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Natural Resources Canada - Port Granby Project

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Project Overview

The Port Granby Project is part of Canadian Nuclear Laboratories $1.28B Port Hope Area Initiative (PHAI), a community-based program for the long-term management of historic low-level radioactive waste (LLRW). AECOM was the Design Engineer and WSP was the primary General Contractor. The Port Granby Project is a first of its kind facility in Canada that demonstrates it is possible to design and construct a safe, long-term management facility for over 700,000 cubic metres of LLRW.

Port Granby, completed Engineered Containment Mound

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1. Innovation

Low level radioactive waste disposal at the Port Granby site was part of the historical activities in the Port Hope area. Processing of uranium ores began in the 1940s and disposal of the process waste at the Port Granby Waste Management Facility (PGWMF) occurred between 1955 and 1988. Wastes were deposited in low lying areas as well as in 76 unlined trenches at the site over that period. Studies conducted at the site indicated there was approximately 450,000 m^3 of impacted material present.

The site is located immediately adjacent to Lake Ontario. Modelling of shore line erosion indicated that, in the long term, the LLRW waste would slough in to Lake Ontario; a situation that could not be allowed to occur.

The Port Granby Project consisted of the following major features:

1. The design and upgrading of 1.6km of Elliott Road from a single lane, gravel road to a 2-lane paved road that meets municipal standards to allow truck access to the site.
2. The design and construction of a state-of-the-art Engineered Containment Mound (ECM) designed for the storage of the excavated waste.
3. The design, construction and commissioning of a Waste Water Treatment Plant (WWTP) to treat contaminated water generated during construction/excavation activities and treat the long-term leachate generated from the ECM.
4. The design, construction, and de-construction of an underpass along Lakeshore Road. The underpass was included in the design so that all project-related traffic would not have to travel on public roads. On completion of the waste excavation, the underpass was removed and traffic returned to the original configuration of Lakeshore Road.
5. The design and planning for the safe excavation, loading, transport, and placement of approximately 700,000 m^3 of LLRW and marginally contaminated soils in the new ECM.
6. Progressive capping of the ECM and restoration of the PGWMF site.
7. Design and construction of numerous enabling infrastructure features such as internal roads, ditching, stormwater management ponds, construction dewatering systems, material laydown areas and material stockpile areas.

Innovative aspects of the project included:

- A state of the art Engineered Containment Mound design for the safe, long-term storage of LLRW
- A one-of-a-kind waste water treatment plant
- The construction and deconstruction of a dedicated underpass for project vehicles
- Numerous radiological safety systems and features to protect workers during construction
- Drone surveying to track excavation-remediation progress and the volume of material relocated

Port Granby Waste Water Treatment Plant

2. Complexity

The types of chemicals and compounds that were being handled, treated, and relocated represented potential exposure to workers. This resulted in the need to address a number of complex challenges that would not otherwise be included in a typical engineering design and construction/remediation project.

Contaminants of concern that required treatment by the waste water treatment plant (WWTP) included ammonia and nitrates, metals (arsenic, in particular), and radiological parameters including radium-226, thorium-230, and uranium. This combination of contaminants resulted in the design of a one-of-a-kind treatment train. The treatment technologies included an equalization pond, membrane bioreactor technology, and reverse osmosis. The residuals treatment from the reverse osmosis units consisted of lime precipitation, thickening, dewatering, evaporation, drying and packaging for disposal in the Engineered Containment Mound (ECM).

Extensive safety precautions were included in the excavation-remediation area of the site. Workers were provided with protective coveralls and boots as well as personal TLD (thermoluminescent) and Radon monitors. Because of the potential to encounter unknown/unanticipated substances as well as intact compressed gas cylinders, excavation equipment was equipped with blast shields and the cab was provided with supplied air.

AECOM routinely flew a drone equipped with topographic surveying capabilities over the site to track progress – both excavation-remediation and filling of the ECM. Early on, we recognized that more waste material was going to be placed in the ECM than the original design could accommodate. We modified the design of the ECM mid-construction to handle the increase in volume, without an impact to the schedule.

Excavation-remediation activies, equipment with blast shields and supplied air packs

3. Social and/or Economic Benefits

The purpose of the Port Granby Project was to move an estimated 450,000 m^3 of LLRW and marginally contaminated soil from the shore of Lake Ontario to a state-of-the-art designed facility for safe, long-term storage. The actual amount of material relocated was approximately 700,000 m^3. The positive benefit to society for relocating a significant amount of contaminated material to prevent it from entering Lake Ontario – a source of drinking water, ecological habitat, fisheries, etc. - one could argue is almost immeasurable.

For the citizens of Clarington and Port Hope, the completion of the Port Granby Project demonstrates that the Government of Canada's Port Hope Area Initiative can deliver on what they promised: the safe remediation of low-level radioactive waste that has been present in the community for over 50 years. Also, the knowledge gained during the execution of the Port Granby Project will continue to be utilized for the on-going remediation activities in Port Hope, having a positive impact on the citizens there.

The construction phase of the Port Granby project was over 10 years with a budget of approximately $250 million dollars. At its peak, there were over 50 workers on site. WSP (as Prime Contractor) retained many local subcontractors, including Indigenous owned companies; providing economic benefits to many local individuals and companies.

Port Granby, ECM under construction

4. Environmental Benefits

Detailed environmental studies were undertaken during the study phase of the project that culminated in an Environmental Assessment Study Report of over 1,000 pages that included a broad assessment of several factors, including:

- The need and purpose of the Port Granby Project
- Consideration of comments and input from the public and key stakeholders
- Assessment of alternative means of implementing the project
- Description of existing environmental conditions
- Assessment of environmental effects of the project, including the effects likely to result from the project in combination with other projects
- Identification and evaluation of mitigation measures to reduce or avoid adverse environmental effects of the project
- Determination of significance of the residual adverse effects
- Assessment of the effects of the environment on the project
- Development of a plan for follow-up monitoring

The most significant positive environmental benefit of the Port Granby Project is the elimination of approximately 700,000 m^3 of low-level radioactive waste from entering Lake Ontario, potentially contaminating drinking water and ruining ecological habitat.

Another positive environmental aspect of the project was the restoration plan that included the planting of areas of cultural meadow, cultural thicket, mixed forest and deciduous forest at key locations across the site intended to provide habitat and migration corridors for wildlife. The meadows and forest planted at the site are part of a Nature Reserve that will be established with the Municipality of Clarington.

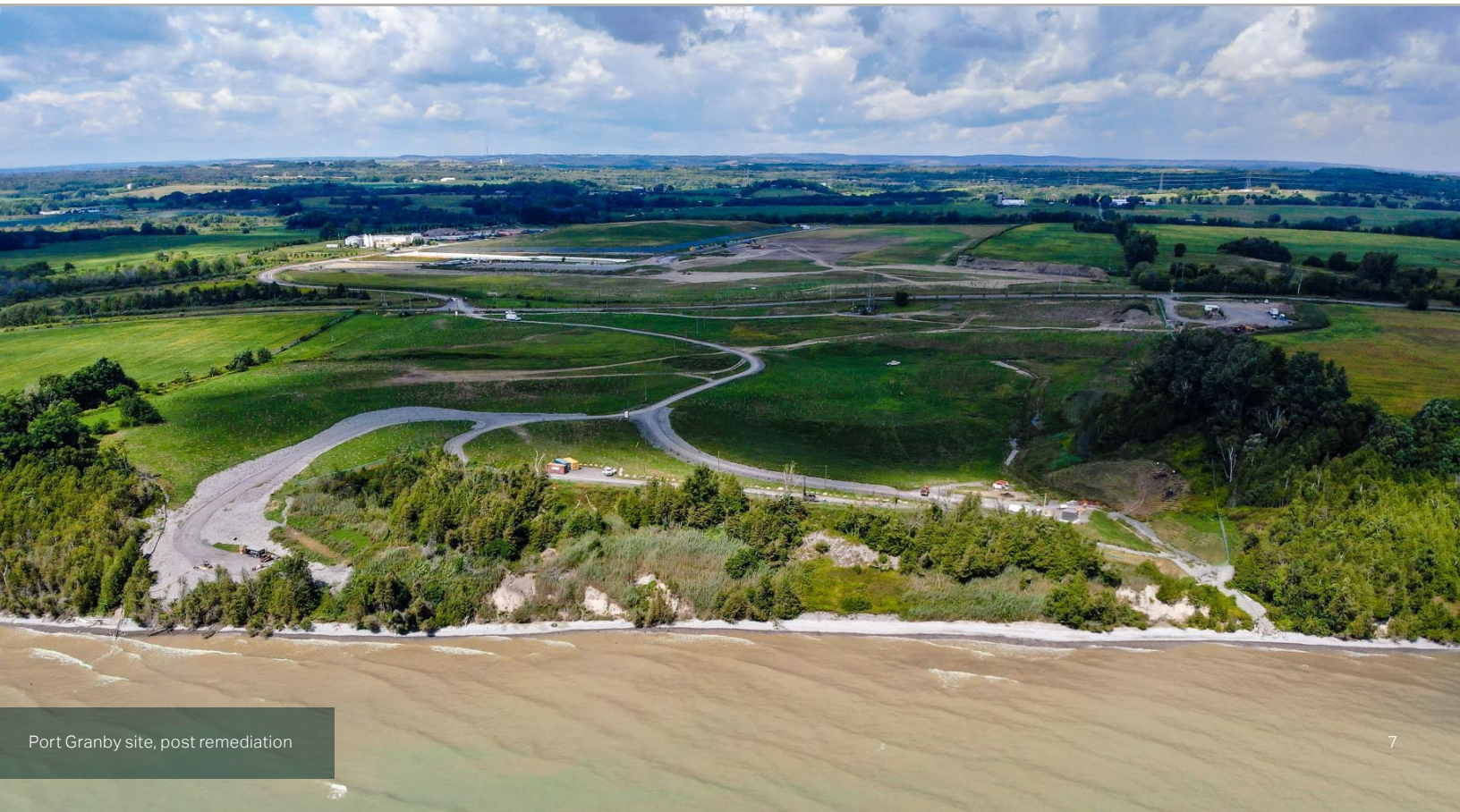
Image of the completed project incorporated into the Nature Reserve

5. Meeting Client's Needs

For the citizens of Clarington and Port Hope, the completion of the Port Granby Project demonstrates that the Government of Canada's Port Hope Area Initiative (PHAI) can deliver on what they promised: the safe remediation of low-level radioactive waste that has been present in the community for over 50 years. This was the key measure of success for Canadian Nuclear Laboratories Ltd., the Client.

The project was also delivered safely, with a total radioactive dose lower than planned, and within the PHAI's schedule and funding allocations. Also, the knowledge gained during the execution of the Port Granby Project will continue to be utilized by CNL and their contractors for the on-going remediation activities in Port Hope.

Further, the design and construction experience gained from the Port Granby Project will greatly benefit the design and construction of CNL's Near Surface Disposal Facility (NSDF) located in Chalk River, Ontario. The NSDF ECM has been designed to receive low level radioactive waste generated by Canada's historic and future nuclear research and production. It is designed to manage 1,000,000 m^3 of material and is to be filled over 50 years.



Port Granby site, post remediation

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