EXECUTIVE SUMMARY

Introduction

The Port Hope Area Initiative (PHAI) is a community-based program directed at the development and implementation of a safe, local long-term management solution for historic low-level radioactive wastes (LLRW) in the Port Hope area. It is the result of an agreement between the Government of Canada and the affected municipalities for the management of specified contaminated materials within the communities in aboveground facilities designed to last for several hundred years. Among other activities and programs, the PHAI includes two primary physical undertakings: i) the Port Hope Long-Term Low-Level Radioactive Waste Management Project (the Port Hope Project); and, ii) the Port Granby Long-Term Low-Level Radioactive Waste Management Project (the Port Granby Project).

This document comprises the Environmental Assessment Study Report (EA Study Report) for the Port Hope Project. The Port Hope Project consists of two principal components:

1. The remediation of sites containing LLRW, marginally contaminated soils (MCS) and specified industrial wastes located in the former Town of Port Hope (now part of the Municipality of Port Hope), including the Port Hope Harbour, and the management of the wastes in a local long-term low-level radioactive waste management facility (LTWMF); and
2. The remediation of sites containing LLRW and MCS located in the former Township of Hope (now part of the Municipality of Port Hope) and the management of the wastes in a local LTWMF.

The Port Hope Project is based on two community proposals. One was developed by the Town of Port Hope and the other by the Township of Hope, both independent municipalities at the time. The Government of Canada accepted those proposals as a potential solution for the long-term management of the LLRW in the area and the above-noted Legal Agreement was struck and came into effect on March 29, 2001. Because the communities were separate municipalities at the time, the proposals both offered individual locations for the LTWMF that was required for each. With the amalgamation of the municipalities and based on the consideration of alternative means of implementing the Project carried out as part of this EA, a single new LTWMF was recommended for development at the site of the existing Welcome waste management facility (WMF) and adjacent automobile wrecking/recycling yard.

Since the Port Hope Project is a Government of Canada initiative, it must undergo a federal Environmental Assessment (EA) as prescribed under the *Canadian Environmental Assessment Act* (CEAA). It was determined that, in accordance with subsection 18(1) of the CEAA, a "screening" must be conducted for the Port Hope Project and a screening report prepared.

The Low-level Radioactive Waste Management Office (LLRWMO), a department within Atomic Energy Canada Limited (AECL), is acting on behalf of the Government of Canada as the proponent for the Port Hope Project. Natural Resources Canada (NRCan), the Canadian Nuclear Safety Commission (CNSC) and the Department of Fisheries and Oceans (DFO) are Responsible Authorities (RAs). Although the RAs delegated the conduct of the EA studies to the LLRWMO, they maintain their responsibilities for conducting the required screening of the Port Hope Project in accordance with the CEAA and for determining if it is likely to cause significant adverse environmental effects.

Scope of the Assessment

The RAs determined that the EA and the screening report must address:

- The need for the Project;
- The purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- The environmental effects of the Project, including the environmental effects of malfunctions or accidents;
- The significance of the effects identified;
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- The capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future;
- The need for, and requirements of, any follow-up program in respect to the Project; and
- Comments from the public.

The Scope of Assessment prepared by the RAs also required that the study areas considered in the EA encompass all relevant components of the environment that can reasonably be expected to be directly or indirectly affected by the Port Hope Project. Accordingly, the EA team developed the following three study areas for general application in the EA:

- **The Regional Study Area**: Extends generally from the Oak Ridges Moraine in the north; south into Lake Ontario sufficiently to consider water resources related to the fishery, recreational use, water supply and water pollution control plant discharges; and sufficiently east and west to encompass the area appropriate for consideration of cumulative effects and potentially wider-spread socio-economic effects;

- **The Local Study Area**: Bounded to the west by Willow Beach/Morrish Church Road; to the east by Theatre Road; and to the north by former Hope Township 4th Line. To the south, the local study area extends approximately 1 km into Lake Ontario; and
- **The Site Study Area**: Includes the immediate zone of influence of the Project and would consist of several different sites for the Port Hope Project. It encompasses all facilities, buildings, infrastructure, lands and waters, including areas in the Port Hope Harbour that are directly connected or associated with the Port Hope Project. Individual and separate Site Study Areas for general application in the EA have been established for each of the fundamental Project components.

The general study areas were adjusted as necessary to consider the individual needs of the various environmental components identified below.

For purposes of this EA, the environment was defined within the following six components that represent the biophysical aspects and human elements potentially subject to effects of the Port Hope Project:

- Atmospheric Environment;
- Geology and Groundwater Environment;
- Aquatic Environment;
- Terrestrial Environment;
- Socio-economic Environment; and
- Human Health and Safety Considerations.

During the baseline characterization studies, each environmental component was further refined into sub-components that represent fundamental constituent features susceptible to a Port Hope Project-induced effect and/or a pathway or mechanism for the transfer of an effect to a valued ecosystem component (VECs).

The periods of time over which the Project-related effects were to be considered as established for EA purposes are shown in the following table:

Project/Assessment Phase	Time Period	Correspondence to Scope of Assessment
EA Baseline Period	2002-2004*	Pre-Project (existing) Conditions
Construction and Development Phase	2007-2013	The Short Term
LTWMF Maintenance and Monitoring Phase • Early Life • Mid Life • Late Life	 2013-2025 2025-2150 2150-2500+	 The Intermediate Term The Long Term
* Also considers historical information, as it may be relevant.		

Historical Context and Need for the Project

LLRW and associated MCS present within the Municipality of Port Hope are the result of industrial activities associated with the processing of radium from ores during the period 1933 to 1955. Process residues and other wastes were dumped at various locations throughout the community, including the Port Hope Landfill, and were used as a convenient source of fill material for construction and landscaping activities.

By 1948, wastes were being placed at a site owned by the federal crown corporation, Eldorado Mining and Refining Limited (Eldorado), near Welcome in the Township of Hope. The Welcome facility was closed in 1955 and a new waste receiving site was established on the Lake Ontario shoreline near the hamlet of Port Granby in Clarington. Both the Welcome and the Port Granby sites were subsequently issued licences by the (former) Atomic Energy Control Board (AECB), now the CNSC. These sites, currently known as the Welcome and Port Granby WMFs, together with the Remediation Sites in Ward 1, are the focus of the PHAI. A successor to Eldorado, Cameco Corporation, continues to manage the Welcome and Port Granby WMFs under licences issued by the CNSC. The LLRWMO, on behalf of the Federal government, manages the in-situ historic LLRW elsewhere in the community.

There is general consensus that the in-situ management systems as they are presently being implemented, while appropriate in the near-term, are not suitable as a long-term solution. This common acknowledgement was the primary motivation for the Legal Agreement between the parties and the PHAI that was subsequently established to facilitate a more appropriate long-term solution. The effective long-term management solution represented by the Port Hope Project also brings with it significant social benefits to the community. These include the elimination of any negative perceptions of Port Hope as a place to live or do business because of the social liabilities associated with the waste; and of continuing financial and administrative burdens on the Municipality associated with the ongoing management and monitoring programs.

Municipal Technical Review during Environmental Assessment Studies for the Port Hope Project

The PHAI was launched by the Government of Canada and the Municipalities of Port Hope and Clarington in 2001 following signing of the Legal Agreement which binds the parties to a co-operative process in the conduct of the Port Hope Project. The LLRWMO, as the proponent, and the Municipalities as parties to the Legal Agreement, meet on a regular basis to ensure adherence to the requirements of the Legal Agreement.

This community-based approach to implementing the Port Hope Project also provided for early involvement of the Municipality of Port Hope in technical review of studies conducted by the LLRWMO. The Municipality engaged an independent team of experts, co-ordinated by municipal staff, to review various aspects of the EA - from planning through to this EA Study Report. The review, deliberation and disposition of comments from the Municipal Peer Review Team (MPRT) became an essential element of the Port Hope Project, strengthening both the technical and community confidence in the EA process and the reliability of the conclusions of the EA studies. MPRT comment and disposition tables are included in the EA Study Report and relevant technical support documents.

Stakeholder Information and Consultation

A Stakeholder Consultation and Communications Plan (Consultation Plan) was designed as an element of the EA to reach out to residents of the Municipality of Port Hope and other key stakeholders (e.g., residents most affected by the Project, community groups, community leaders and elected officials, RAs and other technical agencies) to ensure that they receive appropriate information concerning the Project and are provided the means to input to the EA. The tools for implementing the Consultation Plan included: dissemination of information through media outlets and direct mailings, a Public Registry for all EA-related materials, early establishment of a Project Information Exchange plus other information repositories, an interactive website and structured events including presentations, meetings, workshops, open houses, public forums, information displays and site tours.

The stakeholder information and consultation program was conducted within a context of the overall PHAI, comprising both the Port Hope and the Port Granby Projects. The outreach area boundaries did not limit the communications and consultation program, however, and all groups or individuals with information and expertise to contribute or who expressed an interest in the Port Hope Project were included on the Project contact list. The contact list included all levels of government agencies, the public (individuals and community groups), scientific groups, the media and non-governmental agencies and interest groups.

A number of focused consultation and communications programs were developed to supplement the overall Consultation Plan. These included specific plans for communications with First

Nations and Aboriginal people, regulatory and technical review agencies and the public to address specific objectives following the announcement of the Qualified Concept for the Port Hope Project.

Alternative Means of Carrying Out the Project

An evaluation of the alternative means by which the Port Hope Project could be implemented was carried out as a technical study in support of the EA. The result was the identification of the alternative means considered most appropriate for implementation and it was advanced as the recommended concept and that which is the subject of detailed assessment in this EA.

Based on the evaluation, the recommended means of implementing each of the key elements of the Port Hope Project were determined as follows:

- A single LTWMF for all Ward 1 and Ward 2 waste to be developed on the property currently occupied by the Welcome WMF and an automobile wrecking/recycling yard. The LTWMF will consist of an above-ground engineered containment mound with a double composite base liner and a low-permeability final cover;
- On-land Remediation Sites, including those impacted by LLRW and the designated industrial waste-contaminated sites, to be remediated by excavating the contaminated material and transferring it by highway-licensed trucks to the LTWMF. The remediated sites will be backfilled with imported clean material;
- The Port Hope Harbour to be remediated by dredging the contaminated sediment and transferring it by highway-licensed trucks to the LTWMF; and
- Transport of contaminated materials to the LTWMF and of backfill to the Remediation Sites via prescribed transportation routes.

Description of the Project

The Port Hope Project will involve the construction and development of a LTWMF, the remediation of contaminated sites with transfer of the contaminated material to the LTWMF, the integration of the existing waste at the Welcome WMF into the new facility and the maintenance and monitoring of the LTWMF for a period of several hundred years.

Waste material that will be placed into the LTWMF will originate from four sources:

- **Welcome WMF**: LLRW comprised of native soils contaminated due to mixing or contact with the refinery waste and MCS consisting mostly of undisturbed soils that have become contaminated due to leaching of the refinery waste and movement of affected groundwater at the site. The total quantity of LLRW and MCS that will originate at the Welcome WMF is estimated at approximately 620,000 m^3;

- **Remediation Sites**: Waste material generally consists of sand and silt soil or fill that have been intermixed with LLRW. Several sites will also generate grubbing waste (e.g., tree roots, subsurface vegetation) that cannot effectively be separated and will, therefore, be directed to the LTWMF. The LLRW at the Highland Drive Landfill is commingled with municipal refuse. At some sites, excavation will extend into groundwater and the material will be saturated. The material dredged from the Harbour consists of very loose and soft organic fine sediment. The total quantity of LLRW and MCS that will originate from the Remediation Sites is estimated at approximately 572,000 m^3;
- **Industrial waste-contaminated sites**: These sites are typified by their non-radiological contaminants including metals, petroleum hydrocarbons and polycyclic aromatic hydrocarbons. For EA purposes, the quantity of waste material associated with the industrial waste-contaminated sites is 51,250 m^3; and
- **Cameco decommissioning waste materials**: Drummed waste in storage at the Centre Pier, waste generated during decommissioning of redundant facilities at Cameco and LLRW located on the Centre Pier. For EA purposes, the quantity of waste material has been estimated at 150,000 m^3. As noted in the Legal Agreement, Crane Foundry wastes located on the Centre Pier and at Lions Recreation Centre Park are also included in this quantity.

There are six elements to the Port Hope Project described as follows:

- **LTWMF**: The LTWMF will be located in Ward 2 of the Municipality of Port Hope on lands currently occupied by the existing Welcome WMF and an automobile wrecking/recycling yard (Bailey's Automotive; has operated on the property as an automotive parts supplier under lease from Cameco since 1980). It will consist of an above-ground engineered containment mound with a low-permeability base liner and final cover and a capacity of approximately 1.9 million m^3. The LTWMF will be constructed, and will receive its entire intended inventory of waste material, during the Construction and Development phase currently estimated between the years 2007 and 2013. A number of potential end uses have been considered for the completed LTWMF (e.g., passive recreational/parkland, active recreational/tourism, restricted use) and Municipality-led initiatives to develop the ideas (and preferences) for LTWMF end use have been ongoing since December 2004. Until a specific end use plan has been adopted, however, for purposes of this EA, the long-term condition for the LTWMF during the Maintenance and Monitoring phase is the facility as a passive, grassed mound (mowed 2 or 3 times a year) with limited low-maintenance walking trails connecting to surrounding areas. The LTWMF will be monitored and maintained throughout its service life, estimated at several hundred years. During that time, environmental monitoring, inspection, repair and maintenance will be performed on a regular schedule to ensure that its performance objectives are maintained.
- **On-land Sites with LLRW**: The on-land sites, with the exception of the Highland Drive Landfill, are those that have been previously identified as affected by LLRW, plus a miscellaneous category that has been included with the expectation that additional smaller areas of contamination will be encountered on private properties and public roadways. The

contamination at the on-land sites with LLRW will be removed by excavation to meet cleanup criteria and the affected areas restored with clean soil backfill.

- **Highland Drive Landfill**: This site includes a significant quantity of LLRW, much of which is co-mingled with or overlain by municipal solid waste. To the extent possible, the LLRW within the landfill will be segregated from the municipal refuse and excavated and transferred to the LTWMF. Because it will not be practicable to completely separate the two waste types, all waste resulting from remediation of the landfill will be placed in a dedicated cell at the LTWMF. The cell will include provisions for the management of landfill gas that may continue to be generated in the residual organic material commingled with the LLRW.
- **Port Hope Harbour**: Contamination in the Harbour exists as the sediment layer overlying the till and bedrock surface throughout the Approach Channel and Turning Basin. The sediment thickness varies up to 3 m. The sediment will be removed by dredging conducted in two stages. The first stage, mechanical dredging, will involve excavation by clamshell bucket operating from a barge and loading sediments onto a scow. The residual sediments that remain following the first stage will be removed by hydraulic (i.e., suction) dredging. During both stages, the sediment will be temporarily placed on the adjacent Centre Pier property to allow for its de-watering and from there it will subsequently be loaded onto trucks and transported to the LTWMF.
- **Industrial Waste-contaminated Sites**: These sites are specific former industrial lands that are included in the PHAI by agreement between the Municipality of Port Hope and the Federal government. They will also be remediated by removal of the contaminated material with its transfer to the LTWMF; and restored with clean soil backfill. Given the nature of the contaminants (i.e., non-radiological) and common remediation practice, there may be opportunity to refine the focus and scope of the remediation program at these locations through site-specific risk assessment (SSRA). For purposes of the EA the remediation program assumes removal of contaminants to the appropriate criteria, including as it may be established through SSRA.
- **Transport of Materials**: Transport of contaminated material to the LTWMF and of clean backfill and construction materials to all work sites will be by highway-licensed tandem, tri-axle and tractor trailer trucks travelling on specified haul routes.

The Port Hope Project is scheduled to begin in 2007, with construction and development of the LTWMF extending from 2007 to 2013. Remediation of contaminated sites is planned to commence in 2009 and extend through 2012. The monitoring and maintenance period for the LTWMF will begin at completion of construction activities and extend throughout the remainder of its planned life cycle of several hundred years.

Description of the Existing Environment

The existing environmental conditions within the relevant Study Areas were characterized as the baseline from which incremental effects of the Port Hope Project would be identified. Baseline

characterization studies were carried out in a framework of each of the environmental components established for the EA. The studies generally focused on the three expected primary areas of activity considering the Project as it was envisaged at the initial stages of the EA (i.e., before the evaluation of alternative means established that only a single LTWMF was preferred).

Ward 2 LTWMF Site

The Ward 2 LTWMF site is located on Lots 13 and 14 in Concession II of the Municipality of Port Hope. The site is bordered on the west by Brand Road, on the north by Highway 401, on the east by Baulch Road and on the south by rural/residential lots along the north side of Marsh Road. A residential development exists to the south of Marsh Road and a residential development has been proposed north of Marsh Road and east of Baulch Road. The LTWMF site is currently occupied by the Welcome WMF and an automobile wrecking/recycling yard.

The site slopes down relatively uniformly to the northwest. The most notable topographic feature is the Welcome WMF which rises about 10 m above the surrounding landscape in the southeast quadrant of the site. The southwest quadrant of the site consists of open field. The northwest quadrant of the site is heavily treed except for an open area in the extreme northwest corner that contains a series of ponds that are part of the facility's groundwater/surface water collection and treatment system. The northeast quadrant, a former gravel pit, is currently leased by an automobile wrecking/recycling operation. The west and northwest portions of this parcel, beyond the limits of the former gravel pit, remain relatively undisturbed and forested. Vegetation of low to moderate ecological importance was reported within the Local Study Area.

Surface water from within the site is collected in a series of natural water courses and engineered interceptor ditches and treated onsite prior to discharge via pipeline to Lake Ontario. Brand Creek, located to the west of the site, provides degraded coldwater fish habitat and does not appear to support resident trout although some limited spawning by rainbow trout has been reported.

The surficial geology in the Local Study Area is reported as sand and gravel glacial lake deposits. To the north and west of the LTWMF, silt and clay glacial lake deposits have been mapped and since these are older than the sand and gravel glacial lake deposits, it can be anticipated that they may also underlie the Site Study Area at depth. Similarly, the Newmarket Till is of an older age than the glacial lake deposits and can be expected to be found at depth below the Site Study Area.

Groundwater flow occurs in three separate hydrostratigraphic units throughout the Site Study Area: a discontinuous sand and gravel/upper till with flow to the northwest towards the surface water collection/treatment system; a lower silty sand with flow from the northeast to southwest; and bedrock with flow from southwest to northeast.

The use of wells and groundwater for domestic water supply is limited mainly to rural areas. Where they exist, the majority of wells are drilled to depths in excess of 45 m and are reported

by the owners to be typically of good to excellent water quality. In the Brand Creek area, springs, shallow dug wells and deeper drilled wells are all used for water supply. Many homeowners report that the water is hard and a few report problems with iron and/or iron bacteria.

Ward 1 LTWMF Site

The Highland Drive Landfill and environs are located within an urban setting comprised primarily of residential land uses; a high school and recreational sports complex are located in the southwest portion of the site study area. The topography slopes generally down to the east towards the Ganaraska River situated east of the Site Study Area.

Ravines to the north and south of the site contain stream and pond complexes that ultimately drain into the Ganaraska River. The Ganaraska River provides excellent coldwater fish habitat, supporting resident trout populations (brown, brook and rainbow) as well as spawning and nursery habitat for migratory Lake Ontario species including rainbow trout, brown trout, Chinook salmon, Atlantic salmon and Coho salmon.

The majority of vegetation communities is semi-natural in character due to ongoing disturbances from recreational uses, current management practices and historic site alterations. Communities with a relatively rich floristic composition were identified within the ravine systems associated with the Monkey Mountain Wooded Ravine Complex and the northern section of the Ganaraska River Corridor. In general, the majority of the Local Study Area is considered to be of low to moderate importance.

The surficial geology is reported as sand and gravel glacial lake deposits, with Newmarket Till at the eastern extent and river deposits adjacent to the Ganaraska River. Groundwater flow occurs in each of three hydrostratigraphic units separated by till aquitards. The upper lacustrine sand contains a Perched Water Table Aquifer. Horizontal flow is to the southeast with some vertical loss through the Upper Till layer. Groundwater occurs in the Lower Lacustrine Sand unit as two separate aquifers: one in the upper portion characterized as the Lower Water Table Aquifer (LWT) and the other as the Base of Lacustrine Sand Aquifer (BLS). Flow in the LWT and BLS is in a partial radial fashion to the northeast, east, southeast and south. The calculated horizontal groundwater flow velocity for the BLS is slower than in the LWT. Groundwater in the bedrock is found primarily within fractures and joints in the bedrock with minor amounts of groundwater in pore spaces within the limestone bedrock. Groundwater flow in this aquifer is easterly towards the Ganaraska River.

Municipal water supply is drawn from Lake Ontario.

Remediation Sites

The Port Hope Project Remediation Sites are located throughout the Municipality of Port Hope. The Municipality is characterized as a mix of residential, commercial, institutional and industrial

land uses. The topography is relatively flat with a general slope to the south towards Lake Ontario. A number of stream and river valleys, notably the Ganaraska River valley, create local variations in the topography.

Other than Lake Ontario, which borders the southern extent of the Local Study Area, the main surface water features are the Ganaraska River, Brewery Creek, Alexander Creek and Gage Creek. The exposed lake nearshore fish community consists of primarily cool and coldwater water forage species, including alewife, round whitefish and white sucker. Lake trout were also common during the surveys indicating the presence of suitable coldwater habitat including an abundance of forage. The Port Hope Harbour provides a protected environment and supports a mainly warmwater fish community. Common species include white sucker, brown bullhead and yellow perch. When conditions are suitable coldwater predator species such as lake trout and rainbow trout utilize the Harbour for foraging. The majority of watercourses provide coldwater fish habitat. Most afford spawning and nursery habitat for migratory Lake Ontario species including rainbow trout (steelhead), white sucker, Chinook salmon and Coho salmon. The Ganaraska River tributaries do not appear to support substantial fish communities despite the provision of apparently suitable habitat, particularly in their upper reaches.

In general, the Remediation Sites fall into two main groupings: one group includes those sites that are distinctly human creations (i.e., Viaducts area, Mill Street South site, Port Hope Harbour and the Centre Pier area, Strachan Street Consolidation Site, the Lions Park lawn area and the Former Coal Gasification Plant site). These sites have undergone substantial development and exhibit little undisturbed natural vegetation and habitat. The second group includes isolated remnants of natural forest communities (parts of Strachan Street Consolidation Site, the Lions Park wooded area, Alexander Street Ravine), the open beach at the waterfront west of the Port Hope Harbour, an adjacent Fen and the coastal marsh associated with the Chemetron Lagoon and Sculthorpe Marsh area. No federally, provincially or municipally-designated rare plant species were identified at the time of the field surveys.

The surficial geology in the Local Study Area is reported as sand and gravel glacial lake deposits, with Newmarket Till at the eastern extent of the Highland Drive Landfill area and river deposits adjacent to the Ganaraska River. Silt and clay glacial lake deposits may underlie the Site Study Areas at depth. Similarly, the Newmarket Till is of an older age than the glacial lake deposits and can be expected to be found at depth below the Site Study Areas.

Historically, contaminant investigations at the Remediation Sites were limited to the upper hydrostratigraphic unit and groundwater was encountered only as the water table aquifer. Water table elevations varied considerably by site and by location within individual sites. Both depth to groundwater and flow direction in the upper aquifer were clearly influenced by local topography and proximity to surface water features.

As noted above, with some exceptions, the use of wells and groundwater for water supply is limited mainly to the rural areas. Municipal water supply for the (former) Town of Port Hope is

drawn from Lake Ontario, with the major industries in the area also drawing water from Lake Ontario via offshore intakes.

Assessment and Mitigation of Effects of the Project

The assessment of likely effects of the Port Hope Project was conducted within a framework of the individual environmental components and the works and activities that collectively comprise the Port Hope Project. A summary of the predicted effects on the environment as a result of the Project ("likely environmental effects"), feasible means to eliminate, reduce or control the likely environmental effects ("mitigation measures") and the effects that would remain after the mitigation measures have been implemented ("residual effects") for each environmental component is presented in the following table. It is to be noted that the identified mitigation measures are in addition to the extensive "effects management features" that have been incorporated into the conceptual design of the Port Hope Project for the purpose of preventing or otherwise pre-empting environmental effects.

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Atmospheric Environment			
Under the "Base Case Scenario" for waste placement at the LTWMF, the MOE 24-hour average AAQC for arsenic and cobalt will be exceeded on occasions at offsite locations, including at residential receptors. Also under the "Base Case Scenario", predicted concentrations of PM_{10} , $PM_{2.5}$ and NO_2 will exceed the 24-hour AAQC at some off-site locations	C&D	A "Mitigation Scenario" for waste placement was developed whereby the travel distance for dozers and/or front-end loaders distributing off-loaded contaminated materials within the LTWMF is reduced from 200 to 50 m. Installation of a fence-type barrier (e.g., woven strips in a chain link fence) or other movable physical barriers at specific targeted locations. When construction equipment meeting the proposed federal Off-Road Compression-Ignition Engine Emission Regulation [2328] becomes available, it should be used preferentially in areas of denser urbanization to further mitigate against fine particulate (PM_{10} and $PM_{2.5}$) and NO_x emissions.	No residual adverse effects.
The MOE guideline for odours may be occasionally exceeded at properties in the vicinity of the Highland Drive Landfill and the Harbour.	C&D	Standard operating procedures during works at the Harbour and the Landfill are to include regular and ongoing consideration for unacceptable odours at offsite receptors. If odours are determined unacceptable, odour suppressants will be used. Follow-up sampling of landfill gas in the interior areas of the Landfill is proposed (see Section 13).	No residual adverse effects.
Port Hope Project-related noise will be audible in the vicinity of the works sites. The audibility will range from only the immediately adjacent receptors in the case of small-scale sites to 800 m in the case of the LTWMF.	C&D	The design, operational and management features inherent in the Port Hope Project to control noise will be further developed during subsequent design stages. Measures will include ensuring proper equipment operation (e.g., mufflers), erection of hoarding and establishing and monitoring noise limits among others.	No residual adverse effects. (See additional comments under Socio-economic Environment)

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Geology and Groundwater Environment			
Excavation of contaminated materials at the Remediation Sites will benefit the quality of soil and consequentially improve groundwater.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Excavation of contaminated material at the Remediation Sites can be expected to result in improvement to the quality of groundwater and drainage water associated with the sites as a consequence of removal of the contaminant sources.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Aquatic Environment			
The removal of contaminated material at the Remediation Sites is expected to result in a long-term improvement to down-gradient surface water quality.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Reduced surface water infiltration into and subsequently out of, the LTWMF is expected to result in a reduction in transport of contaminants via groundwater to Brand Creek and consequentially improve the water quality of the creek.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Increased flow of uncontaminated surface water to Brand Creek from the LTWMF stormwater management system will contribute to improved water quality in the creek.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Contaminant loadings to Lake Ontario via treated leachate are expected to decrease with a corresponding improvement in lake water near the point of discharge.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Should it occur, an accidental spill of fuel oil, contaminated soil or release of water from a sediment containment area on the Centre Pier into the Ganaraska River is likely to result in increased mortality of sensitive aquatic organisms.	C&D	An Emergency Response Plan will be in place to address unexpected and unplanned events. The management program for fuels and lubricants will require a Spill Contingency Plan and spill control and cleanup equipment will be provided at all work locations. Prescribed operational procedures also require that erosion and sediment control structures be inspected and maintained regularly.	No residual adverse effects.
The physical change to the marsh substrate as a result of contaminated sediment removal at the Sculthorpe Marsh is likely to reduce invertebrate productivity temporarily. Although the restored benthic community will benefit from the reduced contaminant concentrations in the substrate following remediation, the temporary loss of productivity is considered to be an adverse effect.	C&D	Sediment toxicity testing will be conducted to confirm (or not) the need for remediation and/or to refine the areal extent and scope of the required sediment removal in the Sculthorpe Marsh. If remediation of the sediment is confirmed to be required, a Marsh Remediation Plan will be developed and implemented. The Plan will include some replacement of coarse organic matter, re-planting of shoreline vegetation, possible creation of island areas and other features to enhance habitat diversity, and monitoring of recovery in the benthic invertebrate and aquatic plant communities.	No residual adverse effects.
The removal of contaminated sediment from the Sculthorpe Marsh is expected to result in a long-term improvement to sediment quality and habitat conditions in the Marsh.	C&D	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
The removal of contaminated sediment from the Port Hope Harbour is expected to result in a long-term improvement to sediment quality and habitat conditions in the Harbour.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Terrestrial Environment			
Preparation of the LTWMF site will result in the permanent conversion of vegetation communities or the temporary loss of vegetation. Site remediation will result in the temporary loss of some vegetation within the Local and Site Study Areas. Some wildlife corridors within the Local Study Area will be affected by the Port Hope Project.	M&M	Relocate of the LTWMF stormwater management pond from the wooded area into an area of Cultural Meadow vegetation. Develop a site-specific Landscape Plan for Terrestrial Environment rehabilitation to offset the conversion and temporary loss of existing vegetation communities. Develop a Protection and Rehabilitation Plans for specified vegetative areas.	No residual adverse effects.
The construction and development of the stormwater management pond for the LTWMF will create new onsite amphibian habitat.	C&D M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Socio-economic Environment			
The Port Hope Project will result in the relocation of tenants at two rental properties and the voluntary out-migration of residents from neighbourhoods nearest the LTWMF, major Remediation Sites and along transportation routes prior to and during the Construction and Development phase. The Port Hope Project will result in the relocation of two existing tenant business operations. The Port Hope Project is likely to disrupt business activities at commercial operations with outdoor components and some farm operations. Although there are no indications that the Port Hope Project and particularly, the presence of the LTWMF, would have any change on the tourism industry, the Project will generate nuisance effects and increased traffic that will be seen by some visitors as contributing to what some have identified as unattractive features of Port Hope. As many as six residences with associated farm infrastructure are located within the likely zone of influence of the LTWMF and are likely to experience periodic increased noise and dust concentrations that may result in a consequential disruption to their outdoor activities.	C&D	Implement a business-oriented communications plan regarding completion of the Port Hope Project. Enhance liaison with economic development and tourism officials aimed at identifying and resolving scheduling conflicts between the Port Hope Project and major tourism events. Enhance liaison with local farmers aimed at keeping farm operators aware of Project works and activities, environmental monitoring results, peak traffic periods, potential road closures and access restrictions. In addition to the mitigation measures identified above, some mitigation measures will require the participation and/or approval by community stakeholders (e.g., business operators, farm operators, etc.), including the Municipality of Port Hope and the project proponent. The need for and nature of these mitigation measures shall be established through the complaint resolution process established pursuant to the Legal Agreement. Appendix D identifies the types of mitigation measures that will be considered by the proponent to further mitigate effects on population and economic base. Implement a policy aimed at maximizing local business opportunities and benefits of the Port Hope Project (e.g., pre-qualification programs, contract packaging considerations for local businesses and notification of opportunities).	Relocation of tenants at two rental properties and two tenant business operations. Voluntary out-migration of residents living in neighbourhoods nearest the LTWMF (less than 10%) and nearest major Remediation Sites or along transportation routes (1% to 3%) prior to and during the Construction and Development phase. Disruption to business (including tourism related) activities at commercial operations with outdoor components and farm operations within the likely zone of influence for the LTWMF and Remediation Sites.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
The Port Hope Project will allow the Municipality's Waterfront Plan to proceed with greater confidence that environmental and safety issues have been dealt with. Cleanup of the Harbour will also allow the removal of its existing designation as an Area of Concern by the International Joint Commission and on the whole, the Project is likely to diminish any existing stigma associated with the presence of LLRW in Port Hope.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects
During its Construction and Development phase, the LTWMF will be visible within a viewshed that totals approximately 1,914 ha. Upon completion, views of the LTWMF will be generally similar to views elsewhere in the viewshed. Project works and activities relating to site remediation will be visible throughout the duration of the remediation works which will vary in duration from a few weeks to several months. The heavy equipment, fencing and exposed excavations will be visible from properties in the immediate site vicinity.	C&D M&M M&M	Provide visual berms, noise barriers and landscaping along the dedicated access road from Toronto Road to the LTWMF aimed at minimizing the visibility and disruption associated with Project-related traffic. Implement a landscaping and lighting plan aimed at minimizing the visibility of the LTWMF.	Changes in the quality of existing views from viewing locations within the LTWMF viewshed. Changes in the quality of existing views of the Remediation Sites from viewing locations adjacent to the Remediation Sites.
The Port Hope Project will enable the removal of temporary storage facilities and structures at locations of some of the Remediation Sites.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Decline in residential property values of from 2% to 8% within the zones of influence of the LTWMF and Remediation Sites and along transportation routes where nuisance effects from increased traffic noise are expected.	C&D	Continue the PVP program for the duration of the LTWMF Construction and Development phase and two years into the Maintenance and Monitoring phase.	Reduced residential property values in the likely zone of influence of the Project. Increased turnover of residential properties within the likely zones of influence. Increased difficulties in marketing properties resulting in greater number of days on the market.
Property values in the vicinity of the Port Hope waterfront and specific neighbourhoods following remediation can be expected to increase as a result of the Port Hope Project.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
The Port Hope Project will result in some change in the use and availability of several community and recreational facilities. Non-residents might choose to fish in Port Hope less frequently or might fish elsewhere if they find that the Project renders the waterfront area less attractive for fishing. Up to 16% of Port Hope residents expect that their use and enjoyment of the Waterfront Trail, the Ganaraska Trail and other natural areas would be negatively changed as a result of the Port Hope Project. Port Hope Project Site Remediation activities may result in nuisance-related effects with consequential effects on outdoor activities at the Port Hope High School. Because of the proximity of the Port Hope High School to several of the Remediation Sites, there is potential for interactions with students and remediation activities with consequential effects on student safety.	C&D	Implement nuisance effects management measures specific to each Remediation Site and the LTWMF. Minimize Port Hope Project activities during the first two weeks of fishing season in the Ganaraska River. Enhance liaison with fishers and fishing clubs to keep them aware of Project works and activities, environmental monitoring results, peak traffic periods, potential road closures and access restrictions. Enhance liaison with educational facility operators and parents to keep them informed of air quality and noise levels, schedule of Project works and activities and where to call for answers to questions they may have. Avoid trucking during school bus pick-up/drop-off times along recommended transportation routes. Implement an orientation program for truck drivers focused on school and children safety issues along transportation routes and reinforce the school crossing guard program. Additional mitigation measures will require the participation and/or approval of community stakeholders. The need for and nature of these mitigation measures will be established through the complaint resolution process established pursuant to the Legal Agreement. Appendix D identifies the types of mitigation measures that will be considered to further mitigate effects on community services.	Disruption of user activities at community and recreational facilities with outdoor components located within the likely zones of the Project. Reduced attractiveness of areas used for fishing along the Ganaraska River and Lake Ontario within the likely zone of influence of the Project. Temporary restricted public access to some natural areas and trails during the Construction and Development phase. Disruption of operations at the Port Hope Harbour, Port Hope Yacht Club, Lions Recreation Centre Park, Canadian Fire Fighters Museum during the Construction and Development phase. Increased potential for disruption of operations at the Jack Burger Sports Complex during the

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
			Construction and Development phase. Disruption of outdoor user activities at educational facilities located within the likely zone of influence of the Project.
Remediation of the contaminated sites on and adjacent to the Port Hope waterfront is likely to create an improved locale and attraction for both resident and non-resident fishers with the result being an overall improvement to the recreational fishery.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Opportunities for outdoor recreational activities may be expected to improve once remediation activities along the waterfront have been completed.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.
Depending upon the end use selected for the LTWMF, there is potential for the Port Hope Project to add to the open space inventory available to residents for outdoor recreational uses.	M&M	No mitigation measures required. *Beneficial effect.*	No residual adverse effects.

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Project-related truck traffic will likely disrupt some road users, pedestrians and non-motorized traffic along the transportation routes by posing an additional hazard in specific circumstances, including along route segments where there are no sidewalks, where the transportation route crosses an existing recreational trail, where the configuration of the roads and/or intersection is inappropriate, where local detours or closures are required and where Project-related trucks must cross an existing rail line.	C&D	Upgrade Cavan Street from Highland Drive to Jocelyn Street by applying localized hot mix patches and following remediation works, rehabilitating the pavement. Undertake remedial pavement treatment such as patching or planing on route segments where excessive road wear has been detected. Install signalization at the Toronto Road/LTWMF access road intersection designed with an exclusive northbound left turn lane, an exclusive southbound right turn lane and southbound and northbound acceleration lanes. Implement contract clauses to ensure trucks adhere to recommended transportation routes; Conduct an orientation program for truck drivers focused on safety issues along transportation routes. Optimize offsite trucking activities through development of delivery timing windows, use of convoys and material stockpiling to minimize disruption to local residents and road users. Design and deliver a contingency plan in the event of temporary closure of a transportation route or an accident to ensure appropriate emergency response. Ensure access and proper construction signage for neighbourhoods affected by remediation activities and distribute information notices to affected households. Review and improve pavement marking and signage along the transportation routes in accordance with the requirements of the Ontario Traffic Manual.	Disruption to some road users, pedestrians and non-motorized traffic along the recommended transportation routes and local roads due to perceived hazards, detours and road closures.

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M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Some residents living nearest the LTWMF, Remediation Sites or along transportation routes will experience a change in the enjoyment of their property simply because an undesirable activity is occurring. During the Construction and Development phase, the residential neighbourhoods to the south and east of the LTWMF will experience increased noise and truck traffic which is incompatible with the existing character of the residential areas. Onsite activities at the LTWMF will also be incompatible with the rural nature of the neighbourhoods to the west	C&D	Implement mitigation measures to address the loss of use and enjoyment of property, including development of site-specific plans for nuisance effects and traffic management. Enhance communications with affected residents and newcomers aimed at keeping them informed of the Project and its associated activities. Implement an information program for affected neighbourhoods, including requirements for disclosure of monitoring information and site inspection privileges. Develop an end use for the LTWMF that maximizes the potential for passive and active recreational uses of the property. Develop a "name" for the LTWMF that would not associate it with the Municipality of Port Hope or any community. The licence application has been clear in that the LTWMF is intended only for the management of the waste materials prescribed in the Legal Agreement. Accordingly, the licensing authorities will establish licence terms that will ensure this to be the case. Assist stakeholders in removing the IJC Area of Concern (AOC) designation from Port Hope Harbour and the removal of requirements for existing contaminated property management measures (e.g., Radiological Status Letters). Additional mitigation measures will require the participation and/or approval of community stakeholders. Appendix D identifies the types of mitigation measures that will be considered.	Changes in the use of property and reduced enjoyment of property among some residents living within the likely zone of influence for the LTWMF and Remediation Sites or along transportation routes. Adverse changes to community character or image of neighbourhoods nearest the LTWMF and major Remediation Sites.

Note:
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M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
There were no archaeological or heritage resources found during the Stage 1 assessments conducted for the Port Hope Project (i.e., at the Welcome WMF, the LTWMF site and Remediation Sites). However, there remains the possibility that heritage resources may be discovered during more aggressive excavation activities as will be conducted during the Project.	C&D	Conduct Stage 1 and/or 2 Assessments for the new access road to the LTWMF, any other acquired properties on which Project-related development will occur, and at small-scale Remediation Sites not specifically considered in this EA and for which such assessments have not been conducted. If buried heritage resources are encountered, immediately suspend the work and contact the *Ontario Ministry of Culture*. Work may only resume with concurrence from the Ministry. If human remains are encountered, immediately suspend the work and contact the Registrar or Deputy Registrar of the Cemeteries Regulation Section of the *Ontario Ministry of Consumer and Business Services*. The Archaeology Unit and the local police will also be contacted since it would be necessary to determine whether the remains are prehistoric, historic, or modern and under what the circumstances they were interred. Work will only resume with concurrence from the appropriate authorities. Implement a heavy machinery operator awareness program regarding the identification and management of archaeological artefacts. The program will be delivered by a licensed archaeologist and/or other local experts. Consult with the Heritage Port Hope Advisory Committee prior to any physical works or activities in heritage conservation districts to ensure the Port Hope Project will not affect the built and natural heritage in the Municipality and is in compliance with the Ontario Heritage Act.	No residual adverse effects.

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M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Due to the presence of the facility for several hundred years, First Nations believe some environmental risks will always remain and this may have a consequential effect on the ability of current and future generations to exercise their inherent Aboriginal and Treaty rights.	M&M	Identify and preserve artefacts, campsites, bones, burial sites or human remains encountered during the construction of the LTWMF and cleanup of the Remediation Sites. A licensed archaeologist will be retained during the site preparation to ensure that any heritage or archaeological resources encountered will be quickly identified and that the necessary steps are taken to protect, document and preserve such resources. Any new areas that are subject to construction of ancillary facilities such as the site access road will be surveyed and monitored by the archaeologist whenever topsoil is removed. Project operational protocols will include provisions to stop work immediately and notify the archaeologist and proper authorities if any deeply buried heritage or archaeological resources, such as bones or human remains, are discovered. Keep First Nations informed and involved throughout the Port Hope Project phases. First Nations should have the opportunity to input to development of the LTWMF maintenance and monitoring plans and have the opportunity to be represented on a committee established to manage the LTWMF in the longer term, if desired.	The LTWMF and the long-term environmental risks posed by the wastes will be present within the traditional lands and Treaty area of local First Nations for hundreds of years. The long-term effects of the Project on the environment will depend on the condition, function and integrity of the LTWMF components and the long-term management of the facility for several hundred years. First Nations believe some environmental risks will always remain; and, as a result, there is increased potential for adverse effects on the ability of current and future generations to exercise their inherent Aboriginal and Treaty rights.

Note:
C&D – Construction and Development phase
M&M – Maintenance and Monitoring phase

Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Human Health and Safety Considerations			
Concentrations of PM_{10} and $PM_{2.5}$ will exceed the LOAEL on occasion at some offsite locations. The LOAEL is a level above with the increase in the incidence of severe health effects in the population can be quantified. In addition, increased concentrations of NO_2 at offsite locations may be accompanied by health risk on the (limited) number of days when exceedances of the MOE AAQC occur.	C&D	The "Mitigation Scenario" developed to address effects in the Atmospheric Environment will reduce the offsite emissions of PM_{10} and $PM_{2.5}$.such that this effect is also mitigated. When construction equipment meeting the proposed federal Off-Road Compression-Ignition Engine Emission Regulation [2328] because available, it should be used preferentially in areas of denser urbanization to further reduce $PM_{2.5}$ concentrations. There are no predicted exceedances of NO_2 at residential receptors, therefore, there is no associated adverse effect relating to increased health risk. As noted above, however, preferential use of construction equipment meeting the proposed federal regulation should be given to further reduce potential health risk.	No residual adverse effects.
The Port Hope Project will result in incremental noise levels at a number of locations associated with LTWMF construction and development and site remediation. Although the total sound levels are not expected to reach the threshold of 70 dBA (other than possibly for the special case fenceline receptor) at which physiological effects may result, the increase could be annoying at some locations and cause an adverse response in some people.	C&D	Apply noise mitigation as described above for likely effects in the Atmospheric Environment, plus the following: • Notify residents when activities will result in an increase in noise above 6 dBA; • Establish an operational protocol that will maintain noise levels at the fenceline below 70 dBA; and • Monitor noise levels and prevent public access to areas where noise levels may exceed 70 dBA.	No residual adverse effects.

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
Considering the "Base Case Scenario" (as described above for the Atmospheric Environment), there will be an increased non-cancer risk due to elevated cobalt concentrations for a special case "infant/fenceline" scenario. Although this special case exposure is unlikely, it is plausible.	C&D	The "Mitigation Scenario" developed to address effects in the Atmospheric Environment will reduce the offsite emissions of cobalt such that this risk is ameliorated.	No residual adverse effects.
Changes in feelings of health, sense of well-being, levels of satisfaction with living in the community and feelings of personal security could result in increased stress on the affected individual's health.	C&D	Implement consistent protocols for delivering information to, and for receiving the concerns from, residents in the Local and Regional Study Areas to address their concerns for health, sense of well-being, feelings of safety and security and of satisfaction with their community.	Increased stress and adverse effects to health and general well-being resulting from negative changes to people's feelings of health and sense of well-being, feelings of personal security; and feelings of satisfaction with living in the community.
The predicted risks to bounding-case workers (i.e., Flagman/Excavation Monitor at Port Hope Harbour and in the waste excavation/placement area at the LTWMF) as a result of exposure to conventional contaminants slightly exceed applied risk quotients. The likelihood for construction accidents involving injury, perhaps serious and the health consequences on workers associated with increased noise in the workplace are considered adverse effects.	C&D	Implement a policy that all occupational illnesses and injuries are preventable and adopt an objective of zero occupational illnesses and injuries. Implement a Port Hope Project Health and Safety Program supplemented with site-specific health and safety protocols. Implement a contractor pre-qualification and approval process that will include worker health and safety (e.g., performance and commitment) rating as one of its most important criteria. Actively participation in a WSIB and Construction Safety Association of Ontario (CSAO) or Aggregate Producers' Association of Ontario (APAO) Safety Group.	No residual adverse effects.

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Table E-1: Summary of Likely Environmental Effects, Mitigation Measures and Residual Effects

Likely Environmental Effect	Project Phase	Mitigation Measures	Residual Adverse Effect
		Implement a policy such that failure to comply with Port Hope Project health and safety policies, rules and procedures may result in termination of contracts and exclusion from Project work sites. Implement a program of/for routine and frequent site condition inspections and practice and procedure compliance audits. Implement a progressive discipline policy and process. Implement a process for comprehensive incident reporting, investigation, tracking and analysis to identify trends in incident causation and deficiencies in site practices and document procedures. Implement a process for tracking and analysis to identify trends in site inspection results and audits identifying deficiencies in site practices and document procedures. Implement a process for reviewing and, if appropriate, revising a site practice or documented procedure following and incident involving a failure of that practice or procedure, or whenever an incident or site inspection / audit trend analysis indicates a slippage in adherence to, or a deficiency in the scope of, the practice or procedure. Ensure all drivers associated with vehicle related activities are fully licensed and qualified to operate respective vehicles and that driving safety protocols are adhered to at all times. Ensure appropriate noise protection equipment for all workers in the construction zone. Ensure that appropriate medical monitoring is conducted for workers in higher risk roles. Develop and implement a comprehensive job training program designed to highlight all occupational health and safety considerations.	

Note:
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Assessment of Potential Effects of the Environment on the Port Hope Project

An assessment of potential effects of the environment on the Port Hope Project was carried out as a consideration of how severe weather conditions and other environmental events may interact with and alter the condition and function of the Project resulting in a consequential effect on the environment or risk to human health and safety. The assessment considered severe weather (i.e., thunderstorms, hail storms, ice storms, tornados, hurricanes, high winds and extreme temperatures and precipitation), flooding, seismic events and climate change.

Design and management features will be incorporated into the Port Hope Project to prevent or control possible changes to the Project as a result of conditions in the environment and these were a key consideration in the assessment. It was concluded that there are no potential consequential effects on any of the biophysical or human environmental components considered in this EA as a result of interference of the environment with the Port Hope Project.

Assessment of Cumulative Environmental Effects

An assessment was conducted of adverse environmental effects of the Port Hope Project in combination with the overlapping effects of other projects and activities (i.e., cumulative effects). The single cumulative effect determined to warrant consideration of significance was in terms of Human Health and Safety Considerations, and specifically, a possible reduction in people's feelings of health, sense of well-being, satisfaction with living in the community and personal security as a result of implementation of the Port Hope Project in combination with several other projects and activities throughout the Regional Study Area. The other projects and activities deemed to be relevant in the context of this cumulative effect were the Port Granby Project, those involving the handling of radioactive materials or waste at the Zircatec and Cameco facilities in Port Hope and the future re-tubing and decommissioning activities at the Darlington Nuclear Generating Station.

Significance of Residual Adverse Environmental Effects

A number of residual adverse effects of the Port Hope Project were identified within the Socio-economic Environment. One residual adverse effect of the Project was identified for Human Health and Safety Conditions. In addition, one potential cumulative adverse effect of the Port Hope Project in combination with effects of other projects or activities was also identified. No residual adverse effects were identified within any of the other environmental components considered for the Port Hope Project.

An evaluation of the significance of the residual adverse effects of the Port Hope Project and the single potential cumulative adverse effect established that all such effects represented minor adverse effects (not significant).

Follow-Up Program

The EA Study Report describes a preliminary EA follow-up program that is intended to:

- Assist in determining if the environmental effects of the Project are as predicted in the EA;
- Confirm whether the mitigation measures implemented are effective; and
- Determine if new mitigation strategies are required.

Upon acceptance of the EA by the RAs, further detailed planning for Project implementation will include corresponding refinement of the preliminary follow-up plan. Program refinement will be carried out within a consultative process that will have begun with review comments on this EA Study Report and input received during the subsequent licensing and approvals process and continue through a process that will accommodate input from appropriate stakeholders.

Because follow-up monitoring is an integral element of the EA, all monitoring data will be provided to the RAs (and other agencies they may designate). Reports will also be provided to the Municipality of Port Hope and made available to the public. Although the form and frequency of the reporting will be determined as the program is finalized, it is reasonable to anticipate that the data will be assembled into a formal monitoring report and submitted on a regular basis.

Conceptual Decommissioning/Abandonment Program

A specific proposal for LTWMF decommissioning has not been identified or described at this time. The concept for long-term management of the waste in the LTWMF is, however, conducive to a variety of decommissioning possibilities because the material in storage can be readily and completely retrieved. Features of the LTWMF that support retrievability of the contained waste include that the facility is essentially constructed as an above-ground impoundment; physical elements encapsulating the waste, while being secure, long-lasting and of low permeability, are not structural barriers (e.g., concrete, steel) and can readily be removed to access the impoundment; and the waste in storage will be well-defined and delineated by the containment features.

A possible future context for decisions concerning decommissioning of the LTWMF may include:

- The degree of maintenance and monitoring of the LTWMF necessary to ensure effective containment is determined unacceptable, undesirable or otherwise no longer viable on the basis of cost and/or administrative burden;
- Urbanization, development pressures and/or the continuation of constraints associated with the LTWMF require a reconsideration of land uses in and around the facility;
- The environmental performance of the facility is significantly less than expected; and

- Major refurbishment (e.g., cover replacement or upgrade) to ensure continued effective long-term management for a substantial extension to the maintenance and monitoring period (i.e., an additional period of several hundred years) is deemed inappropriate.

For purposes of this EA, the term *"abandonment"* is interpreted to mean the cessation of all forms of planned, designed human intervention at the decommissioned LTWMF for the purposes of managing or controlling potential environmental or human health and safety concerns associated with it. Abandonment of the LTWMF prior to its decommissioning (i.e., with waste materials still contained within it) is not considered viable or responsible stewardship.

Conclusions of the Proponent

In consideration of the findings of the studies presented in this EA Study Report, it is the conclusion of the LLRWMO that the Port Hope Project is not likely to result in any significant adverse environmental effects. As indicated above, a follow-up program will be implemented to confirm this conclusion.