparation of an environmental assessment document containing inventories, alternatives, evaluations and mitigation strategies to address archaeological concerns. The provincial government, through the Ministry of Culture has a regulatory and licensing responsibility for archaeology under the *Ontario Heritage Act*, however, municipal governments assume the day-to-day responsibility for ensuring that archaeological assessments are completed on lands which hold archaeological potential prior to any soil disturbance activity. The City of Toronto requires an archaeological assessment as a condition of development approval where warranted.

The archaeological review procedure developed as part of the larger "City of Toronto Archaeological Master Plan" is the means through which the City is addressing its responsibility. Working with the City of Toronto, WT has developed an Archaeological Conservation and Management Strategy (ACMS) which contains an inventory of all known archaeological features within the WT Development Area. The ACMS has evaluated the archaeological significance of potential resources, assigned a significance rating, and provides recommendations for mitigating any impacts to potential archaeological resources. The plan includes a funding provision for contingency planning in the event that an unexpected archaeological resource is encountered during the construction process.

#### *Built Heritage Resources*

Under the *Ontario Heritage Act*, a site can either be designated under Part IV (single building) or Part V (Conservation District) or be listed by a municipality as a heritage building.

Listed properties are those for which City Council has adopted a recommendation to be included on the Inventory of Heritage Buildings. The recommendations are based on criteria that

relate to architecture, history, and neighbourhood context. Inclusion on the inventory signifies that the City would like to see the heritage attributes of the property preserved.

Listing a property on the Inventory of Heritage Properties allows Heritage Preservation Services to review development and building applications affecting those properties. It also requires the owner of a listed property to give the City 60 days notice of their intention to demolish the property.

Designated properties are those that have been designated under Part IV or Part V of the Ontario Heritage Act by the passing of a by-law. Designation gives Council the legal authority to refuse an application that will adversely affect the property's heritage attributes.

### *7.2.3 Causative Activities and Conditions*

The Heritage Preservation Services section of the City of Toronto Planning Division must be consulted for any project-related activities such as alterations and demolitions, that could directly or indirectly impact built heritage resources. Heritage Preservation Services is responsible for advising and assisting City Council, the Toronto Preservation Board, the community, and property owners on the conservation of the City's heritage resources. This involves advising on matters stipulated in the *Ontario Heritage Act*, reviewing and advising on development proposals, and monitoring and the maintenance of heritage sites.

All development plans within the WT Development Area are to be reviewed against the ACMS inventory to determine if the proposed undertakings have the potential to impact upon an identified archaeological resource. This is to be done prior to submitting a development application. Upon submission of a development application, City Planning – Heritage Preservation Services will provide formal comment on the archaeological monitoring requirement as a condition of development approval.

The significance rating assigned to individual features and the associated recommendation falls in to one of four basic categories:

**Grade 1**: Historically significant feature for which field work (e.g., archaeological test excavations, possible mitigation) is recommended.

**Grade 2**: Historically important feature for which limited archaeological fieldwork, typically monitoring, is recommended. This grade also applies to sites that would otherwise be ranked as Grade 1, but cannot be mitigated as such for technical reasons or because of economic constraints.

**Grade 3**: Feature of little historical significance, or for which the significance is not apparent; no form of mitigation or monitoring is necessary.

**Grade 4**: Lake fill within Toronto Harbour – no further action required.

### *7.2.4 Maintenance and Monitoring*

While every effort has been made to ensure that the inventory is comprehensive, it is recognized that unexpected heritage resources of interest or value may be encountered when carrying out project-related activities.

When an unexpected resource is found, work must stop in the immediate vicinity of the discovery. The resource is to be evaluated by a licensed archaeologist retained by the proponent. Its significance is to be evaluated using the ACMS and reviewed with the City of Toronto Heritage Preservation Services, and will form the basis of a final recommendation.

No potential archaeological resources within the WT Development Area have been ranked as a Grade 1 resource, that is, a feature of such high significance that archaeological assessment in the form of test excavations and possible mitigation efforts (salvage excavation or preservation in situ) needs to be undertaken in advance of development.

Twenty-one inventoried features or combinations of features within the WT Development Area have been ranked as Grade 2 resources. These are regarded as exhibiting moderate archaeological significance. Limited archaeological fieldwork, in the form of monitoring during construction excavations, is recommended for 18 of these sites.

An **Archaeological Monitoring Protocol** is to be undertaken once large scale excavations commence on a site. The site is visited on a daily basis, or as is deemed necessary based on consultation with the archaeological consultants, the City of Toronto Heritage Preservation Services, WT or other responsible party and on-site supervisory staff. The archaeological monitoring ceases once it has been determined that there is to be no further construction excavation within areas of archaeological potential. The monitoring protocol will be developed on a site-specific basis and ensures that all parties including the proponent, the consulting archaeologist and City Planning – Heritage Preservation Services are aware of the parameters and conditions of the monitoring process.

The purpose of monitoring is to document, through photography and the preparation of measured drawings, any significant exposed features that exhibit notable design or construction attributes. Artefact recovery is at the discretion of the monitoring archaeologist. The **Monitoring Protocol** ensures that heavy equipment operators are to be instructed in on-site protocols, in advance of excavation activities. Equipment protocols may include:

- Notifying their supervisors when they encounter any intact structural features such as wharf cribs, structure foundations, etc.
- Assisting archaeological staff in exposing archaeological features for documentation purposes, and
- Ensuring that significant archaeological features are preserved for a period of 24 to 48 hours to allow the archaeologist to visit the site, record its salient attributes and carry out any other activities that may be necessary.

In the event that suspected human remains are discovered or unearthed, the construction contractor is to take appropriate measures including:

- Halting all work in the vicinity and ensuring the area surrounding the human remains is protected from further disturbance, and
- Contacting the Toronto Police Service (416-808-2222), and
- Advising the archaeological consultant, WT or other responsible party immediately.

### *7.2.5 References*

Archaeological Services Incorporated. 2008. *Waterfront Toronto Archaeological Conservation and Management Strategy (ACMS)*

Archaeological Services Incorporated. 2003. *The Archaeological Master Plan of the Central Waterfront, Toronto, Ontario*

Ministry of Culture, September 2006. *The Discovery of Human Remains – Best Practices*, Unit 5 in *Standards and Guidelines for Consultant Archaeologists – Final Draft*.

## 7.3 Contaminated Soils Management

### *7.3.1 Environmental Concerns*

Much of the land in the WT Development Area was formed through the infilling of Lake Ontario using soil and other fill materials from a variety of sources, some of which may have included contaminated materials. As well, industrial uses in the area may have introduced contaminants such as polycyclic aromatic hydrocarbons (PAHs), volatile organic carbons (VOCs), petroleum hydrocarbons, polychlorinated biphenyls (PCBs) and inorganic substances (e.g., metals).

### *7.3.2 Regulatory Framework*

Federal legislation requires that management of contaminated soils comply with the applicable Regulations made under the *Fisheries Act* and the *Canadian Environmental Protection Act* (CEPA) to ensure the protection of fish, aquatic habitat, the environment and human health.

The identification and management of contaminated soils or suspect materials is more directly governed by Ontario Regulation 153/04 - Record of Site Condition under the Ontario *EPA*. This Regulation outlines acceptable standards for soil, groundwater and sediment quality, depending on the actual or proposed use(s) of land. To ensure the protection of groundwater supplies on adjacent lands, investigation and management of contaminated soils are to be in compliance with Ontario Regulation 169/03 under the *Safe Drinking Water Act.* In addition, if site personnel are at risk of being exposed to airborne contaminants originating from contaminated soils, respiratory protection is to be provided in compliance with the Ontario *Occupational Health and Safety Act* and Canadian Standards Association Standard Z94.4-02.

When soil is removed from a project site, it is to be managed according to Ontario Regulation 347; General – Waste Management under the *EPA*. This requires that contaminated materials be hauled by licensed contractors and that receiving sites are approved for the types of materials that are being disposed. Any treatment of contaminated soils is governed by a C of A process set out in section 27 of the *EPA*.

### *7.3.3 Causative Activities and Conditions*

Carrying out project-related activities in the WT Development Area includes the inherent risk that contaminated soils may be encountered. These soils may be exposed during general grading or excavation for foundations, sewers or utilities in areas of known or suspected contamination.

### *7.3.4 Application*

A **Soil Management Program** is being undertaken by WT because of the known potential for contamination in the WT Development Area. This program will require that each development project involving the excavation or handling of soils be governed by a site-specific **Soil Management Plan** designed by an environmental consultant retained by WT or other responsible party. These plans will be prepared at the design stage of a project before the implementation of any site activities and will provide details concerning the characterization of soil quality and the management and treatment of contaminated soils.

### *7.3.5 Design and Implementation Considerations*

The potential for contaminated soil to be present at a project site is to be assessed through soil testing by WT's environmental consultant prior to the initiation of construction works. The rehabilitation and development of environmentally contaminated sites should also be considered with respect to the requirements outlined in *LEED*® NC Sustainable Sites Credit 3, Redevelopment of Contaminated Sites. The Soil Management Plan developed at the design stage will characterize existing subsurface conditions including potential contaminants, proposed activities that are likely to disturb the soil, and provide direction on the management of excess soils (whether contaminated or not). For contaminated sites, site-specific monitoring programs for air quality and containment of contamination within the site boundaries may be incorporated into the soil management plan. Toronto Public Health may be consulted to ensure soil management protocols mitigate the potential for health effects from contaminated soil.

Construction contractors must adhere to the site-specific Soil Management Plan for each project involving earthworks and incorporate it along with provisions for Spill Response (Section 8.2.2), Air Quality and Dust Management (Section 7.1), Groundwater Management (Section 7.6), Stormwater/Surface Water Management (Section 7.10) and worker health and safety, into an overall site specific program implemented and controlled by the construction contractor.

### *7.3.6 Maintenance and Monitoring*

Any work at a contaminated site must include the input and direction of WT's environmental consultant. Site supervision by WT or its environmental consultant will be undertaken when excavations into or around suspected contaminated soils take place. Where soil excavation is required, advance soil sampling is to be conducted within the proposed project area to determine the presence and concentrations of potential contaminants.

The environmental consultant will maintain records on the identification and management of contaminated soils. Site supervision will include direction on the segregation of contaminated soil and non-contaminated materials, field monitoring, procedural controls to prevent the spread of contamination from the excavation areas, screening and verification sampling to establish the limits of contamination, and the maintenance of appropriate records relevant to the treatment or disposal of contaminated soil.

WT or other responsible party will ensure that the Soil Management Plan is in place prior to initiating any earthworks to ensure effective management of contamination and to minimize risk to human health and safety through exposure to contaminants. Effective management of suspect contamination will also reduce the risk of delays to project schedules.

While project sites are to be adequately characterized in advance of construction activities, contaminated soil may be encountered unexpectedly during excavation. In general, suspect soil is identified through visual clues such as colouration or staining, unusual odours, and the results of field screening using combustible gas detectors or photo-ionization detectors. If suspect soil is unexpectedly encountered, the construction contractor is required to notify WT's environmental consultant and WT or other responsible party immediately, and all works in the affected area are to be suspended and the zone of contamination controlled until evaluated.

Excavated soil is to be managed to prevent sediment accumulation in stormwater runoff (Section 7.10). Excavated soil that is suspected of or known to be contaminated is to be placed in covered bins or other sealed containers, or stockpiled and covered with plastic sheeting anchored in place (Sections 7.1 Air Quality and Dust Management and 7.4 Erosion and Sediment Control). Site protocols are to be established to ensure contaminated soils are not tracked to uncontaminated areas of the site. These will include mud mats, truck washing and equipment scheduling that minimizes equipment movement between contaminant zones.

### *7.3.7 References*

Center for Environmental Excellence by AASHTO. 2008. *Chapter 4: Construction Practices for Environmental Stewardship - Section 4.11: Soil Management in Construction*

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

Ontario Ministry of the Environment. 2004. *Records of Site Condition: A Guide on Site Assessment, the Cleanup of Brownfield Sites and the Filing of Records of Site Condition*

## 7.4 Erosion and Sediment Control

### *7.4.1 Environmental Concerns*

Erosion is generally defined as the destabilization of the ground surface and the transfer of surface soils from one location to another. It commonly occurs when precipitation (rain or snowmelt) flows over the ground surface. The extent and severity of erosion depends on the type of soil, type and condition of soil cover (e.g., vegetation), climate and topography. Site disturbance increases the risk of erosion unless controls are in place to manage erosion and sediment runoff. Erosion concerns are typically relevant during construction or related project activities.

If soil enters a watercourse (either directly or through a storm sewer) the sediment can impair water quality and have an adverse effect on aquatic habitat. Suspended sediment can directly affect aquatic biota through impairment of respiration. Indirectly, sedimentation can inhibit plant productivity and damage spawning areas. Deposited sediments can also reduce the capacity of a watercourse and potentially increase flooding risks.

### *7.4.2 Regulatory Framework*

Legislation, regulations, codes and standards under the jurisdiction of the three levels of government (federal, provincial and municipal) may influence project-related requirements in the WT Development Area. Each is described in the following sections.

#### 7.4.2.1 Federal Regulations

The federal *Fisheries Act* applies to all waters that provide fish habitat and prohibits the damage to fish habitat and the release of deleterious substances to aquatic environments. Harmful alteration, disruption or destruction of fish habitat requires authorization and determination of appropriate mitigation and/or compensation. To avoid disruptions or damage to fish habitat, activities undertaken near a watercourse must implement erosion and sediment controls. Part 8 of the *CEPA* outlines the requirements for environmental emergency plans for unplanned or accidental releases of a substance into the environment.

#### 7.4.2.2 Provincial Regulations

The Ontario *EPA* and the *Ontario Water Resources Act (OWRA)* both aim to protect and manage the quality and quantity of surface water and groundwater. Discharging or depositing material in any water or on any bank that may degrade the quality of surface water such as rivers, streams or lakes is prohibited. Sediment released from a site could also result in a discharge to a water body and subsequent quality degradation. Provincial approvals through a C of A, with demonstrated erosion and sediment control for stormwater management, are required for projects that may contribute to erosion in the WT Development Area.

#### 7.4.2.3 Municipal Requirements

Municipalities must ensure that discharges from storm sewer systems meet provincial requirements. Projects that may release suspended solids to a storm sewer must have an erosion and sediment control plan and comply with City of Toronto Municipal Code Part II,

Chapter 681 (By-law 457-2000) to regulate the discharge of sewage and land drainage. The City of Toronto reviews this requirement as part of its site plan review and approval process (*Planning Act*).

In addition, the Toronto Green Development Standard provides an integrated set of targets, principles, and practices to encourage sustainable development. A completed Toronto Green Standard checklist may be required as part of the planning approval process. With respect to this EPP, it ensures the protection of water quality during construction and demolition through adherence to TRCA's onsite erosion and sediment control guidelines and the implementation of an erosion and sediment control plan. It also promotes the prevention of erosion through the retention and reuse of all uncontaminated on-site soil in areas not covered by buildings or hard surfaces. Where this cannot be achieved, the soil should be replaced with soil of equal or better quality to encourage revegetation and minimize future erosion potential.

### *7.4.3 Causative Activities and Conditions*

Many project-related activities (e.g., demolition and construction) can cause or contribute to erosion or sediment migration. The physical or environmental conditions likely to contribute or cause situations requiring intervention to manage erosion and sediment transport include:

- Erosion caused by rain and runoff, and
- Erosion through project-related works (e.g., excavation, transport and placement of materials, site development and infrastructure-related works) disrupting existing water bodies.

### *7.4.4 Application*

Erosion and sediment control measures must be applied at any project site or associated area (e.g., transport routes) where causative activities or conditions may occur. These measures must be in place prior to the initiation of work in order to prevent, rather than manage erosion that has already begun to take place.

### *7.4.5 Design and Implementation Considerations*

The hierarchy for erosion and sediment control is: first to control erosion at its source; and then to provide controls against potential off-site migration of sediment. To reduce the need for controls for off-site sediment migration, the following procedures are to be implemented:

- Design site layouts to minimize vehicle movement that can cause compaction and subsequent erosion
- Limit both the gradient and the length of exposed slopes (faster moving water associated with steeper slopes accelerates erosion)
- Minimize the area and duration of exposed soil, and
- Maintain and regenerate vegetative cover as a natural erosion control feature.

The *LEED*® NC Program includes requirements for Erosion and Sedimentation Control for Sustainable Sites that must include the considerations within this EPP. The objectives of the *LEED*® program include:

- Preventing loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse
- Preventing sediment release to storm sewers or receiving streams, and
- Preventing dust and particulate matter from polluting the air.

The requirements are prerequisites (Sustainable Sites Prerequisite 1) for obtaining credit as a sustainable site.

The LEED ND Program (pilot version) also includes requirements for Erosion and Sedimentation Control under Green Construction and Technology Prerequisite 1 – Construction Activity Pollution Prevention. The credit objectives are the same as detailed above for LEED NC. The documentation requirements for this credit includes:

- Copies of photographs or drawings to document the erosion and sedimentation control measures implemented on the site, or a representative sample thereof.
- A brief narrative describing the erosion and sedimentation control measures implemented on the project.

#### 7.4.5.1 Erosion Control Measures

To minimize erosion and the need for sediment control, procedures are to be implemented for all projects in the WT Development Area that may be susceptible to erosion. Appropriate controls are to be established in areas where surface water may flow during a storm event and in areas of disturbed surfaces that have not yet been restored. Erosion control procedures may include:

- Diversion ditches within the work areas to direct flows and minimize potential for surface erosion. Completed ditches should be appropriately surfaced (e.g., with sod, stone riprap or manufactured fibre matting)
- Ditch checks consisting of straw bales or rock check dams constructed across swales, draws or ditches and/or around inlets to reduce the velocity of stormwater runoff and to intercept silt, and
- Restoration of soil surfaces immediately following final grading, with surface restoration to include features that minimize erosion (e.g., placing sod, seed and mulch, manufactured fibre matting, cross slope grading).

#### 7.4.5.2 Sediment Control Measures

To further address erosion and related consequences in off-site areas, the following additional procedures are to be implemented at projects where there is potential for transport of sediment beyond the property:

- Erection of silt fences at or near the down-gradient extent of the site to intercept sediment-laden overland flows; and maintain them in place until surface restoration is sufficiently advance that the erosion potential is minimized

- Protection of catch basins, manholes and other storm sewer features (e.g., ditch inlets) from sediment-laden inflows through installation of sealing covers or geotextile filter media at their inlets, and
- Construction of a stormwater management pond to collect and contain runoff for a sufficient period of time to allow for settlement of sediment in suspension, where warranted based on project characteristics (e.g., duration, physical extent).

### *7.4.6 Maintenance and Monitoring*

Erosion and sediment control features require maintenance and monitoring to ensure proper function. Maintenance and monitoring is to be performed on a regular schedule (e.g., weekly), but also before predicted storm events and immediately thereafter. Monitoring requirements will be outlined in project specifications and the construction contractor must implement these monitoring requirements. Verification of compliance with project specifications is conducted by the contract administrator retained by WT or other responsible party. A maintenance and monitoring program should include:

- Inspection of control features, and repair and/or replacement on a regular basis, as required
- Removal of collected sediment on the up-gradient surface of silt fencing when silt has accumulated to approximately half the fence height or when the silt retention capacity has been reduced to approximately 50% due to sagging or staple loss
- Removal of collected sediment from settlement ponds when the storage capacity has reached 50%, and
- Reinforcement of erosion control structures when significant rainfall events are forecast.

### *7.4.7 References*

City of Toronto. 2007. *The Toronto Green Development Standard, January 2007.*

Greater Golden Horseshoe Conservation Authorities. 2006. *Erosion and Sediment Control Guideline for Urban Construction*

Transportation Association of Canada (TAC). 2005. *National Guide to Erosion and Sediment Control on Roadway Projects*, Ottawa, Ontario

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

Department of Fisheries and Oceans (DFO). 2000. *Effects of Sediment on Fish and their Habitat*, DFO Pacific Region Habitat Status Report 2000/01

## 7.5 Fuel and Lubricants Management

### *7.5.1 Environmental Concerns*

Fuels and lubricants are used in mechanical equipment and machinery. Improper management of these fluids may cause environmental impacts through:

- Spills and leaks into the soil, surface water, and/or groundwater, and
- Fires at the site.

Inadvertent release of these fluids may adversely impact the environment and may also affect the project through the diversion of resources to remediate the release.

Risks from spills and leakage of harmful fluids is reduced through the development and implementation of sound management plans for vehicles, machinery (including fuelling and operation), imported materials (including hazardous materials) and materials generated from project-related activities.

Contingency and Emergency Response Plans (Section 8.0) prepared and implemented by construction contractors will minimize the impacts from inadvertent spills.

### *7.5.2 Regulatory Framework*

#### 7.5.2.1 Federal Regulations

Projects are to be carried out in compliance with Parts 5 and 8 of the *CEPA* which relate to the regulation and release of toxic substances, and include requirements for environmental emergency plans, regulations, and remedial actions for an uncontrolled, unplanned or accidental release of a substance into the environment.

In addition, project activities involving fuels and lubricants must ensure the protection of fish habitat and prevention of pollution through the federal *Fisheries Act*.

#### 7.5.2.2 Provincial Regulations

Part V of the Ontario *EPA* prohibits the disposal of wastes to any sewage or other works which are governed by the *OWRA*. In the event that a spill does occur, Part X of the *EPA* provides direction on the management and reporting of spills.

To ensure the protection of groundwater, the management of fuels and lubricants are to be in compliance with Ontario Regulation 169/03 under the *Safe Drinking Water Act.*

Vehicle handling, fuelling and fuel storage are to be conducted in accordance with the *Technical Standards and Safety Act* (Ontario Regulation 217/01) which is administered by the Ontario Technical Standard and Safety Authority (TSSA).

All project activities that involve the storage and use of lubricants and fuels on-site shall follow the *Occupational Health and Safety Act*, Workplace Hazardous Material Information System (WHMIS) regulation (Ontario Regulation 860) in order to ensure cautionary labelling of

containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education programs are implemented properly.

Part 4 of the *Fire Protection and Prevention Act* (O.Reg. 388/97) and *Ontario Fire Code*, which provides guidelines for storing and handling of flammable and combustible liquids, should also be adhered to for all projects.

#### 7.5.2.3 Municipal Requirements

The City of Toronto regulates the discharge of fluids to stormwater, sanitary and combined sewer systems under Part II, Chapter 681 of the Toronto Municipal Code. Management of fuels and lubricants will ensure that release of materials to the sewer system does not violate the requirements laid out in the code.

### *7.5.3 Causative Activities and Conditions*

Activities associated with fuelling of on-site machinery and use of lubricants in the operation and maintenance of machinery can lead to spills or leaks resulting in contamination and migration of contaminants into the soils, groundwater and watercourses.

### *7.5.4 Application*

A **Fuel and Lubricants Management Plan** is to be prepared and implemented by construction contractors involved in the fuelling or maintenance of construction equipment. The Plan is to be completed prior to the start of any on-site work. Construction contractors are responsible for ensuring that all on-site personnel are aware of and trained in the handling of fuels and lubricants.

### *7.5.5 Design and Implementation Considerations*

Good housekeeping practices during project-related activities reduce the potential for spills or leakages of fuels and lubricants into the environment. In addition to project guidelines on workplace fuels and lubricant, the following measures are to be implemented:

- Equipment refuelling is to be performed only at a designated refuelling station
- Equipment maintenance and refuelling are to be controlled to prevent any inadvertent discharge of petroleum products
- Fuels and lubricants are to be properly labelled and stored in a designed storage area
- Vehicle maintenance and refuelling is to be conducted at least 30 metres away from any sensitive watercourse (i.e., Don River, Lake Ontario, etc.) and special care is to be taken near municipal storm sewers (i.e., cover sewers during fuelling)
- Fuel storage and pumps, if installed, are to be placed where access to fuel trucks and construction equipment is easiest and in accordance with provincial fuel tank storage and dispensing regulations
- All personnel working with fuels and lubricants are to be trained in the proper handling of such materials

- Access to fuels/lubricant storage area is to be restricted to personnel qualified and designated to handle such materials
- First aid kits and emergency response equipment (spill kits) are to be available near storage areas and on re-fuelling vehicles
- All vehicles on-site are to be equipped with spill kits
- Fire protection equipment is to be maintained on-site and all personnel are to be trained to respond to emergencies in accordance with the site plan provided by the construction contractor
- MSDS for all hazardous substances are to be accessible on-site, and
- A Spill Prevention and Contingency Plan (Section 8.1) and an Emergency Response Plan (Section 8.2) are to be developed and implemented as required.

Biodiesel fuel is to be used whenever possible for project-related activities, to satisfy the guidelines set out in Waterfront Toronto's Sustainability Framework.

### *7.5.6 Maintenance and Monitoring*

Mechanical equipment is to be in good working repair and free of oil, hydraulic fluid, grease and fuel leaks. A daily inspection of all machines is to be conducted by the construction contractor before start-up to ensure that no potential exists for contamination of soils and watercourses. Operators are responsible for ensuring that no potential exists for oil, grease or other deleterious substances to enter into the environment.

Buffer zones are to be established around all sensitive environmental features to avoid environmental impacts that may be caused by equipment. Equipment is to be stored in a stable location away from sensitive areas and outside the established buffer zones. Contract administrators and site supervisors retained by WT or other responsible party are responsible for ensuring that these measures are effectively implemented by the construction contractor.

Fuel and lubricant storage control measures are to be in place to protect the project site. Where the size of the project or types of materials present warrant additional oversight, an Environmental Monitor may be retained by WT or other responsible party to evaluate, audit and monitor the control measures and report any measures that are ineffective or not being implemented properly. The Environmental Monitor or contract administrator is to complete daily field reports.

Pollutants spilled or discharged into the environment are to be reported to the **Spill Action Centre** of the Ontario Ministry of the Environment (MOE) (1-800-268-6060), as well as to the City of Toronto (416-338-8888). Further information on procedures and contacts in the event of a spill or discharge can be found in Section 8.1 and Appendix B respectively and are to be followed immediately upon discovery of an incident.

### *7.5.7 References*

Center for Environmental Excellence by AASHTO. 2008. *Chapter 4: Construction Practices for Environmental Stewardship - Section 4.6: Vehicle Fluid, Fuel and Washwater Control*

U.S. Environmental Protection Agency. Construction Site Chemical Control. Site accessed on July 14, 2008. http://www.epa.gov/owow/NPS/MMGI/Chapter4/ch4-3b.html

Ontario Provincial Standard Specification. 2000. *OPSS 182: General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks.*

## 7.6 Groundwater Management

### *7.6.1 Environmental Concern*

A majority of the lands in the WT Development Area can be classified as Brownfields (i.e., under utilized lands that are or are perceived to be contaminated). As such, these lands generally pose a higher risk of contamination because of past land uses (e.g., industrial). Adverse impacts to groundwater quality through contamination from on-site activities or from past uses of the lands, can impair the future use of the site and adjacent sites. Impacts to the groundwater are to be avoided or minimized.

Excavation works and construction of foundations may impact groundwater flows if large quantities of groundwater are removed during dewatering or if recharge areas or flow patterns are disrupted. Proper management of groundwater ensures that minimal impacts occur to the environment and wildlife and their habitat.

### *7.6.2 Regulatory Requirements*

Contaminated groundwater represents a potential for adverse effects on nearby water courses and discharge areas. All project activities are to be carried out in a manner that will not adversely affect fish habitat (unless an appropriate approval under the *Fisheries Act is obtained)* and will preserve the environment and human health as required under the *CEPA.*

The extraction and management of groundwater is governed provincially by the *EPA* (Part X) and the *OWRA.* These Acts aim to protect and manage the quality and quantity of surface water and groundwater. Ontario Regulation 153/04 outlines acceptable standards for groundwater quality for a site and is to be followed.

For any works where more than 50,000 L of groundwater will be extracted per day during dewatering, a Permit to Take Water issued under the *OWRA* (section 34) is required.

Should an abandoned well be discovered or should existing wells no longer be required, the decommissioning of the wells is governed by the *Safe Drinking Water Act* and Ontario Regulation 903 - Wells.

The City of Toronto provides requirements for discharge of fluids to stormwater, sanitary and combined sewer systems under Part II, Chapter 681 of the Toronto Municipal Code. Should dewatering works be required for a project, discharge of groundwater to the sewer system are to comply with the requirements laid out in the code and are subject to a sewer discharge agreement.

### *7.6.3 Causative Activities and Conditions*

Activities that could lead to impacts to the groundwater include groundwater pumping, flow attenuation, groundwater recharge, spills and leaks from refuelling of machinery, improper storage and handling of lubricants and fuels, poor stormwater and surface water management and ineffective sediment and erosion controls. Seepage of contaminants into soil may eventually reach the underlying groundwater and migrate off site. Contamination of the

groundwater may eventually impact nearby sensitive watercourses or intrude into buildings through the vapour phase.

### *7.6.4 Application*

Groundwater management is to be undertaken for any project requiring dewatering, whether or not a Permit to Take Water is required and is to be done in concert with Contaminated Soils Management (Section 7.3), Erosion and Sediment Controls (Section 7.4), Fuels and Lubricant Management (Section 7.5) and Stormwater/Surface Water Management (Section 7.10). A Groundwater Management Plan is to be applied at any project site or associated area (e.g., transport route) where there are possibilities for impacting groundwater. These measures are to be in place prior to the initiation of work.

### *7.6.5 Design and Implementation Considerations*

In addition to the planning and implementation considerations outlined in the Contaminated Soils Management (Section 7.3), Erosion and Sediment Control Management (Section 7.4), the Fuels and Lubricant Management (Section 7.5), and the Stormwater/Surface Water Management (Section 7.10) Plans, the following groundwater management guidelines are to be implemented:

- Site plans are to be reviewed by a qualified groundwater professional retained by WT or other responsible party for the subject project activity within the WT Development Area, regardless of vulnerability. The groundwater professional should prepare a **Groundwater Management Plan** that considers the quality and quantity of groundwater to be managed, and
- Where an abandoned well is discovered, site personnel must inform the project's environmental consultant and WT or other responsible party to obtain direction on whether the well has contributed to soil and/or groundwater contamination and measures that are to be taken to decommission the well.

For sites with contaminated groundwater, site-specific monitoring and sampling programs to control off-site migration may be incorporated into the Groundwater Management Plan. Toronto Public Health may be consulted to ensure groundwater management protocols mitigate the potential for health effects from contamination.

### *7.6.6 Maintenance and Monitoring*

If project-related activities can impact groundwater, or if there is known groundwater contamination or if an activity is in the vicinity of a sensitive watercourse or wildlife habitat, monitoring wells are to be installed on-site and on adjacent properties to monitor migration of contaminants in groundwater. The groundwater professional retained by WT or other responsible party will evaluate the need for construction monitoring wells and will include requirements for these in the project specifications. Where monitoring wells are installed, regular monitoring of groundwater quality and elevation is to be conducted by the groundwater professional or as directed by them, before, during, and after the activity.

Should seepage and pooling of groundwater occur during excavation works, sufficient pumps or sumps with the capacity to remove the water that accumulates must be provided and used by

the construction contractor. In addition, proper mitigation measures such as retention ponds and drainage ditches are to be constructed in order to prevent the discharge of groundwater onto the surface. An inspection of retention ponds, drainage ditches, and/or catch basins must be performed by the construction contractor and the groundwater professional prior to dewatering to ensure that capacity to handle dewatered groundwater is adequate. If the groundwater is considered to be non turbid and/or uncontaminated (i.e. meets the specific site condition standards for groundwater under O.Reg 153/04), it can be either recycled/reused or discharged to the storm sewer (as long as it complies with the requirements laid out in Part II, Chapter 681 of the Toronto Municipal Code). Erosion and sediment control measures (Section 7.4) must be implemented by the construction contractor at, in and around all retention ponds, drainage ditches, and/or catch basins.

### *7.6.7 References*

Ontario Ministry of the Environment. 2004. *Groundwater Studies in Ontario: Mapping a Hidden Treasure*

Ontario Ministry of the Environment. 2001. *Stormwater Pollution Prevention Handbook*, *Part III: Ontario Case Studies - Watershed Infrastructure Ecology Program (WIEP)-Toronto*

## 7.7 Methane Control

### *7.7.1 Safety and Environmental Concerns*

Given that the WT Development Area has a history of infilling lands over existing peat layers using waste and sewage material, there is a higher potential and risk for encountering methane on-site through activities that require excavation and subsurface investigations. As such, more care must be taken to ensure that human health and safety is addressed where there exists the potential for encountering methane.

At room temperature and standard pressure, methane is a colourless, odourless gas. In ambient conditions methane gas is lighter than air and dissipates with time. Methane is not toxic but it is highly flammable and may form explosive mixtures. It is violently reactive with oxidizers, halogens, and some halogen-containing compounds.

Methane is also an asphyxiant and may displace oxygen in an enclosed space. Asphyxia may result if the oxygen concentration is reduced to below 19.5% by displacement with methane or other gas. The concentrations at which flammable or explosive mixtures form are much lower than the concentration at which asphyxiation risk is significant. When structures are built on or near methane-generating materials (e.g., landfills, peat or high organic soils), methane off-gas may be required to inhibit penetration into building interiors and to prevent occupants from being exposed to accumulating methane.

Methane is a greenhouse gas that may be present at low aggregate volumes at any project. As such, capture and re-use of methane is not likely feasible at most sites.

### *7.7.2 Regulatory Framework*

Methane control is not directly regulated. However, because of its inherent health and safety hazards, the following regulations may apply:

- Regulation 213 made under the Ontario *Health and Safety Act*: Construction Projects, and
- CSA Z94.4-02: Selection, Use and Care of Respirators, Canadian Standards Association (October 2002).

Certificates of Approval (Air) may be required for gas interception and venting systems that are typically installed to control methane gas migration at a site.

### *7.7.3 Causative Activities and Conditions*

The following WT project-related activities and physical or environmental conditions may contribute or cause situations that require intervention to manage methane hazards:

- Project-related activities involving excavation of methane-generating materials (e.g., organic matter, waste materials) that may form a conduit for methane release, and
- Construction of facilities that may create areas where methane accumulates or redirects methane to enclosed areas (e.g., underground vaults, granular bedding for underground services or impermeable surface coverings).

### *7.7.4 Application*

Methane monitoring and control measures are to be applied at any project site or associated area (e.g., transport route) where causative activities or conditions may occur. These measures are to be in place prior to the initiation of work to prevent methane exposure and migration.

### *7.7.5 Methane Mitigation Design and Implementation Considerations*

To reduce the need for methane monitoring and control measures, the following procedures are to be followed when possible:

- Maximize excavation surface areas to the extent practicable to allow methane gas to dissipate and minimize low surface area to depth ratio excavations (e.g., test pits). Erosion control measures (Section 7.4) are to be balanced with methane control if exposed surfaces will be maximized
- Monitor methane and oxygen levels in any area suspected of containing methane (e.g., confined spaces, basements, caissons, monitoring wells) using a portable combustible gas vapour detector (e.g., RKI Eagle, RKI GX-2003) prior to entry and during occupation
- Design constructed features to prevent methane migration and build up, and
- Include passive or active venting systems in areas where gas pressure differences can build up in the ground, resulting in uncontrolled methane migration.

#### 7.7.5.1 Methane Monitoring Measures

In order to minimize the need for methane control measures, the following procedures are to be implemented for all projects in the WT Development Area where methane may be present:

- Use personal protective equipment including flame-resistant protective clothing (coveralls, gloves, footwear, headgear) in areas of possible methane accumulation
- Extinguish sources of ignition, such as smoking and open flames
- Prohibit eating, smoking or drinking as methane can be swallowed
- Wash hands carefully before eating, drinking, applying cosmetics, smoking or using the toilet
- Use only non-sparking tools and equipment and ground and bond all metal containers and piping
- Calibrate combustible vapour detectors to detect methane and use them before entering areas where methane may be present (e.g., confined spaces, basements, caissons, monitoring wells) to ensure that explosive concentrations do not exist, and
- **Use only NIOSH approved self-contained breathing apparatus with a full face piece (operated in the positive pressure mode) in oxygen-deficient environments**. Any work conducted with respirators must include a written respirator use and care program in accordance with Canadian Standards Association standard Z94.4-02. The program must be administered by the employer of the worker wearing the respirator.

#### 7.7.5.2 Methane Control Measures

To reduce overall risks where methane is assumed or confirmed to be present, the following measures are to be implemented for all projects in the WT Development Area:

- Enclose operations and use local exhaust ventilation at the site of chemical release, where possible. If local exhaust ventilation or enclosure is not used, NIOSH approved self-contained breathing apparatus with a full face piece operated in the positive pressure mode must be used
- Install permanent vapour detection units calibrated to detect and monitor methane concentrations and connect an audible and visual alarm system to the vapour detection units to alert occupants of possible safety hazards
- Post hazard and warning information at all entry points and accesses in work areas and as part of an ongoing training effort, communicate all information on the health and safety hazards of methane to personnel, and
- Install a passive or active soil venting system for in-situ methane gas generating substances to prevent methane build-up and to control methane migration.

### *7.7.6 Maintenance and Monitoring*

Areas where methane may be present are to be monitored on a regular basis at a frequency commensurate with the potential for exposure.

Soil gas measurements can be made using several techniques. However, active whole-air sampling methods and active or passive sorbent sampling methods are usually employed. Typically, a whole-air sampling method is used in which a non-reactive sampling probe is inserted into the soil to a prescribed depth. This can be accomplished manually using a "slam bar", a percussion power drill or inserted into the ground with a drill rig. Soil gas samples can be withdrawn directly from the probe or through flexible tubing connected to the probe. The collection and concentration of soil gas contaminants can be greatly affected by the components of the sampling system. It is imperative to use materials that are inert to the contaminants of concern.

Whole-air sampling is typically accomplished using an evacuated Summa or equivalent canister, or by evacuation to a Tedlar bag. Normal operation includes the use of an in-line flow controller and a sintered stainless steel filter to minimize particles becoming entrained in the sample atmosphere. The sampling rate must not be so high as to allow for ambient air leakage between the annulus of the probe and the surrounding soils.

Passive sorbent sampling involves burial of solid sorbent sampling devices called cartridges or cassettes to a depth of normally 5 feet or less and are typically left in-ground for 72 to 120 hours or longer. During this time, the vapour-phase soil gas contaminants pass through the cassette and are adsorbed as the soil gas moves toward the soil surface by diffusion and/or convection.

### *7.7.7 References*

CSA Z94.4-02: Selection, Use and Care of Respirators, Canadian Standards Association (October 2002)

Ontario Regulation 213/91 made under the *Ontario Health and Safety Act*: Construction Projects

## 7.8 Noise and Vibration Management

### *7.8.1 Environmental Concerns*

Project-generated noise can disturb the community and impact wildlife. Project-generated vibrations can damage nearby roads, buildings and municipal infrastructure and can cause erosion of stream banks, or lead to instability of soil piles and excavated faces.

A **Noise and Vibration Management Plan** establishes a set of protocols to control noise emissions, monitor vibration generation, minimize community and wildlife impacts and promote community acceptance of unavoidable noise.

### *7.8.2 Regulatory Framework*

No federal legislation specifically governs noise and vibration management on construction sites.

Provincially, noise is governed by Section 14 of the *EPA* which prohibits the discharge of noise that may cause an adverse affect.

Noise is also enforced through the City of Toronto Municipal Code on Noise (Chapter 591), specifically 591-2.1 B and 591-3 which outlines restrictions on noise as a result of construction-related activities. The construction contractor must adhere to, at all times during construction, the provisions set forth in the code and that relate to the associated and applicable activities that have the potential for generating noise.

Should blasting be required for a project, it is to be carried out in accordance with the MOE *Guideline NPC-119* regulating the noise and vibration produced during blasting.

Work associated with construction vibration, such as pile driving, is governed by the City of Toronto Municipal Code on Building, Construction and Demolition (Chapter 363), specifically 363-3.6 which outlines vibration restrictions and vibration monitoring protocols. Building permit applicants must provide details relating to the potential for construction vibrations.

### *7.8.3 Causative Activities and Conditions*

Activities such as movement of heavy equipment, pile driving for foundations, blasting, soil excavation and construction of buildings can lead to noise and vibration levels in excess of the provincial and municipal guidelines.

### *7.8.4 Application*

Noise and vibration monitoring and control measures are to be applied on the project site by the construction contractor, in order to minimize nuisance effects on residents, businesses and nearby neighbourhoods.

### *7.8.5 Design and Implementation Considerations*

Where the noise impact exceeds the applicable criteria, mitigation will be necessary. Mitigation measures may be implemented on the site of the noise-sensitive land use or at the source. The preferred and normally the most economical option is to implement noise control measures at the source. These measures include:

- Ensuring that all equipment is well maintained and in good condition
- Using mufflers on vehicles and equipment in accordance with manufacturer's guidelines, and
- Scheduling material delivery and transportation at appropriate times.

Project-related works must not emit sound from any operation of construction equipment (such as jackhammers, concrete saws and/or pneumatic drills), if it is clearly audible at a point of reception in:

- A quiet zone or residential area within the prohibited period of 7:00 p.m. one day to 7:00 a.m. the next day, 9:00 a.m. on Saturdays, and all day Sunday and statutory holidays, or
- In any other area within the prohibited period of all day Sunday and statutory holidays.

This does not apply to the continuous pouring of concrete, large crane work and necessary municipal and emergency work that cannot be performed during regular business hours (City of Toronto Municipal Code on Noise). The City of Toronto (416-392-7539) must be notified and approval must be obtained for these exceptional circumstances.

Required control measures for transportation and stationary sources are to be evaluated separately for day time (between 07:00 and 23:00 hours) and night time (between 23:00 and 07:00 hours) periods. The final selection of control measures should ensure the compliance with the applicable sound level criteria of the provincial *Noise Assessment Criteria in Land Use Planning*.

Where vibrations are anticipated, WT or other responsible party will:

- Retain an engineer specializing in vibration monitoring who must determine the zone surrounding the project site at which vibrations would reach 1.5 to 2.0 mm/sec and undertake a survey documenting the existing condition of structures within the zone of influence
- Establish a vibration monitoring program before activity begins, including number of seismographs, location, frequency of monitoring and transmittal of results protocol
- Conduct test measurements to develop site specific vibration attenuation curves to identify the significant vibration causing project activities, and
- Install sensors to monitor ground vibration during piling.

In these conditions, the construction contractor must monitor areas identified by the engineer that are considered to be susceptible to vibration damage in order to avoid impacts (City of Toronto, 2007).

If generation of noise and vibration is anticipated and likely to affect the neighbourhood, efforts must be made to notify the potential residences and businesses that may be impacted at least one week in advance and to provide measures to minimize the effects.

### *7.8.6 Maintenance and Monitoring*

The construction contractor must ensure that all construction noise and vibration control measures as specified are maintained throughout the project. As appropriate, the construction contractor is required to monitor vibration and noise to ensure that levels comply with the MOE sound level criteria for construction equipment and that disruption to residents and the community are kept at a minimum. Any noise complaint received from the public is to be investigated by and, where required, mitigated by the construction contractor. Construction contractors must record complaints and document actions taken to mitigate against future disturbances. WT or other responsible parties must be notified of the complaints and may take further action, should noise complaints persist. Should it be demonstrated that project-related activities have resulted in property damage to adjacent properties, the construction contractor must notify WT or other responsible party and take all necessary steps to address the issue.

Persistent noise complaints may require the construction contractor to modify the existing mitigation measures for implementation or to employ alternative solutions. These measures are to be designed in consultation with a noise expert retained by the construction contractor. The MOE Regional Office duty officer may be contacted (416-326-6700) to request input when persistent noise complaints occur even with noise controls in place. If noise levels for a project cannot be mitigated, a permit for an exemption from a noise prohibition or noise limitation provision with the City of Toronto (416-392-7539) may have to be obtained.

### *7.8.7 References*

City of Toronto. 2007. *Vibrations Caused by Construction Activity Report*

City of Toronto. 2007. *Toronto Municipal Code: Noise, Chapter 591*

Ontario Ministry of the Environment, *Noise Assessment Criteria in Land Use Planning: Requirements, Procedures and Implementation, 1997*

## 7.9 Project-Related Waste Management

### *7.9.1 Environmental Concerns*

During project-related activities, both hazardous and non-hazardous wastes may be generated. Improper handling and management of waste such as contaminated soils or lubricant wastes could lead to the contamination of soils, groundwater, and watercourses, and the attraction of nuisance vectors, leading to heath and safety risks.

### *7.9.2 Regulatory Framework*

The management of wastes generated at construction and development projects is regulated in some form by the three levels of government (federal, provincial and municipal).

#### 7.9.2.1 Federal Regulations

Projects are to be implemented in a manner such that the management of waste is in compliance with Part 5 and 8 of the *CEPA* which provides for the regulation and release of toxic substances. This section of the *CEPA* also includes requirements for environmental emergency plans, regulations, and remedial actions for an uncontrolled, unplanned or accidental release of a substance into the environment (Section 8).

#### 7.9.2.2 Provincial Regulations

Part V, section 26 of the Ontario *EPA* prohibits the storage or disposal of wastes likely to create a nuisance. Section 86 of the Act prohibits the abandonment of any material in a place, manner, receptacle or wrapping such that it is reasonably likely that the material will become litter. Project activities are to ensure compliance with these sections of the Act. Part X of the Ontario EPA provides direction on the disposal of pollutants, which are also to be considered in waste management activities.

Regulations outlined in the MOE *Waste Diversion Act* and Ontario Regulations 102/94 and 103/94 pertain to the development and implementation of waste diversion and reduction plans. All projects of a size and type governed by the Act are to incorporate waste management protocols to reduce, reuse, and recycle waste.

Registration as a waste generator, as stipulated in the *EPA* (Ontario Regulation 347), may be required for a project should hazardous waste be generated during construction. A waste audit will be conducted for each project to determine whether a waste generator number is required as stipulated by MOE Waste Audits and Waste Reduction Work Plans, and Source Separation Programs (Ontario Regulation 102/94 and Ontario Regulation 103/94).

Should portable toilets be required on-site, the construction contractor is to employ a MOE C of A licensed waste hauler to dispose of the waste. Disposal of waste will also be in accordance with the *OWRA* which regulates the discharge of polluting material and sewage.

Part 6 of the Fire Protection and Prevention Act (O.Reg. 388/97) and Ontario Fire Code, which provides guidelines for storing, handling, and use of hazardous materials should also be adhered to for all projects.

#### 7.9.2.3 Municipal Requirements

Each project is to be conducted in accordance with the City of Toronto Solid Waste Management Services (416-338-2010) for the transfer and disposal of generated waste and the promotion of reducing, reusing and recycling non-hazardous material. This would be in accordance with the Toronto Municipal Code Part II, Chapter 548 which pertains to the littering and dumping of refuse and includes a list of recyclable materials and prohibited waste.

In addition, the Toronto Green Development Standard provides an integrated set of targets, principles, and practices to encourage sustainable development. A completed Toronto Green Standard checklist may be required as part of the planning approval process. With respect to this EPP, it ensures the reduction of waste going to landfill and reduces the demand for new materials. This standard has been integrated into this EPP.

### *7.9.3 Causative Activities and Conditions*

Projects generate waste products through excavation of soil, maintenance of machinery and vehicles and routine construction and demolition activities. These wastes are composed of a variety of materials such as glass, wood, and metal waste products. Waste generated from on-site personnel can include food and septic wastes, which can attract nuisance vectors if not managed properly. Portable toilet waste is classified as septage, an untreated waste that can cause impacts to groundwater and aquatic life if released into the environment.

### *7.9.4 Application*

Project-related **Waste Management Plans**, developed by construction contractors, will be in place prior to the initiation of any on-site works. Project waste management is to be maintained by construction contractors and monitored daily to ensure that waste for the project is handled and disposed of properly. Construction contractors are to include general waste, hazardous waste, and non-hazardous waste in their Waste Management Plans.

### *7.9.5 General Waste Design and Implementation*

Waste management is to be carried out in a manner that maximizes the opportunity for the reduction, re-use and recycling of solid waste and, as appropriate, to ensure management and disposal of waste that cannot be diverted. Waste generated at project sites are to be managed through containment and regular removal in order to minimize impacts from litter and the attraction of vectors.

Portable toilet facilities are to be provided on sites where required by the City of Toronto and situated a minimum of 30 metres away from sensitive environmental features. These facilities are to be maintained and emptied by a commercial MOE-licensed waste contractor for the duration of project activities.

All on-site personnel are to have valid WHMIS training appropriate to their job description in order to raise awareness and knowledge for the proper safety and handling of waste materials.

Project-Related Waste Management initiatives must also adhere to commitments set out in WTs *LEED*® ND Program (Green Construction and Technology Credit 18). Specifically, construction

contractors are to ensure that all WT projects recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Construction contractors will also identify the materials that will be diverted and/or stored on-site or commingled. The documentation requirements for this credit includes:

- A table of the demolition debris, including a general description of each category of waste generated, the quantity in tons or cubic yards, and the location of receiving agent (recycler / landfill) for waste.

- A calculation showing the total percentage of material diverted from landfill disposal.

WT projects should also achieve *LEED*® NC credits for construction waste management (Materials and Resources credits 2.1 and 2.2) to divert waste from landfills. Adherence to these commitments also satisfies the Toronto Green Development Standard on construction waste management, however, their preference would be for the recycling and/or salvage of at least 75% of non-hazardous construction and demolition debris.

#### 7.9.5.1 Hazardous Waste Design and Implementation

If hazardous waste is generated, construction contractors must ensure that the waste is handled in a manner that protects workers and the environment.

Where required by the MOE, a Waste Generator Number must be obtained by WT, other responsible party or their agent, for hazardous wastes removed from the project site. The wastes must be disposed of through a MOE-approved hazardous waste hauler and sent to a MOE-approved waste disposal site. While on-site, waste is to be stored in a secure container in an area that minimizes risks to the environment. The choice of containment location depends on the activity and materials involved. Proper waste storage and recognition that some wastes are incompatible with others is critical to avoiding violent, explosive reactions and/or creation of toxic fumes. Personnel responsible for dealing with hazardous waste generated on-site must be properly trained in these duties.

Potential environmental impacts resulting from waste generation include soil and groundwater contamination from spills or environmental accidents. In these cases, refer to the Spill Prevention and Contingency Plan (Section 8.1) when waste is being moved from or throughout the site.

#### 7.9.5.2 Non-hazardous Waste Design and Implementation

On-site personnel should be encouraged to minimize the generation of non-hazardous waste through reduction, reuse, and recycling. Non-hazardous waste generated on-site is to be managed according to these procedures:

- Provide appropriate waste storage containers
- Provide separate containers for each category of waste (e.g., concrete, cardboard, drywall, steel and wood) for sorting purposes or based on their end-use (e.g., recyclable or green) in accordance with Ontario Regulation 103/94
- Label containers and keep them in good condition, sealed, closed/covered at all times to prevent wildlife attraction, ensure safety and to comply with proper handling requirements

- Transfer waste regularly from points of waste generation to central consolidation or transfer points
- Store waste until quantities are adequate to be transported for recycling, treatment and disposal as per municipal regulations
- Transport waste according to provincial and municipal requirements
- Dispose of excess construction material and debris in accordance with the project site requirements
- Place waste to be transported from the site into containers with proper labelling to ensure safety and prevent loss of materials in surrounding environments
- Equip waste transport vehicles with spill response kits and train drivers in proper procedures in the event of a spill, and
- Reuse/recycle materials from structures slated for decommissioning or demolition, where possible.

### *7.9.6 Maintenance and Monitoring*

The construction contractor is to conduct an audit of construction waste generated and address the extent to which materials or products used consist of recycled or reused materials (Ontario Regulation 102/94). Based on the results of the audit, the construction contractor is to develop and implement a Waste Reduction Work Plan to reduce, reuse and recycle waste generated during a project and will include measures for communicating the plan to on-site workers.

As an element of the above-noted Plan, construction contractors are to record quantities, material type and final destination of all waste, recyclable and reusable materials managed off site. A written record of the material management is to be provided to the WT's or other responsible party's contract administrator on a regular basis, at least monthly.

### *7.9.7 References*

City of Toronto. 2007. *The Toronto Green Development Standard, January 2007.*

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

Ontario Ministry of the Environment. 2003. *Fact Sheet: Banning the Spread of Untreated Portable Toilet Waste.*

Government of Canada. 1992. *Hazardous Waste Management: Canadian Directions.* http://dsp-psd.tpsgc.gc.ca/Collection-R/LoPBdP/BP/bp323-e.htm#C.%20Storage(txt)

Habitat Associates with the Ontario Home Builders' Association. 1997. *Sustainability in Practice: Reducing Construction Waste in the Ontario Residential Construction Industry*

## 7.10 Stormwater / Surface Water Management

### *7.10.1 Environmental Concerns*

Stormwater and surface water affected by construction activities can cause environmental impacts during project-related activities. These include general runoff with erosion and the formation of ruts and puddles on-site than can contain sediment-laden water and create excessive mud build up on tires, which can then be transported onto local roads and dispersed into the environment with stormwater or as dust. Improper management of stormwater and surface water is a pathway for potentially contaminated soil and/or groundwater to move off site and into the environment.

Vehicle and equipment cleaning procedures and practices are typically used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain systems or watercourses. On-site vehicle and equipment washing is discouraged to minimize water usage and runoff effects; however, when necessary to control the migration of contaminants from the site, capture and management of wash water will be required. Where necessary, these activities must be conducted at dedicated vehicle washing sites, where wash water can be collected and controlled.

Impacts to surface water could also be a primary concern if activities associated with a project required in-water works. All works within water must ensure mitigation against impacts to the surface water and lakebed as well as the prevention and spread of spills in the surface water.

### *7.10.2 Regulatory Framework*

Project-related stormwater and surface water is to be managed in a manner that does not adversely affect fish habitat and considers associated requirements of the federal *Fisheries Act*.

All works are to comply with the *EPA* (Part V) and the *OWRA* (section 29), which are intended to protect and manage the quality and quantity of surface water and groundwater.

A MOE C of A for Industrial Sewage Wastewater Discharge may be required as stipulated by the *OWRA* (sections 33 and 53) to regulate effluent discharge directly to surface water bodies during construction and other project-related works.

The requirements laid out in the City of Toronto Municipal Code on Sewers (Chapter 681-4) are to be followed with respect to the discharge or deposit of matter of any type into a storm sewer, watercourse, and municipal or private sewer connection to any storm sewer.

In addition, the Toronto Green Development Standard provides an integrated set of targets, principles, and practices to encourage sustainable development. A completed Toronto Green Standard checklist may be required as part of the planning approval process. With respect to this EPP, it ensures the protection of water quality during construction and demolition through adherence to TRCA's onsite erosion and sediment control guidelines and the implementation of an erosion and sediment control plan. An Erosion and Sediment Control EPP for Waterfront Toronto projects can be found in Section 7.4.

### 7.10.3 Causative Activities and Conditions

Surface water and stormwater that can be of concern on construction projects include, melting of snow, and pooling/seepage of water either from storm events or from excavated pits that are below the water table. If the volume of collected water exceeds the capacity of the on-site management features, overflows and runoff leaving the site could result in environmental impacts on adjacent properties.

Activities resulting from in-water works have the potential for altering surface water conditions, impacting the lakebed and introducing contaminants as a result of spills and generation of debris.

### 7.10.4 Application

Where potential impacts may occur to areas adjacent to a project site, stormwater and surface water management measures must be applied on-site prior to the start of any works. These measures must be maintained and modified as necessary throughout all phases of the project to address changing conditions.

### 7.10.5 Design and Implementation Considerations

In addition to the mitigation measures discussed in the Erosion and Sediment Control EPP (Section 7.4), temporary stormwater works described in a project-specific C of A must also be implemented, where applicable. To control the quality and quantity of runoff while project-related activities are taking place, the following measures are to be implemented:

- Install silt fences, blankets, and berms around construction areas, including the laydown area, and across sloping terrain/areas to prevent surface runoff from carrying sediment off-site and into any sewer
- Install sub-drains/catch basins in areas of excavations/trenches or areas sensitive to erosion in order to trap runoff
- Trap sediment using silt traps once sub-drains/catch basins have been installed
- Design and size ditches and stormwater management ponds appropriately to remove sediment before the water is discharged from the site; and
- Discourage the on-site washing of equipment and vehicles. Where necessary to control the migration of contaminated soil, an area for the washing of vehicles, which includes containment and treatment of wash water, is to be designated and located away from sensitive receivers.

These design considerations also address the requirements outlined in *LEED*® NC Sustainable Sites Prerequisite 1 Erosion and Sedimentation Control. The prerequisite provides objectives for preventing sediment release to storm sewers and receiving streams through the design of sediment and erosion control plans.

For in-water works, the following measures are to be implemented, based on EC's guidance document[3] for work in and around water:

- All work involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials shall be conducted so as to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Any water contacting uncured or partly cured concrete or Portland cement or lime-containing construction materials, such as the water that may be used for exposed aggregate wash-off, wet curing, equipment and truck washing, etc. shall be prevented from entering, directly or indirectly, to the aquatic environment unless this water has been tested and found to have a pH of between 6.5 and 9.0 and a turbidity of less than 25 NTU. Containment facilities shall be provided at the site for wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment as required
- Sediment or sediment laden waters or other deleterious substances shall not be allowed to enter the aquatic environment during the proposed work. Work should be conducted in accordance with best management practices, for example the sediment and erosion provisions of the *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada, 1993)
- An appropriate spill prevention, containment, and clean up contingency plan for hydrocarbon products (e.g. fuel, oil, hydraulic fluid, etc.), and other deleterious substances shall be put in place prior to work commencing, and appropriate spill containment and cleanup supplies shall be kept available on-site whenever the works are occurring. Further, all personnel working on the project should be familiar with implementing the spill clean up plan and the deployment of spill response materials, as indicated in Section 8
- If land-based equipment or machinery is used to conduct the proposed works, the equipment/machinery should operate upland of the proposed works. Impacts outside the footprint of the proposed works must be prevented
- All machinery used on-site should be in good repair and free of excess oil and grease. Any fuelling or maintenance of such equipment should occur on the upland well away from the foreshore
- If steel piles are to be used, they must be capped to prevent the entry of wildlife
- All demolition materials are to be disposed of upland in an authorized manner. Whenever possible, recycling of materials is encouraged, and
- Only clean, uncontaminated material, as approved by TRCA may be used as fill.

### *7.10.6 Maintenance and Monitoring*

A thorough check of the measures to manage stormwater and surface water must be conducted by the construction contractor on a daily basis, especially before and after a forecast storm/rain event. Construction contractors are to be aware of upcoming weather conditions and modify/implement appropriate measures in order to prevent off-site migration of sediment or

[3] Environment Canada – Pacific and Yukon. 2008. *Interim Guidance for Addressing Water Quality for Work In and Around Water*

contaminated water. Any deficiencies in the mitigation measures must be addressed and/or repaired immediately. It is best to inspect the stormwater and surface water mitigation measures within 24 hours of a rain event. Inspection should include information relating to:

- The hydraulic operation of the facility (detention time, evidence or occurrence of overflows)
- Obstructions at the inlet and outlet and removal of objects
- Verification that dumpsters, paints and chemicals are covered
- Evidence of spills and oil/grease contamination, and
- Trash build-up.

Should any evidence of spills, contamination or trash build-up be identified, the construction contractor must address the source of the issue and remediate or remove the contamination or trash.

### *7.10.7 References*

Environment Canada – Pacific and Yukon. 2008. *Interim Guidance for Addressing Water Quality for Work in and around Water*

Center for Environmental Excellence by AASHTO. 2008. *Chapter 4: Construction Practices for Environmental Stewardship - Section 4.6: Vehicle Fluid, Fuel and Washwater Control*

City of Toronto. 2007. *The Toronto Green Development Standard, January 2007.*

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

U.S. Environmental Protection Agency. 2004. *Construction Site Operator BMP Inspection and Maintenance*

Ontario Ministry of the Environment. 2003. *Stormwater Management Planning and Design Manual*

## 7.11 Traffic Management

### *7.11.1 Environmental Concerns*

Traffic to and from project sites include a variety of vehicles and equipment that have the potential for causing environmental impacts including traffic delays/congestion, detours, damage to roads from heavy/tracked equipment, and an increase in dust, exhaust emissions and noise.

### *7.11.2 Regulatory Framework*

All motor vehicles used for project activities are to be in compliance with the Ontario *EPA*, Part III, section 23 which regulates motor and motor vehicle operations.

Project-related works represent significant changes to the local environment. As such, site plan control review and approval (*Planning Act*) may require that a Traffic Operations Assessment be submitted to the City of Toronto and that an approved **Traffic Protection Plan** be obtained from the City.

Zoning amendments, occupancy permits, heavy haul traffic arrangements, and other parking by-laws and ordinances are to be considered, in accordance with the *Toronto Municipal Code, Part II and III Traffic and Parking By-laws*. Available resources from the Ontario Provincial Police, Toronto Police Service and/or the Ontario Ministry of Transportation may be used for project-related activities. The need for these resources are to be identified in the Traffic Protection Plan.

### *7.11.3 Causative Activities and Conditions*

Project-related traffic volumes can vary and may cause disruptions to nearby residences and businesses through heavy trucks, construction equipment, employee parking, traffic delays and congestion, detours, damage to roads, and an increase in dust, exhaust emissions and noise.

### *7.11.4 Application*

Traffic management measures will be evaluated before a project begins and implemented throughout a project. All personnel associated with the project are to be aware of the traffic management issues and are to conduct project-related activities in accordance with the approved Traffic Protection Plan, where applicable. Continual updates and modifications in traffic management are to be performed based on the effectiveness in minimizing traffic-related disruptions. Air Quality and Dust Management (Section 7.1) and Noise and Vibration Management (Section 7.8) EPPs are to be consulted in the preparation of project specifications to ensure implementation of appropriate mitigation measures.

### *7.11.5 Design and Implementation Considerations*

Construction activities are to be staged to minimize and avoid where possible, traffic delays and related effects to residents, business owners, facility owners/users, and motorists, cyclists and pedestrians traveling through the area. The prevailing site conditions, including an overview of existing traffic conditions adjacent to the site with respect to traffic volumes, lane markings, on-

street parking and pedestrian and cycle routes, are to be documented in order to develop a traffic management strategy.

Traffic management planning is to consider the following:

- Maximum number and tonnage of construction vehicles arriving and departing the site at any one time (hourly or daily rate in peak)
- Vehicle entry and exit points considering the evolving stages of construction
- Routes between the site and major arterial roads for construction vehicles that minimize use of residential streets
- Queuing locations for arriving vehicles if not solely on-site (engines are to be switched off when using these queuing locations)
- Work zones for any area of public land to be occupied including plans of the affected area and the duration of occupation
- Information concerning oversized vehicles including their location and duration of stay, is to be provided to the proper authorities (municipal authorities, Toronto Police Service, local OPP office, fire and emergency services) (all oversize vehicles must obtain permits from the City of Toronto, Ontario Provincial Police, Toronto Police - 72 hours prior to arrival at the site)
- Arrival times for construction vehicles (arrival of construction vehicles other than oversize vehicles must not take place prior to 6:30 in the morning in residential areas)
- Method of loading and unloading of construction vehicles, and
- Routes to be used by construction personnel including suitable and sufficient parking facilities on or near the construction site.

### *7.11.6 Maintenance and Monitoring*

Construction contractors must ensure the effectiveness of traffic management for the project and take the necessary steps to implement or improve measures that minimize disruption to local residents and businesses. These may include:

- Providing authorities with any updates or changes to planned traffic events and obtain permits as required (including closures, duration, detours and alternative routes)
- Providing prior notice to residents of potential traffic impacts through the use of an appropriate medium (newspaper, mail drop, local media announcement, etc.), where necessary
- Providing on-site traffic signage and traffic conductors (automated or flag-person) for heavy haul traffic with the use of traffic lights, where practical
- Maintaining access for emergency vehicles and school buses at all times on designated routes
- Providing temporary access for residents at all times during the length of construction, where necessary, and

- Installing adequate night-time accident-prevention measures (lights, flashers, road markings etc.) throughout the construction period.

Construction contractors are to ensure that all roads used by construction-related traffic are free of debris and that dirt and dust are kept to an acceptable level. Regular road sweeping and cleaning are to be implemented at a frequency that effectively maintains the off-site roads in a condition that would not result in dust generation, sediment transport or nuisance effects in the community.

The Air Quality and Dust Management (Section 7.1) and Noise and Vibration Management (Section 7.8) EPPs provide guidelines for ensuring effective transportation management for the project.

Any traffic/parking complaints received from the public are to be addressed in accordance with **complaint filing and management procedures** developed by the construction contractor.

### *7.11.7 References*

City of Toronto Transportation Services. 2008. http://www.toronto.ca/transportation/

City of Toronto. 2003. *Traffic Control Policy.* http://wx.toronto.ca/intra/hr/policies.nsf/9fff29b7237299b385256729004b844b/0062fd60774a35fa85256d08006e0634/$FILE/TrafficControlPolicy_Standards_approved.pdf

## 7.12 Vegetation Management

### *7.12.1 Environmental Concerns*

General construction activities give rise to a number of environmental concerns that can be addressed through management of vegetation at the site, including:

- Protection of existing vegetation
- General weed prevention and invasive species control
- Control of vegetative debris, and
- Minimizing erosion and disturbance of soils.

Vegetation management is to be considered at the planning and design stage of a project to ensure that intermittent stream channels, shore lines and drainage swales are kept in a free-to-grow, low-maintenance condition and that the potential for invasive plants to become established from construction activities is minimized as much as possible. *LEED*® NC, Sustainable Sites Credit 5.1 for Reduced Site Disturbance provides direction on achieving conservation of existing natural areas and restoration of damaged areas.

### *7.12.2 Regulatory Requirements*

Management of vegetation is to be carried out in a manner that does not adversely affect fish habitat and considers associated requirements of the federal *Fisheries Act*.

The requirements outlined in the *Migratory Birds Conservation Act* stipulates that any removal of vegetation should be carried out at the appropriate time of year to protect migratory birds. All projects must adhere to this Act.

With respect to vegetative debris, Part V, section 26 of the *EPA* prohibits the storage or disposal of wastes that are likely to create a nuisance. Section 86 of the Act prohibits the abandonment of any material that may become litter. Part X of the *EPA* provides direction on the disposal of pollutants and is to be followed. Project activities which generate vegetative debris are to ensure compliance with these sections of the EPA.

Should a project require weed control with compliance stipulated under the *Weed Control Act* and require the use of pesticides, the Ontario *Pesticide Act* as well as the Toronto Municipal Code Chapter 612 are to be considered. In all other circumstances, the application of pesticides is not permitted.

A Natural Heritage Impact Study may be required as part of the planning approvals process for projects in or near natural heritage systems as identified on Map 9 of the Official Plan or areas defined as municipal Environmentally Significant Areas. A Natural Heritage Impact Study is required for any undertaking within a designated Environmentally Sensitive Area under Official Plan Policy 3.4.13.

A permit may be required under the Ravine and Natural Feature Protection by-law (Toronto Municipal Code Chapter 658), which regulates activities that may injure or destroy a tree, or alter the grade of the land.

The Toronto Municipal Code Chapter 813, Article III is commonly referred to as the City's "Private Tree By-law". This by-law regulates injury or removal of privately owned trees which measure 30 cm in diameter or more as measured at 1.4 m above ground level. All construction activities are to adhere to the regulations outlined in this by-law to ensure protected trees are not damaged or harmed.

In addition, the Toronto Green Development Standard provides an integrated set of targets, principles, and practices to encourage sustainable development. A completed Toronto Green Standard checklist may be required as part of the planning approval process. With respect to this EPP, it provides guidance in ensuring the protection of urban trees and should be referred to if a Tree Protection Plan is required.

### *7.12.3 Causative Activities and Conditions*

Project-related activities such as excavation, grading and movement of heavy equipment and vehicles can damage trees, wetlands and riparian areas.

If clearing and grubbing activities are required for a project, vegetative debris including brush, trees, and stumps will be generated.

Significant environmental damage can also result through the invasion of fugitive and exotic plants that could potentially compete with, or otherwise disrupt, native/adapted plant habitats when these habitats are disturbed through project-related activities.

### *7.12.4 Application*

The need for vegetation management is to be evaluated by WT or other responsible party in consultation with technical experts prior to the start of a project. Where project conditions warrant it, a **Vegetation Management Plan** that may include such components as a **Tree Protection Plan** or an **Integrated Pesticide Management Pan**, will be developed by an ecological specialist retained by WT or other responsible party. Construction contractors are to implement identified measures during the project to manage vegetation appropriately. The Vegetation Management Plan can be modified as necessary to mitigate against adverse impacts from project-related activities.

### *7.12.5 Design and Implementation Considerations*

The level of vegetation management planning required is based on the site location and surrounding area. The evaluation, which must be conducted at the design stage and may require the involvement of an ecological specialist, should include:

- An inventory (to “vegetation type” level) of the vegetation on the project site, described in accordance with the Ecological Land Classification System, including a species list
- Identification of existing tree and other vegetation protection measures
- Preparation of a Tree Protection Plan by a qualified arborist or approved tree professional retained by WT or other responsible party working in consultation with City of Toronto Urban Forestry Services where required by City of Toronto by-laws. Each construction project will have its own unique requirements for tree protection depending on the type and size of trees located at or near the site. Tier 2 designation under the Toronto Green Standard requires

that any trees with a diameter greater than 15 cm measured at 1.4 m above ground level be retained throughout the construction and development period.

- Identification of areas of the site that are to be maintained or returned to a natural self-sustaining vegetated state as well as those that are to be converted to a non-vegetated surface, i.e., buildings, roads, parking areas, lined ponds. The Toronto Green Standard requires the retention and reuse of all uncontaminated on-site soil in areas not covered by buildings or hard surfaces. Where this cannot be achieved, the soil should be replaced with soil of equal or better quality to encourage revegetation and minimize future erosion potential.
- Proposed treatment and buffers from development for areas where site alteration is prohibited and for intermittent stream channels and treatment of drainage swales that results in free-to-grow, low-maintenance management
- Temporary designated storage locations for vegetative debris and mitigation of impacts to watercourses and soil erosion, and
- Preparation of an Integrated Pesticide Management Plan (IPM) in accordance with Landscape Ontario IPM practice requirements, as warranted by site conditions. The IPM may include watering regimens, biocide and fertilizer applications and controls/restrictions, including targets for reducing water, biocide and fertilizer use.

For general weed prevention practices and invasive species control, construction contractors are to ensure that:

- Seeds and straw material are certified as weed-free, and
- Areas of noxious weeds are identified and treated, as determined by an ecological specialist prior to the start of project-related activities.

If projects are located near extremely sensitive or protected areas, added prevention practices, such as equipment inspections and cleaning may be required. To comply with *LEED*® Reduced Site Disturbance, the following specific requirements must be incorporated into the project specifications:

- For greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 12 meters beyond the building perimeter, 1.5 meters beyond primary roadway curbs, walkways, and main utility branch trenches, and 7.5 metres beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area, and

- For previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation.

### *7.12.6 Maintenance and Monitoring*

Tree protection barriers and zones are to remain until all site activities, including landscaping, are complete. Construction contractors are to inspect all tree protection barriers and zones daily and ensure that they are properly maintained (i.e., upright, no rips or holes, etc.). The

arborist retained by WT or other responsible party will provide written notice to the City of Toronto Urban Forestry Services prior to the removal of the tree protection barriers.

Any roots or branches extending beyond the tree protection zones are to be pruned by a qualified arborist or other tree professional as approved by the City of Toronto Urban Forestry Services and retained by WT or other responsible party. Pruning of tree roots and branches will be in accordance with good arboricultural standards. The arborist or tree professional will contact Urban Forestry Services no less than 48 hours prior to conducting any work.

Construction contractors are to ensure that vegetation debris is properly managed. This includes storing all vegetative debris in designated areas, ensuring that vegetative debris is covered, and transporting vegetative debris off site in trucks with covers or caps to contain the debris. Transport of vegetative debris to an appropriate disposal location is determined by the construction contractor.

Due to the rapid spread of invasive plants in areas of disturbed soil, soil disturbance and vegetative removal should be minimized. Vehicles that have entered weed-infested areas are to be cleaned and inspected before entering into non-infested areas.

As soon as possible following construction, the construction contractor will re-vegetate or otherwise prevent the establishment of weeds in applicable areas of the project site. Re-vegetation must use plant types that have a high likelihood of survival and are native to the area.

### *7.12.7 References*

Center for Environmental Excellence by AASHTO. 2008. *Chapter 4: Construction Practices for Environmental Stewardship - Section 4.10: Vegetation Management In Construction*

City of Toronto. 2007. *The Toronto Green Development Standard, January 2007.*

Canada Green Building Council. 2004. *LEED® Green Building Rating System for New Construction and Major Renovations LEED® Canada-NC Version 1.0*

City of Toronto Urban Forestry Services. 2002. *Tree Protection Policy and Specifications*

## 7.13 Wildlife Management

### *7.13.1 Environmental Concerns*

The WT Development Area includes areas that have both aquatic and terrestrial wildlife habitats. Project-related activities that are conducted near these habitats may impact both the habitats and associated wildlife species. The incorporation of wildlife management protocols in project-related activities can protect wildlife species and their habitat.

### *7.13.2 Regulatory Requirements*

#### 7.13.2.1 Federal Regulations

The *Canada Wildlife Act* provides for the protection of marine areas and wildlife in danger of extinction and also prescribes measures for the conservation of wildlife. The *Species at Risk Act* is a key federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides for the legal protection of wildlife species and the conservation of their biological diversity. Activities associated with WT projects are to be in compliance with these Acts.

To ensure that WT projects do not result in harmful alteration, disruption or destruction (HADD) of nearby sensitive watercourses, compliance with sections 35 to 43 of the *Fisheries Act* is required. This requirement will apply to proposed projects or work near water and fish habitat.

The *Migratory Birds Convention Act* provides conventions for protecting and conserving migratory birds and their nests. It is enforced by Environment Canada (Canadian Wildlife Service) and must be followed if project-related activities can potentially impact or disrupt migratory birds and their nests.

#### 7.13.2.2 Provincial Regulations

Ontario Regulation 166/06 of the *Conservation Authorities Act* requires a permit from the Toronto and Region Conservation Authority (TRCA) for development and interference with wetlands and alterations to shorelines and watercourses.

As well, all project activities must adhere to the *Ontario Endangered Species Act*, which provides for the protection of species at risk and their habitat.

### *7.13.3 Causative Activities and Conditions*

Construction activities such as tree and vegetation removal, excavation, and movement of heavy equipment and vehicles have the potential to impact, disrupt, and potentially harm aquatic and terrestrial wildlife and their habitats. As well, some terrestrial wildlife can also pose a threat to human safety. Generally, wildlife will not bother humans unless they are surprised or threatened.

### *7.13.4 Application*

At the project planning stages, WT or other responsible party must consider the need for a **Wildlife Management Plan** depending on the proximity to wildlife habitats or the potential for encountering and/or impacting wildlife species. Wildlife experts and biologists may need to be consulted in areas where a project will encroach upon sensitive and/or protected wetlands, vegetated valleys, and water bodies. Where project conditions warrant the preparation of such a plan, a wildlife consultant retained by WT is to prepare the plan in consultation with the TRCA. This consultation will also identify any permitting required by the project, particularly in relation to alterations to aquatic and terrestrial habitats. The plan is to be included in the project specifications, which will be implemented by the construction contractor.

Measures for the management and protection of wildlife including reduction of mortalities associated with vehicle collisions, wildlife habitat fragmentation, impacts to amphibians/aquatic habitats, and exclusion periods during construction are to be addressed in the Wildlife Management Plan.

Projects must minimize disruption to wildlife habitats as much as possible. All necessary precautions are to be taken by project personnel to avoid creating situations that attract wildlife.

### *7.13.5 Design and Implementation Considerations*

The Wildlife Management Plan will be prepared through field assessments by the ecological consultant to confirm the presence of sensitive species and their habitats. The plan will identify wildlife mitigation activities and strategies including:

- Field assessments to confirm that impacts of the specific design features and construction methods proposed in the project specifications do not exceed those assumed in the Environmental Assessment or other applicable environmental guiding document for the project
- The identification of construction mitigation measures (general and site specific) including timing restrictions, wildlife salvage, prevention of barriers to wildlife movement, and buffer retention
- Specific mitigation measures identified through consultation with the Aquatic Habitat Toronto working group, and
- The inclusion of wildlife enhancement considerations in site rehabilitation and restoration planning.

Wildlife protection measures are to address the specific types of terrestrial and aquatic species and communities that are identified to occur in the habitat areas and that could be affected by the proposed works. For projects that may impact wildlife, a wildlife specialist is to be retained by WT in order to provide monitoring during key animal activity periods and/or where wildlife may impact or be impacted by construction activities.

Noise and vibration mitigation measures, as outlined in the EPP in Section 7.8, should be consulted in order to minimize effect on wildlife and their habitats.

### *7.13.6 Maintenance and Monitoring*

**Aquatic Wildlife**

General procedures for the maintenance and monitoring of the aquatic environment will:

- Consider and incorporate where applicable, the recommendations made for protection of the aquatic environment in an Environmental Assessment that may have been conducted for the project
- Minimize disturbance to all wetlands when activities are carried out through and adjacent to these areas
- Where possible conduct activities in the vicinity of aquatic habitats during winter months to reduce impacts to the aquatic environment
- Fence the entire construction site and install silt fencing along all protected aquatic wildlife habitats and water bodies within 30 m of the construction site
- Organic and mineral soils that are excavated from wetlands may be used as berms to isolate the construction area from the adjacent wetland or aquatic wildlife habitat, and
- When monitoring of watercourses in the vicinity of the project suggest that the aquatic environment may be affected by the work, (e.g., transport of sediment), implement mitigation measures to address the concern.

Where avoidance of construction activities in or near wetlands or water bodies is not possible, the construction contractor is to implement habitat enhancements as identified by the wildlife expert that has been retained by WT or other responsible party. These enhancements may include rip rap and vegetation plantings to provide a greater in-water habitat diversity and improve riparian vegetation.

**Terrestrial Wildlife**

General procedures for the maintenance and monitoring of terrestrial wildlife are to include:

- A survey of the construction site to identify terrestrial wildlife, nesting birds, amphibians using vernal pools, reptile nest activity, and movement between habitat areas and general mammal movement
- Appropriate action to be taken should sensitive species be identified
- Clear vegetation during winter to reduce impacts to species that use the areas as corridors and nest sites, where possible
- Fence construction areas to prevent wildlife access, and
- Avoid unnecessarily removing or destroying terrestrial wildlife habitat.

All construction personnel must report wildlife observations that may impact on or be impacted by project-related activities to the wildlife consultant that was retained by WT or other responsible party. Should terrestrial wildlife be encountered on the project site, personnel are to move a safe distance away from the animal and wait for the animal to move off the project site. Should an animal persist on-site, an appropriate response plan is to be developed by the wildlife consultant in consultation with the construction contractor, TRCA and Ontario MNR.

### *7.13.7 References*

Species at Risk Public Registry. 2008. *http://www.sararegistry.gc.ca/default_e.cfm*

Department of Fisheries and Ocean. 2008. Working in and around Water. http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/water-eau/index_e.asp

Environment Canada. 2006. Great Lakes Wetlands Conservation Action Plan Highlights Report 2003–2005. Environment Canada, Toronto, Ontario.

Toronto and Region Conservation Authority. 2004. Lower Don Valley Biological Inventory.

Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide.

# 8.0 CONTINGENCY AND EMERGENCY RESPONSE PLANS

EPPs are intended to address normal operations at project sites. Regardless of planning and precautions implemented to avoid upset conditions, unexpected events may still occur. Contingency plans for spill control and emergency response plans for unexpected situations provide the means to mitigate or otherwise manage, environmental consequences that may otherwise result.

Typically, demolition and construction contractors maintain corporate spill prevention and contingency plans and emergency response plans tailored to the nature of the work undertaken by them. Although there may be features that are common to every plan, plans for the demolition or construction of high-rise buildings differ from those associated with excavation projects or works in watercourses.

All construction contractors working in the WT Development Area are required to develop and implement a spill prevention and contingency plan and an emergency response plan that consider the project-related activities to be undertaken in their contract.

## 8.1 Spill Prevention and Contingency Plan

A Spill Prevention and Contingency Plan provides on-site personnel with information relating to the prevention of and response to spill events involving liquid chemicals and fuels. Appropriately-trained personnel can react to spills in a proactive manner so that adverse impacts from such releases are reduced. This Plan may be incorporated into a construction contractor's health, safety and environmental manual that is prepared for the contract.

Spill Prevention and Contingency Plans are to include:

***Spill Prevention***

- Identification of type and location of fuels or chemicals that are to be stored and used during project-related activities
- Requirement for all containers to be identified according to the WHMIS standard
- Proactive methods and procedures for material storage and use to prevent spills, including containment, fuelling inspections and training
- Requirement for the maintenance of spill response materials (shovels, absorbents, etc.) in a designated area on-site
- A monitoring program to document condition of materials and compliance with use and storage standards, and
- Provision for employee training on the storage and use of materials and prevention of spills.

***Spill Response***

- Spill response procedures for each material that may be spilled with appropriate responses for the potential risk associated with a release
- Provision for the appropriate delegation of responsibility to specific on-site staff

- Provision for the assessment of reportable spills
- Requirements for internal (e.g., WT, contractor management) and external (e.g., MOE Spills Action Centre, Toronto Public Health and City of Toronto Works and Emergency Services) reporting, including follow-up reporting after the response
- Information on emergency services contacts for spill response
- Requirements for documentation of the spill and response through photographs of the spill incident, and
- Requirements for the documentation of remediation of the spill area and disposal of spill clean-up materials in accordance with Ontario Regulation 347 under the *EPA*.

## 8.2 Emergency Response Plan

An Emergency Response Plan describes, in detail, a construction contractor's policy and procedures for handling and responding to an emergency situation on-site. These policies and procedures must define how the construction contractor will protect people and property at the site during an emergency. For the purposes of projects in the WT Development Area, the emergency response plan should be compatible with the City of Toronto's emergency response plan.

As part of an Emergency Response Plan, these measures must include:

- Preparations for reasonably anticipated emergencies (i.e., storms) that provide for the protection of the site and surrounding area from the anticipated emergency
- Communication protocol in the event of emergencies (i.e., fire, flood, storms, power outages, explosions, etc.)
- Identification of emergency muster stations and the types of materials and documentation that will be maintained at the muster stations (e.g., emergency contacts, first aid kit, site map, evacuation location, fire extinguisher, MSDSs, spill kit and an air horn), and
- Emergency contact information, including fire, medical, security, and evacuation.

# APPENDIX A

# Applicable Regulatory Requirements

**(Note:** Changes in the regulatory environment may occur at any time. Responsible parties, designers, consultants and construction contractors are responsible for confirming that the cited regulations are current)

| Legend: Acronyms | | | |
|---|---|---|---|
| **CCME** | Canadian Council of Ministers of the Environment | **EC** | Environment Canada |
| **CEAA** | Canadian Environmental Assessment Act | **EC (CWS)** | Environment Canada (Canadian Wildlife Service) |
| **CEPA** | Canadian Environmental Protection Act | **EAA** | Environmental Assessment Act |
| **CEQG** | Canadian Environmental Quality Guidelines | **MOE** | Ontario Ministry of the Environment |
| **CSA** | Canadian Standards Association | **OWRA** | Ontario Water Resources Act |
| **DFO** | Department of Fisheries and Oceans Canada | **SARA** | Species At Risk Act |
| | | **TSSA** | Technical Standards and Safety Authority |
| | | **TRCA** | Toronto and Region Conservation Authority |

| Regulatory Component | Agency or Administrator[1] | Part and/or Section | Regulated Activity/Element | Applicable Project Components |
|---|---|---|---|---|
| **Federal Jurisdiction** | | | | |
| *Fisheries Act* (R.S. 1985, c. F-14). | DFO | s. 35 to 43 | Address fish habitat protection and pollution prevention and are intended to ensure activities do not result in harmful alteration, disruption or destruction (HADD) of fish habitat (i.e., Don River, Lake Ontario). The *Act* prohibits the deposit (by discharge, spraying, releasing, dumping, leaking, or otherwise) of deleterious substances into waters frequented by fish, including lakes and rivers and including storm drains that may lead to such waters. Facilities and activities regulated under this *Act* are required to conduct environmental effects monitoring as part of a program to assess effectiveness of their activities in terms of legislative and regulatory compliance. Section 37 requires that a proponent receive approval from the Minister or designated person before proceeding with any activity that may result in the HADD of fish habitat or the deposit of any deleterious substance in fish habitat. | Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Stormwater/Surface Water Management; Vegetation Management; Wildlife Management |
| *Canadian Environmental Protection Act* (1999, c. 33) | EC | Part 5 | CEPA governs pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. Part 5 pertains to controlling toxic substances and provides for the regulation and release of toxic substances. | Contaminated Soils Management; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management |
| | | Part 8 | Part 8 pertains to environmental matters associated with emergencies and provides requirements for environmental emergency plans, regulations and, remedial actions for an uncontrolled, unplanned or accidental release of a substance into the environment. | Air Quality and Dust Management; Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Spill Prevention and Contingency Plan; Emergency Response Plan |
| *Canadian Environmental Assessment Act* (1992, c.37) | EC | | CEAA ensures that the environmental effects of projects are carefully considered before federal authorities act in connection with them. CEAA t requires that an environmental assessment (EA) be carried out before an undertaking is initiated when any of the following conditions apply:<br>i) the federal authority (FA) is the project proponent<br>ii) the FA funds or facilitates funds for the project<br>iii) the FA has control over the lands associated with the project and transfers control of the lands to enable the project, and<br>iv) the FA issues an approval, license or otherwise permits the project to proceed. | General – applies to all WT projects and activities. Individual EPPs can be used to document implementation of mitigation measures identified in project EAs |
| Canadian Environmental Quality Guidelines | CCME | | Provides nationally endorsed science-based goals for the quality of atmospheric, aquatic and terrestrial ecosystems and<br>• document chemical-specific fact sheets that summarize the key scientific information and rationale for each substance<br>• detailed summary tables of recommended guidelines for the different media and resource uses, and<br>• protocols used in developing the CEQG, along with their associated implementation guidance. | General – applies to all WT projects and activities. |
| *Migratory Birds Convention Act*, 1994 (1994, c.22) | EC (CWS) | | Implements a Convention for protecting and conserving migratory birds — as populations and individual birds — and their nests. | Vegetation Management; Wildlife Management |
| *Species at Risk Act* | Minister of | | SARA aims to prevent species, subspecies and distinct populations of wildlife from becoming extirpated or extinct; to | Wildlife Management |

| Regulatory Component | Agency or Administrator[1] | Part and/or Section | Regulated Activity/Element | Applicable Project Components |
|---|---|---|---|---|
| | Canadian Heritage; DFO; MOE; TRCA | | provide for the recovery of endangered or threatened species; and to encourage the management of other species to prevent them from becoming at risk. | |
| *Canada Wildlife Act* | EC (CWS) | | The Act provides protection of marine areas and wildlife in danger of extinction and also prescribes measures for the conservation of wildlife. | Wildlife Management |
| *CSA Z94.4-02 Selection, Use and Care of Respirators* | CSA | | Guidance document for the selection, use and care of respirators should methane or other contaminants be present on a project site. | Contaminated Soils Management; Methane Control; Project-Related Waste Management |
| **Provincial Jurisdiction** | | | | |
| *Environmental Protection Act* (R.S.O. 1990, c. E-19). | MOE | Part II, s. 6 and 14 | This Act provides for the protection and conservation of the natural environment. These provisions address general provisions for contamination and discharge and prohibits the discharge of any contaminant into the natural environment, if the discharge causes or may cause an adverse effect. | General – applies to all WT projects and activities. |
| | | Part II, s. 9 | This section regulates air emissions and the issuance of Cs of A for Air and Noise. This pertains specifically to projects that require the installation of gas interception and venting systems for methane gas control. | Methane Control |
| | | Part III, s. 23 | This section addresses motor and motor vehicles and prohibits the operation of a motor or motor vehicle that does not comply with the regulations. | Traffic Management |
| | | Part V, s. 26 and Part IX, s. 86 | This section addresses waste management and litter. Section 26 includes the prohibition of storage or disposal of wastes that are likely to create a nuisance, or that may violate the *Ontario Water Resources Act*. Section 86 of the Act prohibits the abandonment of any material in a place, manner, receptacle or wrapping such that it is reasonably likely that the material will become litter. | Erosion and Sediment Control; Fuels and Lubricants Management; Project-Related Waste Management; Stormwater/Surface Water Management; Vegetation Management |
| | | Part V, s. 27 | This section regulates waste management systems and the issuance of Certificate of Approvals. This pertains specifically to the removal and treatment of contaminated soils and management of project-related wastes. | Contaminated Soils Management; Project-Related Waste Management |
| | | Part X | This Part addresses spills and includes provisions for spill prevention and spill contingency plans, notice of spills, duty to mitigate and restore, and disposal of pollutants. | Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Vegetation Management; Spill Prevention and Contingency Plan; Emergency Response Plan |
| *Environmental Assessment Act* (R.S.O. 1990, c. E.18 | MOE | Part II | The EAA provides for the protection, conservation and wise management of the environment, including the social, economic and cultural aspects of the environment. Major public and designated private undertakings must conduct an EA prior to obtaining permits. Regardless of the undertaking size, type and proponency (e.g., private sector), it may be designated as subject to the EAA by the Minister. | General – applies to all WT projects and activities. |
| *Ontario Water Resources Act* (R.S.O. 1990, c. 0.40) | MOE | s. 29 to 34, 53 | The OWRA provides for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, to promote long-term environmental, social and economic well-being. The Act governs the release of contaminants to waters, such that the water must not be impaired. Sections 29 to 33 pertain to the supervision of all surface waters and groundwaters and prohibits or regulates the discharge of polluting material and sewage. Section 34 provides for the taking of water while section 53 pertains to the issuance of a C of A for industrial sewage wastewater discharge. | Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Stormwater/Surface Water Management |
| *Planning Act* (R.S.O. 1990, c. P.13) | City of Toronto | Part V | This Act relates to land use controls and related administration, including zoning by-laws and site-plan control. If any zoning amendments and site plan approvals/agreements are required, this Act must be followed. | General – applies to all WT projects and activities. |
| *Health Protection and Promotion Act* | Ministry of Health | | Establishes a role for TPH in aspects of a project that relates to the protection of the health of people of Ontario. | Air Quality and Dust Management; Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater |

| Regulatory Component | Agency or Administrator[1] | Part and/or Section | Regulated Activity/Element | Applicable Project Components |
|---|---|---|---|---|
| | | | | Management; Project-Related Waste Management; Spill Prevention and Contingency Plan; Emergency Response Plan |
| *Building Code Act,* 1992 (S.O. 1992, c. 23) | City of Toronto | s. 8 to 14 | These sections pertain to construction and demolition and includes the issuance of building permits. Required for the demolition and/or construction of buildings and structures associated with WT projects. | General – applies to all WT projects and activities. |
| *Waste Diversion Act*, 2002 (S.O. 2002, c. 6) | Waste Diversion Ontario and MOE | s. 25 | This Act promotes the reduction, reuse and recycling of waste and provides for the development, implementation and operation of waste diversion programs. | Project-Related Waste Management |
| O. Reg. 347 (R.R.O. 1990) General - Waste Management | MOE | s. 17.1 to 23 | Reg. 347 addresses the management, handling and disposal of waste. Under this regulation, waste generators and waste carriers are required to obtain identification numbers for any waste generation facility that is involved in the production, collection, handling or storage of subject waste which includes solid and hazardous waste. | Contaminated Soils Management; Project-Related Waste Management |
| O. Reg. 102/94 and O.Reg 103/94 – Waste Audits and Waste Reduction Work Plans & Industrial, Commercial, and Institutional Source Separation Programs | MOE | Part IV and V | These Parts pertain to the requirements for waste audits, waste reduction and waste work plans for large construction and demolition projects. | Project-Related Waste Management |
| O. Reg. 169/03- Ontario Drinking Water Quality under the *Safe Drinking Water Act* | MOE | s. 1& 2 | To ensure that construction projects protect groundwater supplies on adjacent lands. | Contaminated Soils Management; Fuels and Lubricants Management; Groundwater Management |
| *Pesticide Act* (R.S.O. 1990, c. P.11) | MOE | s. 4 | This Act must be adhered to when undertaking landscaping activities. | Vegetation Management |
| MOE Guideline NPC-119 | MOE | | NPC-119 regulates the amount of noise and vibration produced during blasting operations associated with construction activities. | Noise and Vibration Management |
| MOE Noise Assessment Criteria in Land Use Planning | MOE | | Outlines the requirements for feasibility and detailed noise impact studies should a project generate sound levels exceeding the requirements outlined in the document. | Noise and Vibration Management |
| Weed Control Act (R.S.O. 1990, c. W.5) | Ministry of Agriculture Food and Rural Affairs | | This Act provides for reducing the infestation of noxious weeds and to reduce plant diseases by eliminating plant disease hosts. | Vegetation Management |
| *Ontario Heritage Act* (R.S.O. 1990, c. O.18) | Ontario Ministry of Culture | Part IV & VI | This Act provides for the protection and conservation of cultural heritage and archaeological resources. Archaeological clearance must be obtained prior to construction and authorization is required for design. This Act must be adhered to in case there is the discovery of archaeological resources (handling, excavation and reporting of find) during construction. | Archaeological and Heritage Resources Management |
| O. Reg. 217/01- Liquid Fuels, *Technical Standards and Safety Act* & *WHMIS Regulation*. (R.R.O. 1990, Reg. 860, s. 26.) | TSSA | | This Act is to ensure that vehicle handling, fuelling and fuel storage during construction are in accordance with the TSSA. | Fuels and Lubricants Management |
| Fire Protection and Prevention Act (O.Reg. 388/97) and Ontario Fire Code | The Office of the Fire Marshal | Part 4 | This part of the Act provides guidelines for storing and handling of flammable and combustible liquids. | Fuels and Lubricants Management |
| | | Part 5 | This part of the Act provides guidelines for the storage, handling, and use of hazardous materials. | Project-Related Waste Management |
| O. Reg. 166/06, under the *Conservation Authorities Act* | TRCA | | This regulation ensures that planning, construction and operation activities are undertaken in accordance with the guidelines of the TRCA, which grants permission for development in or on the areas near shorelines, streams and rivers, and wetlands if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development. | General – applies to all WT projects and activities |

| Regulatory Component | Agency or Administrator[1] | Part and/or Section | Regulated Activity/Element | Applicable Project Components |
|---|---|---|---|---|
| Erosion and Sediment Control Guidelines for Urban Construction | TRCA | | This guideline ensures the protection of water quality during construction and demolition activities | General – applies to all WT projects and activities. |
| O. Reg. 213/91 – Construction Projects, *Occupational Health and Safety Act* | Ontario Ministry of Labour | Part II to III | This regulation is to ensure that the construction contractor adheres to the MOL labour codes outlined for general construction and excavation practices for all works on a project. | General – applies to all WT projects and activities. |
| O. Reg. 419/05 – Air Pollution – Local Air Quality | Clean Air Partnership; and MOE | Part III, s. 37 | Ensures regulation of emission of contaminants to the air through construction and sandblasting works. | Air Quality and Dust Management |
| *Endangered Species Act,* 2007 (S.O. 2007, c. 6) | MOE | | Identifies Species at Risk list in Ontario and stipulates the protection and recovery of species and includes prohibition on damage to habitat. | Wildlife Management |
| O. Reg. 153/04 – Record of Site Condition | MOE | | This regulation outlines acceptable standards for soil, groundwater and sediment quality for a site, depending on its land use. | Contaminated Soils Management; Groundwater Management |
| O. Reg. 903 (R.R.O. 1990) – Wells | MOE | | This regulation under the *Safe Drinking Water Act* ensures the proper construction, decommissioning and abandonment of wells. The standards outlined must be followed should works involving wells be required. | Groundwater Management |
| **Municipal Jurisdiction** | | | | |
| Toronto Municipal Code | City of Toronto | Part II, Ch.363 and 415 | Pertain to approvals and permits for building construction, demolition and site development. | General – applies to all WT projects and activities. |
| | | Part II, Ch. 517 and Part III Ch. 950 | Pertain to the restrictions on idling of vehicles and traffic and parking provisions and regulations for the city. | Traffic Management |
| | | Part II, Ch. 548 | Pertains to littering and dumping of refuse including recyclable materials and prohibited waste. | Project-Related Waste Management |
| | | Part II, Ch. 591 | General provisions and limitations for sound levels. | Noise and Vibration Management |
| | | Part II, Ch. 612 and Ch. 813 | Restrictions on the use of pesticides (612) and the protection of trees (813). | Vegetation Management |
| | | Part II, Ch. 681 | Pertains to stormwater, sanitary and combined sewer discharge requirements. | Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Stormwater/Surface Water Management |
| | | Part II, Ch. 851-9 | Pertains to water supply and in particular permit for a water service connection for the supply of water to the property for construction purposes. | General – dependent on type and requirements of the project |
| | | Ch.658 | Pertains to the injury or destruction of vegetation in the ravine and natural feature area | Vegetation Management |
| Archaeological Master Plan of the Central Waterfront | City of Toronto | | Provides guidelines for the management, development review and conservation of known and potential archaeological resources. | Archaeological and Built Heritage Resources Management |
| The Toronto Green Development Standard 2007 | City of Toronto | | Provides an integrated set of targets, principles, and practices to encourage sustainable development. | Air Quality and Dust Management ; Erosion and Sediment Control; Project-Related Waste Management Stormwater/Surface Water Management; Vegetation Management |

# APPENDIX B

# Applicable Regulatory Agency Contacts for Projects in the Waterfront Toronto Development Area

(**Note:** Contact information may change over time. It is the responsibility of all parties to maintain updated information.)

| Agency or Administrator | Department | Description | Applicable Project Components | Phone Number |
|---|---|---|---|---|
| **Federal Agency Contact Numbers** | | | | |
| Department of Fisheries and Oceans (DFO) | General | Any activity that may result in the harmful alteration, disruption or destruction (HADD) of fish habitat or the deposit of any deleterious substance in fish habitat must contact the DFO. | Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Stormwater/Surface Water Management; Vegetation Management; Wildlife Management | 613-993-0999 |
| Environment Canada (EC) | Ontario Regional Office | Governs pollution prevention and the protection of the environment. Should an uncontrolled, unplanned or accidental release of a substance into the environment occur, EC must be contacted. | Air Quality and Dust Management; Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Spill Prevention and Contingency Plan; Emergency Response Plan | 416-739-4826 Alternate: 1 800 668-6767 |
| | Canadian Wildlife Service | Any activity that could lead to impacts on the protection and management of migratory birds, nationally significant habitat and endangered species. | Wildlife Management | 819-997-2800 Alternate: 1 800 668-6767 |
| **Provincial Agency Contact Numbers** | | | | |
| Ontario Ministry of the Environment (MOE) | Spill Action Centre (SAC) | All spills or other emergencies must be reported to the SAC as soon as possible. This is a 24/7 service. | Fuels and Lubricants Management | 1-800-268-6060 Alternate: 416-325-3000 |
| | Toronto Regional Office Duty Officer – | Projects that may require approval and licenses for discharge of contaminants to the air, surface and ground water; management of wastes; and the use of pesticides must contact this department of the | All applicable EPPs that may require an MOE approval or license for project related activities. | (416) 314-6378 |

| Agency or Administrator | Department | Description | Applicable Project Components | Phone Number |
|---|---|---|---|---|
| | Operations Division | MOE to ensure compliance with environmental laws. | | |
| | Toronto Regional Office Duty Officer – Investigations and Enforcement Branch | Activities that may violate the Environmental Protection Act, Ontario Water Resources Act, Environmental Assessment Act, and/or Pesticides Act must contact this department of the MOE. | Air Quality and Dust Management; Contaminated Soils Management; Erosion and Sediment Control; Fuels and Lubricants Management; Groundwater Management; Project-Related Waste Management; Spill Prevention and Contingency Plan; Emergency Response Plan | (416) 326-6700 |
| Ontario Ministry of Natural Resources (MNR) | Greater Toronto Area Regional Office | Provides for the protection of fish and wildlife. Any activity that may impact wildlife including their habitat or works in the vicinity of water must contact MNR for consultation on applicable permits/licenses that may be required. | Wildlife Management | (905) 713-7400 Alternate: 1-800-667-1940 |
| Ontario Technical Standard and Safety Authority (TSSA) | General | TSSA must be contacted should a fuels related incident such as carbon monoxide poisoning, pipeline strikes, explosions, spills, leaks, fires, and/or the discovery of petroleum product occur. | Fuels and Lubricant Management; Spill Prevention and Contingency Plan; Emergency Response Plan | 416-734-3300 Alternate: 1-877-682-TSSA (8772) |
| Ontario Provincial Police (OPP) | General | OPP must be informed for activities that require the movement of oversized vehicles on provincial highways and may result in the requirement for a permit. | Traffic Management (Highways) | 1-888-310-1122 |
| **Municipal Contact Numbers** | | | | |
| City of Toronto | Heritage Preservation | Consultation with Heritage Preservation Services is required prior to activities that involve work on or near a structure on the Inventory of Heritage | Archaeological and Heritage Resources Management | 416-338-1076 Alternate: 416-338-1079 or 416-338-1096 for specific inquiries related to |

| Agency or Administrator | Department | Description | Applicable Project Components | Phone Number |
|---|---|---|---|---|
| | Services | Properties, or prior to any soil disturbance activities. | | archaeology |
| | Toronto Water's 24 hour spill reporting line (Water Services) | Any spill that results in the release of contaminants into catchbasins, stormwater sewers, or watercourses must report the incident to the 24 hour reporting line. | Erosion and Sediment Control; Fuels and Lubricants Management; Spill Prevention and Contingency Plan | 416-338-8888 |
| | Air Quality Information Line | Provides daily information on the smog alert status for the City. | Air Quality and Dust Management | 416-338-SMOG (7664) |
| | Toronto Building Customer Service | Provides formal permission from the City of Toronto to begin construction, demolition, addition or renovation on a property. | Building Permits | 416-392-7539 |
| | Solid Waste Management Services | Should be notified and consulted for handling the transfer and disposal of garbage onsite as well as the processing of recyclable materials. | Project-Related Waste Management | 416-338-2010 |
| | Transportation Services | Projects that require road and sidewalk maintenance; street cleaning, snow clearing and road salting; permits for on-street parking; construction events; traffic signs and pavement markings; and/or traffic signals and traffic safety construction planning must contact this department. | Air quality and Dust Management; Traffic Management | 416-338-9999 |
| | Urban Forestry | Projects that require maintenance and protection of private and city owned trees must inform this | Vegetation Management | 416-338-TREE (8733)<br>After hours emergency: 416- |

| Agency or Administrator | Department | Description | Applicable Project Components | Phone Number |
|---|---|---|---|---|
| | Services | department. | | 338-9999 |
| Toronto Police Service | General | Any activity that may or will compromise the safety of the public or individuals on or near site (i.e. injuries, fire, explosions, vehicle collisions, spills, etc.) | Emergency Response | In an Emergency: 911 Non-Emergency: 416-808-2222 |
| | Traffic Services | Toronto Police must be informed for activities that require the movement of oversized vehicles; local traffic signs/management; and any other construction or design that may impact the safety of the general public. | Traffic Management | 416-808-2222 |
| Toronto Fire Service | Fire Prevention South (Toronto) District | Any activity that may or will compromise the safety of the public or individuals on or near site (i.e. injuries, fire, explosions, vehicle collisions, spills, etc.) | Traffic Management; Spill Prevention; Emergency Response | In an Emergency: 911 Non-Emergency: 416-338-9350 |
| Toronto Emergency Medical Service (EMS) | General | Any activity that may or will compromise the safety of the public or individuals on or near site (i.e. injuries, fire, explosions, vehicle collisions, spills, etc.) | Emergency Response | In an Emergency: 911 Non-Emergency: 416-392-2000 |
| Toronto and Region Conservation Authority (TRCA) | Planning and Permits | Any activity within or adjacent to natural areas that may or will cause impacts to stream corridors, wetlands, and along the Lake Ontario shoreline. | Wildlife Management; | 416-667-6295 |

# APPENDIX C

# Recommended Procedures for Methane Management at the East Bayfront Precinct

July 14, 2009

## WATERFRONT TORONTO

# Recommended Procedures for Methane Management at the East Bayfront Precinct

**Submitted to:**
Waterfront Toronto
20 Bay Street, Suite 1310
Toronto, Ontario
M5J 2N8

REPORT

**Report Number:** 09-1113-0101

A world of capabilities delivered locally

Golder Associates

# Table of Contents

# 1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Toronto Waterfront Revitalization Corporation (Waterfront Toronto) on May 22, 2009 to provide a Methane Management Guidance document that will be used for Waterfront Toronto construction projects. The purpose of the document is to outline the minimum requirements for methane management for the development of Health and Safety plans during construction of buildings and facilities across the East Bayfront Precinct where methane has been previously and consistently identified by investigation.

This document presents a set of minimum recommended procedures for monitoring and managing methane and related gases during construction activities at sites within the East Bayfront Precinct.

Methane management and mitigation measures for permanent structures such as buildings and water park/skating rink will be provided in a separate report currently under preparation.

# 2.0 PURPOSE AND SCOPE

The recommended methane management procedures outlined in this document are to be used as guidelines for the development of Health and Safety plans by contractors who will develop the Site. This document meets the objectives of Waterfront Toronto's "Environmental Management Plan for Project-Related Activities (January 2009)". The general scope of work for this project was outlined in our proposal to Waterfront Toronto dated April 21, 2009.

*Golder has not independently assessed the presence of methane or other possible biogenic gases (e.g., hydrogen sulphide) and volatile gases (e.g., benzene) at the Site. For the purposes of this document, we have relied on the findings related to methane in the Phase I and Phase II environmental site assessment reports prepared by Dillon Consulting Limited (Dillon), referenced in Section 3.0, below. Copies of letters provided by Dillon to Waterfront Toronto addressing health and safety requirements for volatile organic compounds are attached. (Appendix A).*

The purpose of this document is to provide guidance to contractors, site owners, or owners' representatives on minimum recommended procedures for methane management during construction activities. Potential health and safety concerns due to other volatile gases are not addressed in this report. Please refer to the Dillon letters referred to above regarding other volatile gases.

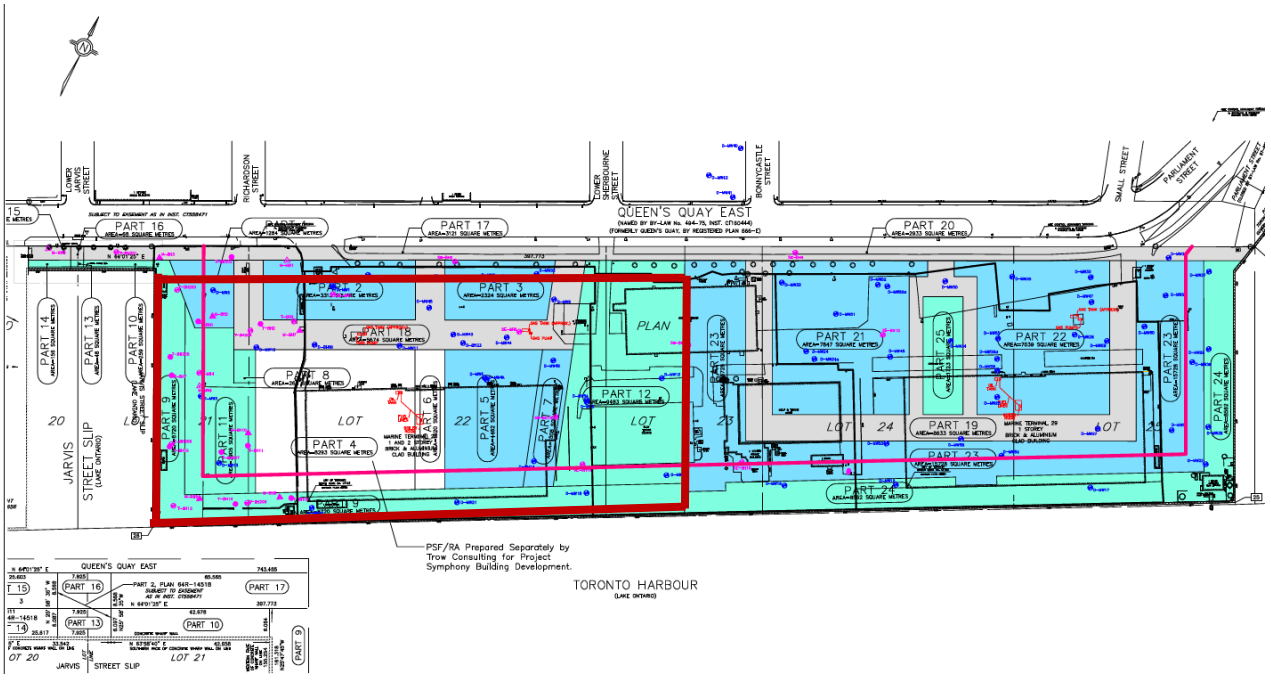
It is understood that this document will be included as a supporting document to the tender documents that Waterfront Toronto is issuing for construction projects in the East Bayfront Precinct. Site-specific Health and Safety Plans incorporating these minimum requirements to address potential health and safety hazards associated with methane should be developed for each construction project.

*This document applies only to the construction phases of projects, and not post-construction phases once site development is complete (to be addressed by Golder separately). This document is specifically intended for proposed construction activities within the East Bayfront Precinct.*

The document provides background information and recommendations on methane management procedures as general guidelines. These guidelines should be reviewed by the contractor in the context of the specific work to be conducted and all applicable regulatory requirements, and the contractor should prepare and implement their

own Health and Safety Plan that addresses all construction hazards, including potential hazards from methane and other soil gases that may be encountered during construction activities.

**Figure 1. East Bayfront Precinct**




## 3.0 BACKGROUND INFORMATION

Dillon was retained by TEDCO to conduct Phase I and II Environmental Site Assessments (ESAs) on a portion of the East Bayfront lands, as documented in the following reports:

- Phase I Environmental Site Assessment City of Toronto Economic Development Corporation (TEDCO) Lands - East Bayfront, dated July 27, 2007.
- Phase II Environmental Site Assessment (May 2008 Update), TEDCO Lands - East Bayfront, May 2008.

The findings of the Phase 1 and II ESA that are pertinent to soil gas issues for the East Bayfront Precinct are summarized below.

## 3.1 *Phase I Environmental Site Assessment (ESA)*

The Phase 1 ESA was conducted for an area of Toronto bounded by Lakeshore Boulevard East to the north, Freeland Street to the west, Parliament Street to the east and Lake Ontario to the south.

The Phase I ESA indicated that this area includes sediments dredged from Lake Ontario as well as surplus and/or poor quality fill (containing brick, glass, tree stumps, other woody materials, metal, concrete, cinder, and coal). The potential for spills and fuel leaks from cargo or vehicles particularly adjacent to loading docks and the potential for impacts from former fuelling stations at Marine Terminal No. 28 at 175 Queens Quay was identified. Slightly further from the Sherbourne Park site, one confirmed and one potential former fueling station was indicated to be present at Marine Terminal No. 29 at 261 Queens Quay East.

Offsite, there were several land uses identified that could impact on soil gas, which were former Shell Oil gasoline service station located on the adjoining property to the north (up-gradient) at 319 Lakeshore Blvd. (currently part of 307 Lakeshore), and unknown source and quality of fill at 190 Queens Quay East, Parcel A – South Corner of Parliament and Small Street and Parcel B1 and Parcel B2 - Former Rail Spurs located between Freeland Street and Queens Quay.

*The Phase I ESA identified the potential for methane generation from fill and soil deposits. There were two specific references to methane in the Phase 1 ESA. Summarizing the findings of a report titled "Proposed Waterfront Broadcast and Media Hub, 125 Queens Quay East", by Trow Associates Inc. (Trow), December, 2004 and "Geotechnical Investigation Update, 125 Queens Quay East", Trow Associates Inc., 2007", it was indicated that methane was measured by Trow in open boreholes, and that all concentrations were below the lower explosive limit (LEL) for methane, which is 5 percent in air. With reference to 215 Lakeshore Blvd, the Ontario Technical Standards and Safety Authority (TSSA) provided a letter from the City Health Department in response to a building permit request. The letter indicates that methane gas was identified in the subsurface and a passive gas extraction system was recommended to be installed below the building floor slab.*

The Phase I ESA carried out by Dillon satisfies the needs of the work by Golder in developing the methane guidance document.

## 3.2 *Phase II Environmental Site Assessment (ESA)*

The Phase II ESA was conducted for the East Bayfront (EBF) lands, defined as the TEDCO-owned properties bounded by Queen's Quay East to the north, Jarvis Street slip to the west, Parliament Street slip to the east, and Lake Ontario to the south.

The general subsurface stratigraphy was described to consist of a surface layer of asphalt or concrete underlain by approximately 7 metres of dark brown to black silt, sand, gravel and clay fill containing brick and concrete debris. The fill is underlain by approximately 4 to 6 metres of native former lake bottom sediments comprised of silty clay to clayey silt. This organic silt overlies shale bedrock. The depth to groundwater during the investigation was measured to be between 0.44 metres and 2.45 metres below ground surface.

Previous assessments conducted in this area identified the potential for methane gas generation within subsurface soils and fill, most likely due to anaerobic decomposition of organics associated with the organic-rich soils. Measurements of methane, oxygen and carbon dioxide using a Landtec GEM-2000 and organic vapours using a MiniRae 2000 photoionization detector (PID) were reported for numerous monitoring wells installed in the area. Gas readings from each well were recorded only after 60 seconds and once the levels stabilized.

The soil gas monitoring results indicated high levels of methane in various monitoring wells, predominantly those installed in either fill materials or the native lake bottom sediments underlying the fill between 7 and 12 metres below grade.

*The average methane concentrations were 38% in wells installed in the fill deposits and 67% in the lake bottom deposits, and at all wells constructed in these two units the methane concentrations were greater than 5%, the approximate lower explosive limit (LEL) of methane in air.*

Headspace vapour readings were taken by placing soil in a bag, waiting an hour, and taking measurements using a Gastechtor vapour detector Model 1238ME with methane elimination switch. There were a number of locations with soil combustible headspace readings that were at percent levels (i.e., above 20% of the LEL).

The Phase II ESA report concluded that gas monitoring conducted at the site identified significant levels of combustible gases (methane) apparently being generated from deeper soils (former lake bottom sediments and/or peats) or within fill deposits, and indicates risk management measures for methane will be required to address migration to outdoor air during construction activities and future development of the site where combustible gases have the potential for building up in enclosed spaces.

A number of inorganic and volatile and semi-volatile organic compounds (e.g., petroleum and chlorinated hydrocarbon compounds) in soil and groundwater exceeded applicable standards. In addition, free cyanide and mercury concentrations, which are volatile inorganic substances, were above applicable soil standards.

The Phase II ESA carried out by Dillon satisfies the needs of the work by Golder in developing the methane guidance document.

# 4.0 REGULATORY FRAMEWORK

## 4.1 Provincial Regulations

Provincial regulations in Ontario with application to construction at sites with biogenic soil gases, including methane, are the Occupational Health and Safety Act (R.S.O. 1990, Chapter O.1), as amended, and the Ontario Regulation 213/91 for Construction, as amended ( O.Reg. 628/05, June 5, 2009). Occupational exposure limits (OELs) in Ontario are mostly based on limits recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), with a few exceptions. The OELs are contained in Ontario Regulation 833, Control of Exposure to Biological or Chemical Agents. The Regulation for Confined Spaces, Ontario Regulation 632 addresses requirements for confined space entry, and Ontario Regulation 213/91, as amended, also addresses confined spaces on and within construction projects.

Ontario Regulation 232/98, Landfilling Sites (amended as O.Reg 216/08, June 5, 2009) and accompanying MOE Landfill Standards Guideline provide regulations and guidelines for methane monitoring at landfill sites. Regulation 232/98 addresses potential combustion or explosion concern with methane by requiring an assessment of the potential for subsurface migration and by setting concentration limits for methane. The concentration limits specified in the Regulation are:

- Less than 2.5 percent methane gas (50% of the LEL) in the subsurface at the property boundary;
- Less than 1.0 percent methane (20 % of the LEL) in an on-site building, or the area immediately outside its foundation or floor; and
- Less than 0.05 percent methane (i.e. not present) in a building, or area immediately outside its foundation or floor, which is located off-site.

## 4.2 Federal Regulations

Because Waterfront Toronto and components of the redevelopment of the waterfront are under federal jurisdiction, the Canada Labour Code Part II, and the Canada Occupational Health and Safety Regulations (SOR/86-304) also apply. Specific elements of SOR/86-304 that must be addressed at the Site as appropriate include health and safety requirements for Temporary Structures and Excavations, Hazardous Substances, Confined Spaces, and Hazard Prevention Program.

*For regulatory compliance, the more stringent confined space flammable gas management requirements of the Ontario regulations should be followed for all construction projects in the East Bayfront Precinct.*

# 5.0 PROPOSED CONSTRUCTION AND DEVELOPMENT

Details on the construction methodology for the various proposed projects within the East Bayfront Precinct were not available at the time of writing this guidance document. It is understood that the site development activities could include the following:

- Shallow excavation and shallow trenches (less than 2 m to maximum of 3 m);
- Deeper excavations of varying widths (3 to 6 m deep), and
- Caisson drilling (greater than 6 m depth).

# 6.0 POTENTIAL HAZARDS DUE TO METHANE

This section of the document identifies potential hazards associated with construction activities in the East Bayfront Precinct due to the presence of methane. Golder has not independently assessed the presence of methane in the proposed construction areas. For the purposes of this guidance document, reliance is made on the methane data provided in the Dillon Phase II report of May 2008 (referenced in Section 3.2, above). As noted above, other biogenic gases and vapours are not addressed in this document (*please refer to the Dillon letters in Appendix A*).

Methane and carbon dioxide may be generated through the biological breakdown of organic matter present in fill or native soil deposits (e.g., peat, wood, soil with high organic content) and petroleum hydrocarbon impacted soil, if present.

Methane is a flammable gas and can form explosive mixtures with air. Methane is violently reactive with oxidizers, halogens and some halogen-containing compounds. Combustible vapours may also be associated with petroleum fuels. The Lower Explosive Limit (LEL) of a gas or a vapour is its minimum concentration in air needed for the gas to explode if an ignition source is present. The LEL of methane is approximately 5% by volume in air (gasoline vapours have a lower LEL of approximately 1.4% in air). The Upper Explosive Limit (UEL) is the highest concentration of a gas or a vapour in air capable of producing an explosion if an ignition source is present. The UEL of methane is approximately 15 % by volume in air. This is summarized in Table 1.

**Table 1: Methane concentrations in air by volume expressed in percentage and parts per million**

| | Concentration of methane in air by volume Expressed as percentage (%) | Concentration of methane in air by volume Expressed as parts per million (ppm) |
|---|---|---|
| Lower Explosive Limit (LEL) | 5 | 50,000 |
| Upper Explosive Limit (UEL) | 15 | 150,000 |
| 20% (i.e. 1/5) of LEL | 1 | 10,000 |

If a highly concentrated emission of methane is diluted with air, explosive mixtures of methane and air can be formed. Such mixtures may have the greatest potential to be present in subsurface excavations, in confined spaces at a construction site (for example manholes, pits, trenches) and in subsurface utilities (within the utility conduit and backfill). There may also be the potential for methane build-up below temporary construction buildings or enclosures placed directly on soil without ventilation, if present. There is also the potential for oxygen deficiency or asphyxiation when methane or carbon dioxide displaces or dilutes air confined spaces, and creates oxygen deficient conditions that could lead to coma, convulsions or death.

Occupational exposure limits for methane and related gases, carbon dioxide and oxygen, are presented in Table 2.

**Table 2: Occupational Exposure Limits for Selected Gases**

| Substance | Ontario OEL TWAEV[1] | Ontario OEL STEV[2] | Ontario OEL Ceiling[3] |
|---|---|---|---|
| Methane | 1,000 ppm (0.1%) | N/A | N/A |
| Carbon Dioxide | 5,000 ppm (0.5%) | 30,000 ppm (3%) | N/A |
| Oxygen | N/A | N/A | N/A |

[1] TWAEV = time weighted average exposure limit (8 hour).
[2] STEV = Short-term exposure value (15 minute).
[3] Ceiling = maximum not to be exceeded at any time

Methane and carbon dioxide are considered simple asphyxiants, and methane is also flammable and combustible. The OSHA limits for oxygen-deficient and oxygen-enriched environments are 19.5 % and 23.5%, respectively (29CFR 1910.146). Ontario Regulation 632 sets the oxygen limits as between 19.5 % and 23 %.

## 7.0 METHANE MONITORING AND MANAGEMENT PLAN

The recommended procedures for methane management described below do not constitute a health and safety plan, but may be used as guidelines for contractors to develop their own requirements, which should be documented in a project-specific Health and Safety Plan. If there are changes to the project scope of work or new information is obtained on soil gases, the recommendations below should be updated.

## 7.1 General Requirements

General requirements for the methane monitoring and management plan and that should be addressed in the contractor's Health and Safety Plan include:

- The roles and responsibilities for all contractors and persons entering the site should be defined prior to the onset of the work in the contractors Health and Safety Plan. This should include designation of the Site Safety Officer and persons responsible for soil gas monitoring.
  - Gas monitoring should be conducted by trained and competent individuals. Individuals using equipment should undergo supplier product orientation for specific instrument or specific confined space training with focus on instrumentation and interpretation.
- A safety briefing should be held as a minimum daily or more frequently prior to beginning any new work task. Information and data obtained during gas monitoring should be discussed and recorded, and health and safety incidents and resolutions or actions taken should be documented.

The implementation of the project-specific Health and Safety Plan should be audited and corrective action taken if there are deficiencies noted.

## 7.2 Safe Work Procedures and Prohibited Activities

The contractor should develop safe work procedures and develop a list of prohibited activities based on hazards identified in Section 6 and the work to be performed. Safe work procedures should include consideration of construction methods, personnel protective equipment (PPE), ventilation, confined space entry, control of ignition sources, use of electronic devices and smoking.

A site exclusion or work zone should be established where gas monitoring and management applies, and as needed, signage and site security (e.g., fencing) should be provided.

The contractor should develop procedures for confined space entry, if confined space entry is required. Ontario Regulation 213/91, as amended, defines a confined space as "a fully or partially enclosed space, that is not both designed and constructed for continuous human occupancy, and in which atmospheric hazards may occur because of its construction, location or contents, or because of work that is done in it".

It is important to note that both of the above conditions must apply in order for the space to meet the definition of a confined space. Ontario Regulation 632 defines a "hazardous atmosphere "as:

1) the accumulation of flammable, combustible or explosive agents;

2) an oxygen content that is less than 19.5% or more than 23%; or

3) the accumulation of atmospheric contaminants that could result in acute health effects that pose an immediate threat to life or interfere with a person's ability to escape unaided from a confined space.

Entry to and work in confined spaces is limited as follows:

- Inspection only to less than 20% Lower Explosive Limit (1% methane by volume)
- Cold work (not capable of producing ignition sources) to less than 10% Lower Explosive Limit (0.05% methane by volume); and

- Hot work (capable of producing ignition sources) to less than 5% Lower Explosive Limit (0.025% methane by volume) and with additional controls such as fans and ventilation.

Further guidance on confined spaces is beyond the scope of this document.

Gas concentrations may be higher wherever gases can accumulate and are not readily dispersed into the ambient air. Such conditions are most likely to occur in poorly ventilated areas and confined, enclosed, or partially enclosed spaces, such as:

- Trenches, excavations (partially enclosed spaces);
- Enclosed spaces such as caissons, manhole, pits; and
- Poorly ventilated spaces below man-made temporary (e.g., raised construction trailer with "skirt") or permanent structures.

Entry to above areas should be avoided to the extent practical. If lateral gas migration occurs, high gas concentrations may also be encountered in buildings on or in the vicinity of the excavation, especially in basements, enclosed areas, and service entry points.

Measures for safe work are further described below:

- **Communication, Access Requirements and Signage:** Designate an exclusion or work zone where soil gas monitoring and management apply. Post hazard and warning information at all entry points and accesses in work area; communicate all information on the health and safety hazards.
- **Ventilation.** It may be possible to enhance natural ventilation through design (e.g., sloping) of excavations and positioning of soil piles and equipment relative to prevailing winds. To the extent practicable, minimize the depth to width ratio of excavation (e.g., test pits). Mechanical ventilation may also be a good strategy to reduce the potential for hazardous gas concentrations to develop. Where possible, position personnel and equipment up-wind of gas sources.
- **Personal Protective Equipment.** In addition to standard PPE (i.e. hi-visibility clothing, hard hat, eye protection, gloves and overalls), gas detectors may be warranted under certain conditions (see sections below).
- **Ignition Sources.** Methane gas and combustible petroleum vapours are extremely flammable. Sparks, cigarette, naked flames and other sources of ignition should be kept well away from sources of this and other combustible (e.g., gasoline or diesel) vapours. In addition, all works and operations should be undertaken in a manner compliant with Ontario Regulation 851/90 as amended for Industrial Establishments, as applicable.
- **Use of Mobile Phones**: Reporting periodically by mobile phone to an office contact person is a widely used lone-working procedure. Ideally, no uncertified electrical equipment should be taken into any hazardous areas. However, it is a greater risk for the worker to leave an uncertified mobile phone outside of a suspect area than to have it with him/her for the phone to be within easy reach in case of an injury. Uncertified mobile phones without a metal case can be used in certain areas. Mobile phones with metal cases may produce a sufficiently strong electrostatic discharge to ignite methane gas; therefore, such phones should not be brought into a suspect area.
- **Electronic Equipment**: No personal electronic equipment (radio, I-pods, etc.) should be taken into work areas.

- **Smoking**: Should be prohibited in work areas.

## 7.3 Methane Monitoring

The following monitoring procedure is recommended:

1) Continuous monitoring at the commencement and during excavation activity, and during work in or near to trenches, caissons, boreholes, subsurface utilities and other subsurface confined, enclosed or below-grade spaces (Table 3).

2) Gas concentrations should be measured at multiple locations including close to (within 10 centimetres) of the ground surface (or other gas emitting surface), within the breathing zone, in areas where equipment is used, and other locations. Under windy conditions, measurement locations should include the leeward side of excavation. A reduced frequency of monitoring (at start of shift and re-entry into excavation and ½ hourly spot checks thereafter at a minimum) of soil gases is acceptable in shallow bulk excavations (less than 3 m depth) after the excavation is complete (soil is no longer being removed), providing initial set of measurements indicate that there is a stable and safe trend of gas concentrations indicated.

3) A combustible gas detector calibrated to methane should be used to measure combustible gas concentrations and % LEL. When the gas detected is methane, a combustible gas detector measures the methane concentration and %LEL of methane. For carbon dioxide and oxygen, appropriate instrumentation should be used. The required detection limits are as follows:

   a) Combustible gases: 0.05% (500 ppm)

   b) Oxygen: 0.1 % (1,000 ppm)

   c) Carbon dioxide: 0.1 % (1,000 ppm)

4) Acceptable monitoring equipment includes RAE Systems Entry RAE or Industrial Scientific TMX412 or equivalent, or higher, grade with data logging capability. Logged data should be downloaded at the end of each shift.

5) If working in areas susceptible to explosive, oxygen deficient, and/or toxic environments, a personal monitoring device (i.e., attached to the worker at chest height) that is capable of measuring the above gases is required.

6) Only intrinsically safe and approved equipment should be used for gas monitoring (such equipment is typically marked to indicate where it is safe to use). The equipment should be approved for the type of use in accordance with applicable codes and regulations, and as specified by the Ontario Fire Marshall's office.

7) Calibration should be current to no less than 30 days prior to each use (not just prior to project start up), and the instrument should be 'bump tested' daily at start of shift, and records maintained for each piece of equipment used. All equipment should be appropriately maintained.

**Table 3: Soil Gas Monitoring Requirements**

| Area | Monitoring Requirements |
|---|---|
| Shallow Excavation < 3m | Continuous soil gas monitoring, reduced frequency of monitoring may be considered after stable and safe trend is observed |
| Deeper Excavation >3m | Continuous monitoring |
| Caisson Excavation | Continuous monitoring |

## 7.4 Action Levels and Contingent Measures

The contractors should set action levels that meet applicable regulations based on the work being conducted. Action limits should address the average or daily, short term and maximum or ceiling concentrations. For monitoring of gases at construction sites, it is typically considered good practice to set an initial action level that is half of the 8-hour time-weighted average. Thus, for carbon dioxide, the initial action level would be 2,500 ppm, while for methane, the initial action level based on the TWAEV is 500 ppm. The threshold indicating potential significant (explosive) safety concern for methane is 20 % of the LEL, thus, an initial action level of 10% of the LEL (or 0.5 % or 5,000 ppm) is calculated. This level is higher than the TWAEV so the value based on the TWAEV takes precedence. Table 4, below, provides recommended action levels.

**Table 4: Recommended Action Levels**

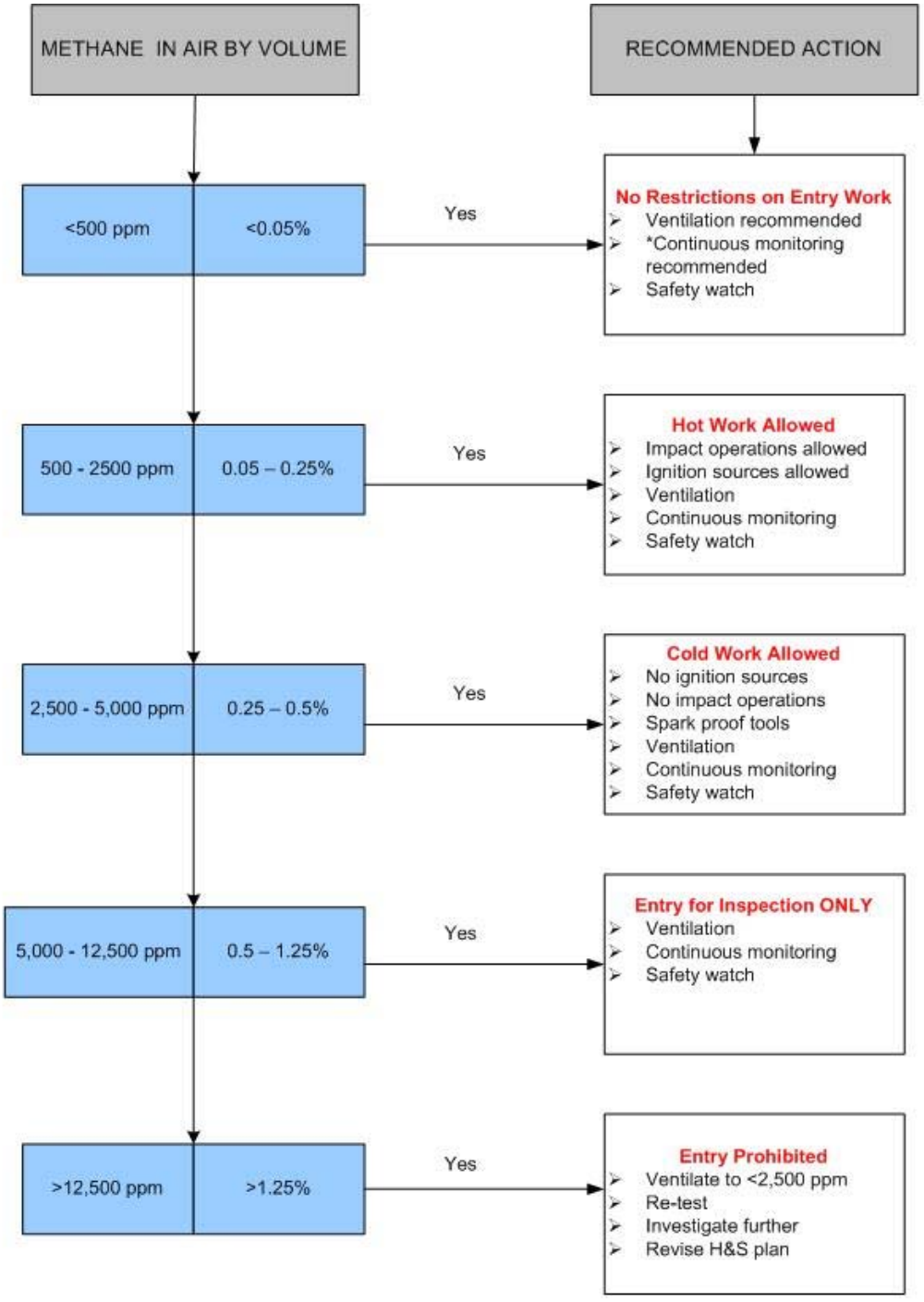
| Soil gas | Initial Action Level | Action Level |
|---|---|---|
| Carbon dioxide | 0.25% (2,500 ppm) | 0.5% (5000 ppm) |
| Methane | 0.05% (500 ppm) | 0.1% (1000 ppm) |
| Oxygen | 19.5% | 19.5% |

If the initial action level is exceeded, appropriate actions must be taken, which may depend on the gases detected. Equipment should be stopped, the immediate area should be safely evacuated immediately, preferably in an upwind direction. Monitoring should be conducted to demonstrate safe conditions before entering the area where action levels were exceeded. Mitigation measures such as forced-air ventilation (i.e., fans) may be considered, designed and installed by qualified persons. After safely evacuated, the work area should be carefully approached while continuously monitoring gases. The work area should only be re-entered if conditions are safe.

The decision chart (Section 8.0) provides a recommended approach for methane gas monitoring at construction sites in the East Bayfront Precinct.

(*Note: carbon dioxide concentrations and oxygen depletion are to be measured as part of standard atmospheric monitoring protocol for confined or enclosed spaces which is not addressed in this guidance document*).

## 8.0 METHANE CONCENTRATION / CONTROL DECISION TREE




Notes:
* Continuous Monitoring – Frequency of measurements to be determined on site specific basis but should include at a minimum measurements immediately prior to ground breaking and at various times during the specific construction activity
5% methane = lower explosive limit (LEL)
1% methane = 20% of LEL

## 9.0 LIMITATION

This report was prepared for the exclusive use of Waterfront Toronto, its designated contractor Eastern Construction, and the City of Toronto as owner of sites within the study area and must be considered in its entirety. Any use of this document, the findings, conclusions or recommendations provided in this report by any person or entity other than the parties named above is at the sole risk of such user. Any reliance upon this report by any party other than the parties named above requires the prior written approval of Golder. Golder must be contacted should any questions arise as to the scope of this report or the context in which the work was performed.

The recommendations in this report are limited to guidelines to address the potential for unsafe or hazardous working conditions associated with the accumulation of methane during the construction phase of the project. Golder is not responsible for ensuring in any manner that these guidelines are appropriately applied and is not liable for any property damage, injury or loss of revenue associated with misapplication of these recommendations or a failure to implement safe working conditions where and when appropriate.

Golder has not independently assessed methane levels in the proposed construction area and has relied on data on methane gas in the Dillon Consulting Limited Phase II ESA report of May, 2008 in preparing this guidance document.

**GOLDER ASSOCIATES LTD.**

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# APPENDIX A

## Dillon Health and Safety Letters

May 13, 2009

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Vice President, Development
WATERFRONToronto
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Toronto, Ontario, M5J 2N8

**Re: East Bayfront Dockside Redevelopment**
**Evaluation of Worker Risks During Site Redevelopment Activities**

Dear Andrew:

Dillon Consulting Limited (Dillon) is providing this brief submission at the request of WATERFRONToronto to clarify the extent to which subsurface environmental contamination within the Dockside Redevelopment (exclusive of the Corus Development) may present a risk to construction workers during the site redevelopment, implementation of risk management measures, and remedial activities.

The subsurface environmental quality across the site has been thoroughly investigated and evaluated as part of ongoing environmental investigations and risk assessments for the Dockside Roadways and Parks, completed in accordance with Ontario Regulation 153/04 (O.Reg. 153).

As required under O. Reg. 153, exposures for construction workers to surface and subsurface soil and groundwater were examined, including during excavation activities. The risk assessments conservatively assume that construction workers would be consistently exposed to the maximum reported concentrations of contaminants across the whole site, excluding one localized area within the proposed Sherbourne Park that requires remediation through soil excavation and off-site disposal. The results of the risk assessments clearly show that:

- subsurface materials (excluding the hot-spot area) do not pose a health risk to construction workers engaged in remediation activities.

The localized remediation of the area within the proposed Sherbourne Park will be subject to the requirements of a site-specific health and safety plan, which will be clearly outlined in construction contract documents.

Although the risk assessment results do not indicate potential concerns relative to construction worker exposure, these do not obviate any of the Contractor's health and safety requirements/responsibilities under the Ontario Occupational Health and

*...cont'd*

Safety Act (OHSA), as well as any contingency plan(s) to address potentially variable site conditions.

Should you have any questions or comments, please contact the undersigned at (905) 901-2912.

Yours sincerely,

**DILLON CONSULTING LIMITED**

Bryan Leece, Ph.D.

*...cont'd*

November 25, 2008

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Attention: Mr. David Kusturin
VP – Program Management

**Re: East Bayfront District Energy Plant**
**Evaluation of Worker Risks**

Dear Mr. Kusturin

Dillon Consulting Limited (Dillon) has prepared this submission in reference to a request from WATERFRONToronto (WT) to provide comment on potential risks associated with exposure by workers to existing soils at the above noted site within the East Bayfront Redevelopment. This request was directed to Dillon since we are currently completing human health and ecological risk assessments for other portions of the East Bayfront Redevelopment in order to meet the requirements of Ontario Regulation (O.Reg.) 153/04 (Brownfields regulation), administered by the Ontario Ministry of the Environment (MOE).

The information presented herein is provided for information purposes only in order to provide general guidance to the Contractor engaged in soil excavation and related activities at the site (Aecon Buildings). This information does not obviate any of the Contractor's health and safety requirements/responsibilities under the Ontario Occupational Health and Safety Act (OHSA).

We further note that the site in question has been identified as 'contaminated' relative to soil and/or groundwater standards referenced by O. Reg. 153/04[1]. These standards are based upon chronic (long-term) exposure by the general population (including sensitive receptors such as children) and would generally be considered overly conservative when applied to the types of shorter duration exposures more typical of the sort of construction activities contemplated for the site (and otherwise regulated by the OHSA). Nevertheless, there are contaminants in the soil in excess of the established site conditions standards, therefore efforts to limit exposure to the soil should be encouraged.

## SITE DESCRIPTION

The site in question comprises Block 2 of the East Bayfront Redevelopment. It consists of portions of the lands formerly identified as 125 and 175 Queen's Quay East. The site will consist of the entirety of one future city block, being bounded to the north by Queen's Quay East, and to the east, south and west by future roadways associated with the East Bayfront Dockside Redevelopment.

[1] Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004.

*...cont'd*

The property constitutes reclaimed land via filling of Lake Ontario during the 1950s. The lands were mainly created through placement of fill from lake dredging and surplus fill from other parts of Toronto. Considering the diverse sources of lakefill material utilized, and given that environmental quality considerations were not a significant concern during that era, it can be expected that some portion of the fill material emplaced was impacted with various contaminants. These would include contaminants present in harbour sediments used as dredgeate fill due to the long history of industrial activities in and around the harbour, as well as contaminants in fill derived from land-based sources due to past activities at those sources. Superimposed over this is the potential for contaminant input from industrial activities that have occurred since the property was initially developed.

Extensive environmental characterization work has been completed at the East Bayfront Redevelopment in the context of O.Reg. 153/04. This has included sampling of soils and groundwater at Block 2 and adjoining lands. Soil and groundwater quality data from t[2]hese areas was recently evaluated by Dillon in support of the completion of a human health and ecological risk assessment for the Dockside Redevelopment Roadways. Contaminants that have been identified at the site and on the immediately surrounding lands as being present in soil and/or groundwater at concentrations in excess of the O.Reg. 153/04 standards include various metals, volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs) and polycyclic aromatic hydrocarbons (PAHs). It is noted that the maximum concentrations in all cases were measured on adjoining lands rather than Block 2 per se.

## CONTAMINANTS OF CONCERN FOR WORKER EXPOSURE

The O.Reg. 153/04 Standards applied to the site are based upon consideration of potential adverse effects to both human health and the environment. Since this evaluation is focussed on potential human health effects only, the site data was subjected to an additional screening against the relevant human health criteria components only[3].

The results of this additional screening indicated that the following chemical constituents of concern (COCs) required further assessment for the purposes of this risk evaluation:

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[2] Soil and groundwater data from Block 2 and adjacent locations on Queen's Quay East has previously been provided to the Contractor. Additional sampling data has been considered herein from locations to the east, west and south of Block 2.

[3] Generally the MOE S2 criteria for soil contact, or applicable substitute criteria from the MOE or the Canadian Council of Ministers of the Environment (CCME). Criteria components based on drinking water consumption and the inhalation of volatile constituents via migration to indoor air were not considered as these exposure pathways are not considered to be applicable in the context of this assessment.

*...cont'd*

Metals
- Antimony
- Arsenic
- Beryllium
- Lead

PAHs
- Benzo[a]pyrene
- Benzo[b,j]fluoranthene
- Dibenz[a,h]anthracene
- Indeno[1,2,3-cd]pyrene
- Phenanthrene

It is reiterated that this contaminant screening is based on review of data from Block 2 and adjoining lands and includes higher COC concentrations than have been observed on Block 2 alone.

## RISK EVALUATION

As noted previously, data from the site in question (i.e. Block 2) as well as adjoining lands was recently evaluated by Dillon in support of the completion of a risk assessment for the Dockside Redevelopment Roadways[4]. That risk assessment included evaluation of a construction/maintenance worker exposure scenario that is considered to be applicable to the current risk evaluation. Consideration was given to worker exposure to COCs in site soils via incidental ingestion of soil, dermal contact with soil, and inhalation of wind-blown particulates. Exposure was assumed to occur over a 6 month construction period, 5 days per week. Other exposure factors, such as physical/physiological parameters and soil dermal loading factors, were adopted from those endorsed by the MOE and Health Canada.

The risk assessment was used to predict theoretical levels of hazard (in the case of non-carcinogenic COCs) and risk (in the case of carcinogenic COCs) for the construction/maintenance workers. It was also used to calculate Property Specific Standards (PSS) for the COCs. The results indicated that none of the predicted hazard or risk levels for these receptors exceeded target levels. Furthermore, the calculated PSS for all COCs were higher than the maximum concentrations observed at the site. Of note, the risk assessment also evaluated exposures to these receptors via inhalation of volatile COCs in outdoor air and contact with COCs in groundwater (e.g. within excavations), with similar results obtained.

As such, it can be concluded that the COC concentrations that have been measured at the site and adjoining lands do not pose an exposure risk to workers at the site.

## RISK MANAGEMENT

Although the risk evaluation results did not indicate potential concerns relative to worker exposure, COC concentrations at the site are variable and it is possible that zones of previously unknown contamination could be present. For this reason, the implementation of risk management precautions is recommended. These could include measures such as the following:

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[4] East Bayfront - Dockside Redevelopment Roadways, Quantitative Human Health and Ecological Risk Assessment (Dillon, 2008) . Please note that this work is complete but has not yet been submitted to, or reviewed by the MOE.

*...cont'd*

- Measures to reduce potential incidental ingestion of contaminated soils (e.g. reducing hand to mouth contact through washing hands prior to eating and drinking, no eating or smoking in work area);
- Measures to reduce potential skin contact with contaminated soils (e.g. wearing gloves, keeping other skin surfaces covered);
- Measures to reduce potential inhalation of airborne particulate/dust (e.g. practicing good dust control techniques, donning particulate masks as needed); and
- Avoiding/minimizing direct contact with groundwater.

Please note that risk management measures of this nature are standard practice for work at contaminated sites. Other measures may be necessary if previously unknown conditions are encountered, as indicated by observations such as extensive staining of soils, petroleum or other chemical smells.

We understand that the Contractor will be preparing a site-specific health and safety plan for this work. Further, pursuant to Change Directive No. 1, it is understood that the Contractor will be obtaining representative soil samples of the materials to be excavated. Any such additional data obtained should also be considered in the formulation of health and safety measures for the work.

## CLOSURE

This submission has been provided for information purposes only in order to help inform decisions concerning health and safety requirements for workers at the site in question. The information and guidance provided does not obviate any of the Contractor's requirements pursuant to the OHSA. The evaluation herein has consisted of a further review of data and risk assessment activities previously completed for the East Bayfront Dockside Redevelopment Roadways and is subject to the same limitations referred to therein.

This submission was prepared by Dillon for the sole benefit and use of WATERFRONToronto and the City of Toronto. The material in it reflects Dillon's best judgement in light of the information available to it at the time of preparation. Any use that a third party makes of this submission, or any reliance on or decision made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this submission.

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Should you have any questions or comments, please contact the undersigned at (416) 229 4647, ext. 2313

Yours sincerely,

**DILLON CONSULTING LIMITED**

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Sr. Scientist/Risk Assessor

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At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.


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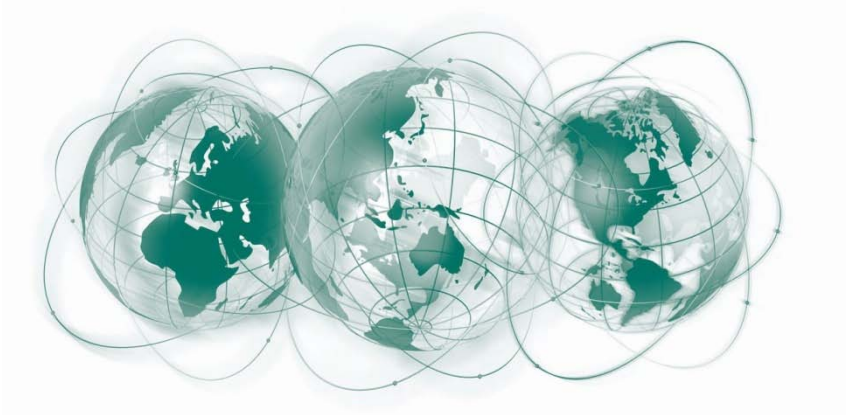


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