

Scheduling the Remediation of Port Hope: Logistical and Regulatory Challenges of a Multiple Site Urban Remediation Project – 13119

Andrea Ferguson Jones, P.Geo.*, Angela Lee, MASc., P.Eng., PMP* and Tim Palmeter**

*MMM Group Limited

100 Commerce Valley Drive West, Thornhill, Ontario, Canada L3T 0A1

FergusonJonesA@mmm.ca / LeeA@mmm.ca

**Public Works and Government Services Canada

4900 Yonge Street, Toronto, Ontario, Canada M2N 6A6

Tim.Palmer@pwgsc-tps.gc.ca

ABSTRACT

The Port Hope Project is part of the larger CAN\$1.28 billion Port Hope Area Initiative (PHAI), a community-based program for the development and implementation of a safe, local, long-term management solution for historic Low-Level Radioactive Waste (LLRW) in the Municipalities of Port Hope and Clarington, Ontario, Canada. Atomic Energy of Canada (AECL) is the Project Proponent, Public Works and Government Services (PWGSC) is managing the procurement of services and the MMM Group Limited – Conestoga Rovers & Associates Joint Venture (MMM-CRA Joint Venture) is providing detailed design and construction oversight and administration services for the Project. The Port Hope Project includes the construction of a long-term waste management facility (LTWFM) in the Municipality of Port Hope and the remediation of 18 (eighteen) large-scale LLRW, numerous small-scale sites still being identified and industrial sites within the Municipality. The total volume to be remediated is over one million cubic metres and will come from sites that include temporary storage sites, ravines, beaches, parks, private commercial and residential properties and vacant industrial sites all within the urban area of Port Hope.

Challenges that will need to be overcome during this 10 year project include:

- Requirements stipulated by the Environmental Assessment (EA) that affect Project logistics and schedule.
- Coordination of site remediation with the construction schedule at the LTWFM.
- Physical constraints on transport routes and at sites affecting production rates.
- Despite being an urban undertaking, seasonal constraints for birds and fish (i.e., nesting and spawning seasons).
- Municipal considerations.
- Site-specific constraints.
- Site interdependencies exist requiring consideration in the schedule. Several sites require the use of an adjacent site for staging.

INTRODUCTION

Port Hope is a town of just over 16,000 residents located approximately 100 km east of Toronto in Ontario, Canada. The historic low-level radioactive waste (LLRW) and industrial contaminated

soil located at various sites around the community are the result of waste handling practices involving the refining of radium and uranium by a former federal Crown Corporation, Eldorado Nuclear Limited. Waste placement occurred between the early 1930s and mid 1950s. These waste materials contain radium-226, uranium, arsenic and other contaminants resulting from the refining process.

Over the years, the waste has been managed and monitored by the Canadian Federal government and a final solution to LLRW waste management in Port Hope has been under development since the mid 1970s. A primary part of the activities to date is the monitoring and inspection of waste sites to ensure the waste does not pose a risk to health or the environment.

The current CAN\$1.28 billion [1] 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 LLRW in Port Hope. It is the result of an agreement established in 2001 between the Government of Canada and the affected Municipalities for safe cleanup, transportation, isolation and long-term management of LLRW. The PHAI includes two 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). Only the Port Hope Project will be discussed herein.

The Port Hope Project consists of the construction and development of the Long-Term Waste Management Facility (LTWMF) and the remediation of contaminated sites in the Municipality of Port Hope with transfer of the contaminated material to the LTWMF. At the site of the LTWMF, the existing waste at the Welcome WMF will be remediated and included in the new facility. There are thirteen LLRW sites including the Port Hope Harbour and five industrial sites as well as numerous small-scale remediation sites still being identified through a survey of all properties within the municipality. The total volume is estimated at 1.2 million m³. Remediation sites include temporary storage sites, ravines, beaches, parks, private commercial and residential properties, and vacant industrial sites all within the urban area of Port Hope. The Cameco Corporation (Cameco) currently operating in Port Hope also has an allocation of 150,000 m³ of LLRW that will be managed at the LTWMF and is included in the total volume estimate. Combining to form the Port Hope Area Initiative Management Office (PHAI MO), Atomic Energy of Canada (AECL) is the Project Proponent and Public Works and Government Services (PWGSC) is managing the procurement of services. The MMM-CRA Joint Venture is providing detailed design and construction oversight and administration services for the Project.

SCHEDULING CONSTRAINTS AND CHALLENGES

The complexity associated with the scheduling of the remediation work for the 10 year construction phase of the Port Hope Project involved minimizing the various risks to the Project and working within the numerous constraints imposed by the nature of the work, external stakeholders, codes, standards and laws. There are several Project constraints on the construction implementation schedule that are imposed by the Environmental Assessment (EA) which established modelling scenarios and required mitigation measures. In addition, guideline principles for remediation were also considered. These are described in the following sections.

Truck Traffic

The Remediation Sites, both as origins of waste destined for the LTWMF and destinations for backfill materials were, for transport planning purposes, clustered within three Waste Generation Regions (North, South and Central) with each region representing a group of Remediation Sites. Each region was established to represent the point of origin for the waste material transport routes within each region. The terminus of each waste material transport route will be the intersection of Toronto Road and the LTWMF access road. Backfill will be imported to the Remediation Sites from the point of origin of each transport route from one of either the intersections of Toronto Road (County Road 2) and Highway 401 or Ontario Street (County Road 28) and Highway 401. The terminus of each backfill route will be one of the three regions. The transport routes are illustrated in Figure 1.

All waste materials from and backfill materials to the Remediation Sites will be transported by highway-licensed tandem, tri-axle and tractor-trailer trucks. For EA purposes, the proportion of vehicles types destined for the LTWMF was established at a typical distribution of 70% tandem-axle, 25% tri-axle and 5% tractor trailers; however, this will vary by site and region. Backfill supply will utilize tri-axle trucks almost exclusively. It is estimated that trucks will depart individual Remediation Sites at a frequency of between 30 and 60 per day, with occasional peaks of up to 80 trucks per day based on a typical 9 to 10 hour workday. However, production rates will be significantly affected by site constraints related to site size, slope and configuration which will limit the size of equipment that can be used for excavation and loading and the ease with which trucks can enter sites to be loaded and exit following loading, tarping and monitoring.

The design assumed that the LTWMF could receive waste materials would be 2,000 m³ per day. Assuming a typical haulage truck could carry 10 m³ of material (for ease of calculation), this rate equates to approximately 200 trucks per day arriving at the entrance to the LTWMF. This trucking rate also corresponds well with the maximum trucks used in the EA that represented the “maximum year” scenario.

Finally, the volume of 200 trucks per day also compares favourably to the amount of time required to unload, clean and monitor a truck using multiple tarping stations prior to leaving the LTWMF.



Figure 1: Transportation Routes

Seasonal

For several sites, work is constrained by the following:

- Sites that involve clearing of wooded areas are to be scheduled during bird non-nesting seasons (i.e., late July to late March); and
- Sites that involve working in or near watercourses are to be scheduled during non-spawning times (i.e., mid June to early September).

Municipal Considerations

The Port Hope Project takes into account Port Hope By-Law No. 30/2002 which stipulates that all construction activities shall be limited to the hours between 0700 and 2300. Consideration is being given to granting an exception for the Port Hope Harbour remediation.

The Municipality's document *Remediation of the Port Hope Waterfront: Principles to Guide Site Remediation Sequencing* [2] includes the following guidance which has been incorporated into the Project specifications:

Maintain Public Access to and Enjoyment of the Waterfront

Work in and around the waterfront has been scheduled to minimize multiple large-scale sites being remediated concurrently in one area taking into account Project constraints relating to truck traffic and seasonal conditions.

Protection of the Port Hope Downtown

Whenever possible based on site location, truck routes have been selected with consideration of moving materials around the perimeter of the Municipality as shown on Figure 1 rather than through the core where the celebrated downtown and heritage designated buildings are located.

Other roads will be used as required to access the prescribed routes whenever a site is not located on prescribed transport route.

Continuing Coordination

Coordination with the Municipality and Cameco remediation activities will be addressed through the on-going PHAI MO Communications Program that is currently in place and will be implemented throughout the Project.

Waterfront Sectors

Work in and around the waterfront has been scheduled to minimize multiple large-scale sites being remediated at the same time in one area minimizing disruption to this busy tourist area.

Site-Specific Constraints - LTWMF

The footprint of the engineered containment system for the LTWMF will encompass the area of the existing Welcome Waste Management Facility (WMF) waste burial area. Portions of the containment system footprint as well as much of the infrastructure will also encompass areas outside the limits of the existing waste burial area and will also require waste (contaminated soil) excavation in a number of areas. As a result, a phased approach to waste excavation and site

development has been established. The phased approach will require the waste excavation and site development to be performed in a predetermined sequence that has been designed to:

- Ensure that the Water Treatment Plant (WTP) at the LTWMF has been commissioned before excavation and placement of onsite and offsite wastes in the LTWMF occurs in accordance with Canadian Nuclear Safety Commission licence conditions;
- Minimize the amount of waste excavation required prior to establishing the receiving cells of the engineered containment system (e.g., minimize the amount of temporary stockpiling that would result in double-handling of the waste) as well as reduce temporary stockpiling of higher concentration wastes;
- Accommodate seasonal constraints on cell base liner construction (i.e., construct through summer construction season); and
- Allow the cells of the new engineered containment system to be developed in sequence and at the appropriate time in the overall Project schedule in order to be available to receive waste when required, but not before in order to minimize leachate generation.

In addition, final cover construction will be completed as soon as practicable in areas that reach final waste grades, but also generally during the summer construction season to facilitate final cover component construction during appropriate weather conditions.

Due to space constraints at the LTWMF, material from the Remediation Sites cannot be delivered to the LTWMF until after a portion of the Welcome WMF has been excavated and placed into the LTWMF. Also, as noted earlier, the rate of waste material delivery has been assumed to be about 2,000 m³ per day.

Site-Specific Constraints - On-Land Remediation Sites

The schedule was based on the premise that multiple sites throughout Port Hope will undergo remediation concurrently. Specific elements considered in the schedule are:

- Remediation at the Highland Drive Landfill Area will occur during colder weather (i.e., fall, winter and spring) to minimize the opportunity for odour generation. Remediation at this site will also take place following the remediation of the Pine Street North Temporary Storage Site since that area is required for staging;
- Remediation of large-scale LLRW and industrial sites have been sequenced to consider spatial distribution (consecutive rather than concurrent remediation of adjacent sites, such as the Centre Pier TSS and the Viaducts site, is considered preferable). Alexander Street Ravine, Mill Street, Waterworks, Lions Park and Highland Drive South Ravine will be completed when low groundwater levels are expected; and
- Small-scale sites will be remediated in conjunction with the On-Land Sites. The location and nature of these sites have not been specifically established and therefore the scheduling of individual sites has not been considered.

Site-Specific Constraints - Port Hope Harbour

Prior to any remediation activities at the Port Hope Harbour, the Centre Pier Temporary Storage site must be remediated, the Yacht Club facilities moved and the four Centre Pier buildings emptied of their contents and removed by Cameco. These activities will provide the space required for the rehabilitation of the Harbour walls and the establishment of the sediment dewatering facilities on Centre Pier. Work in the Harbour will be initiated at the Outer Harbour at the start of July (i.e., outside of the fish spawning period). The intent is to undertake the installation of the temporary wave attenuator, fish barrier and associate fish removal in the Outer Harbour during the summer months when the wave climate is more moderate and prior to the start of the fall spawning period in mid-September. The wave attenuator will effectively isolate the work area and will allow work within the Harbour area to continue through subsequent fish spawning periods until complete. After installation of the wave attenuator, the dredging and wall rehabilitation operations will commence in the Outer Harbour and Inner Harbour areas (i.e., Approach Channel and Turning Basin).

Dredging work is not scheduled to take place during winter months due to difficulties in pumping slurries and conducting dewatering activities as temperatures will reach down well below freezing for extended periods of time.

CONCLUSION

Preparing a schedule for any large undertaking is a challenging exercise. In the case of the Port Hope Project, multiple sites, the urban nature of the sites and both regulatory and site-specific constraints make the scheduling exercise particularly challenging. Ongoing scheduling efforts during preliminary and detailed designed have demonstrated that with care and consideration for all of the schedule constraints , an efficient schedule for the implementation of the Port Hope Project is achievable as illustrated in Figure 2.

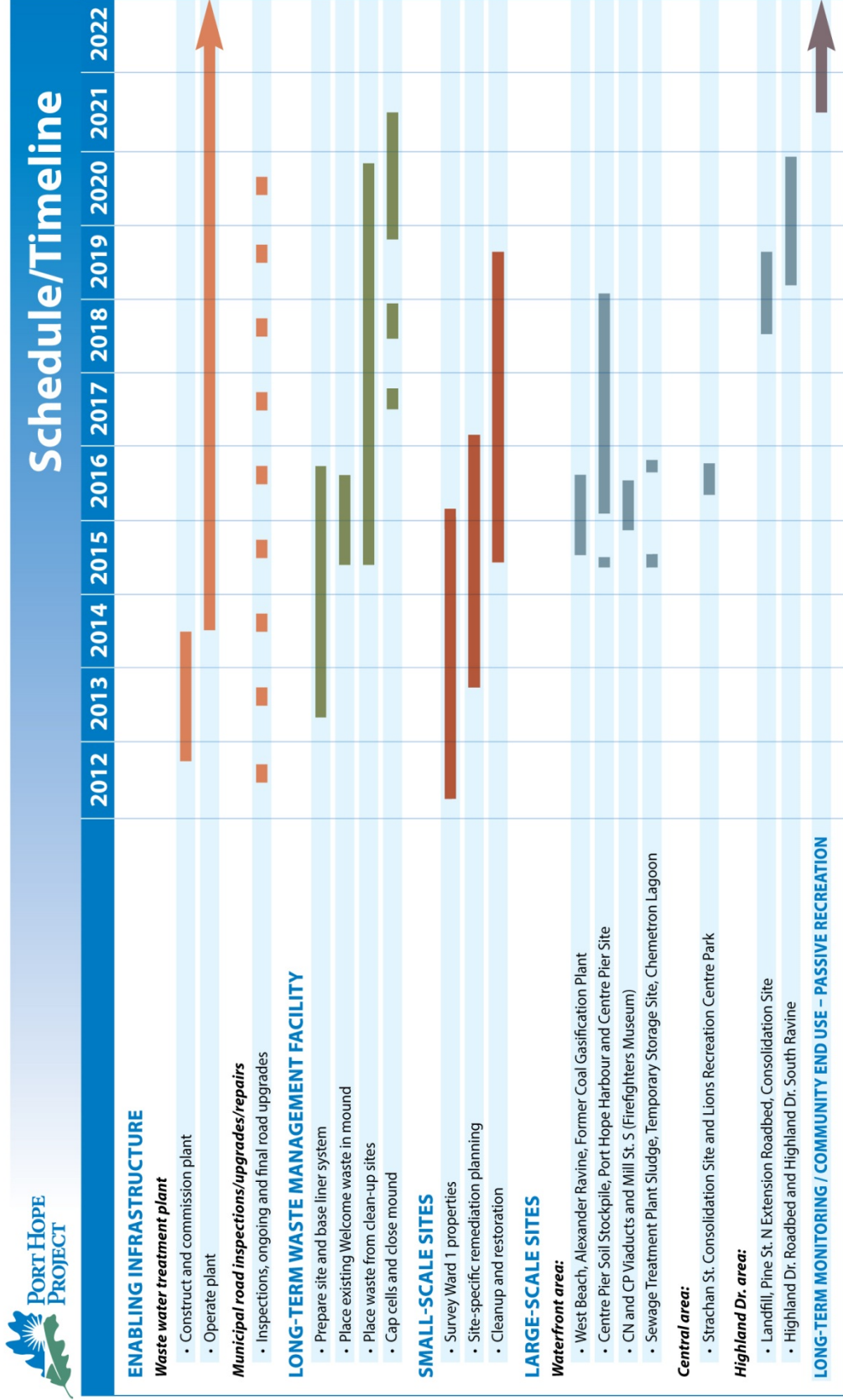


Figure 2: Port Hope Project Implementation Schedule

REFERENCES

1. Natural Resources Canada, www.nrcan.gc.ca, *Government of Canada Announces Funding for Implementation Phase of Port Hope Area Initiative*, dated January 13, 2012
2. Waterfront Implementation Technical Advisory Group. 2010. *Remediation of the Port Hope Waterfront: Principles to Guide Site Remediation Sequencing* dated March 30, 2010.