Port Granby Project Overview – 13208

David W. Smith [1], Gary Vandergaast [1], and Mark Sungaila [2]
[1] Atomic Energy of Canada Limited, Port Hope, ON,
smithdav@aecl.ca and vandergaastg@aecl.ca
[2] AECOM, Markham, ON, mark.sungaila@aecom.com

ABSTRACT

The Port Granby Project is an integral part of the Port Hope Area Initiative (PHAI), and is located approximately 14 kilometres west of the Municipality of Port Hope in the adjacent Municipality of Clarington, Ontario. The principal objective of the project is the excavation and relocation of low-level radioactive waste (LLRW) and marginally contaminated soils, which were deposited at the Port Granby Waste Management Facility (PGWMF) by Eldorado Nuclear Limited during the period 1955 to 1988, to a new, highly engineered above-ground Long-term Waste Management Facility (LTWMF) to be constructed on a nearby site. The Environmental Assessment for the Project was approved in 2009 August and the required Waste Nuclear Substance License was received in 2011 November. Once the detailed engineering design was completed, in 2011 March, the Port Granby Project was divided into three major contracts for construction implementation purposes. The first of these contracts was completed in late 2012 and the second is planned to start in early 2013. The contracting process for the third major contract is also expected to be completed during 2013. This paper provides an overview of the Port Granby Project as well as discussion on the status of the Project, including the regulatory approvals process, the approach to contracting the construction works and an update of work recently completed and soon to get underway.

INTRODUCTION

The Port Hope Area Initiative (PHAI) is Canada's largest Low Level Radioactive Waste (LLRW) remediation project. The PHAI is defined by a three phase process. Phase 1 (2001 to 2008) consisted of planning, environmental assessments and regulatory approval steps. Phase 1A (2008 to 2012) involved detailed design development and contracting steps. Phase 2, which started in 2012 January, will include the construction and development works, which when completed, will launch Phase 3 – the long-term monitoring and maintenance period. The Port Granby Project is currently in the early stages of Phase 2, and during the next 7 to 8 years will be the subject of major construction and remediation activities. This paper describes these Phase 2 activities and provides information about the upcoming construction projects. A similar overview of the larger Port Hope Project is presented in WM 2013 Conference paper "From Pushing Paper to Pushing Dirt – Canada's Largest LLRW Cleanup Gets Underway. [1].

The Port Granby Project entered Phase 2 in early 2012 when the Government of Canada announced its commitment to fund the Project. This followed the granting of license to AECL by the Canadian Nuclear Safety Commission (CNSC) for the Project in 2011 November and the earlier completion of an Environmental Assessment Screening Report in 2009 August, which concluded that the Project could be completed with no residual adverse environmental effects, assuming that proposed mitigation measures will implemented. Additional information about the PHAI, its achievements in Phases 1 and 1A and the background of the development of the Port Granby Project are presented in WM 2013 papers 13152 [2] and 13151 [3].

The existing Port Granby Waste Management Facility contains an estimated 375,000 m^3 of LLRW and contaminated soil. The LLRW includes uranium refinery process wastes such as limed raffinate, calcium fluoride-based filter cake, magnesium fluoride-based slag and ammonium nitrate – all of which originated at the uranium ore processing operations at the former Eldorado Port Hope plant. Additionally, there are contaminated industrial wastes, miscellaneous drummed materials, contaminated soil and purportedly, unusual items such as a number of compressed gas cylinders, large box filtration units, possibly a concrete truck mixing drum and a small road vehicle to contend with. The waste materials are buried in approximately eighty trenches on the existing Waste Management Facility Site as well as in the head ends of two pre-existing gorges present on the site. The total volume of material can be further described as approximately 205,000 m^3 of LLRW, approximately 100,000 m^3 of Marginally Contaminated Soil (MCS), and approximately 70,000 m^3 of potentially impacted topsoil /fill overlying the LLRW. Fig. 1 below is an aerial view of the existing Port Granby WMF situated on the north shore of Lake Ontario, Canada.

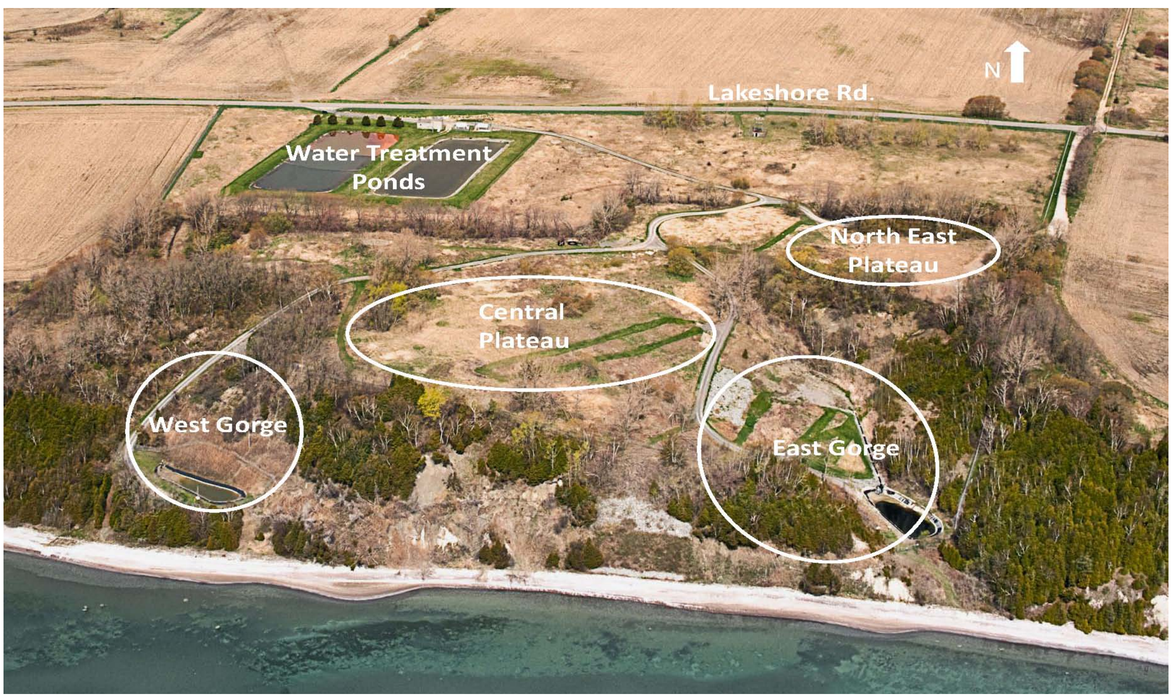

Figure 1: Current Port Granby Waste Management Facility to be Remediated Showing Waste Burial Areas – Lake Ontario in the Foreground

Detailed engineering design work for Phase 2 of the Port Granby Project was started in the spring of 2010. Relatively early on, it was determined that the packaging of the project for contracting purposes would be to divide the work up into three contracts. The rationale for the distribution of the work to these three contracts was largely based on work sequencing and contract implementation considerations. In addition, outputs of the federal Environmental Assessment (EA) and licensing processes dictated a certain logical order for doing the work, as elaborated below.

Major government contracts in Canada over a prescribed dollar value require administrative oversight by the government's own Public Works and Government Services (PWGSC) department. A dedicated PWGSC project team was therefore formed to be an integral part of the PHAI Management Office at the start of Phase 1A. The requisite governmental review, approval and funding authorization stages are variable depending on the estimated value of prospective contracts. Since the construction of the new LTWMF and the remediation of the existing Port Granby WMF represent that major components of the work, the contract for these aspects is expected to require the longest approvals process.

An important relevant outcome from the EA for the Project was that in the construction of the new LTWMF, all construction materials would be delivered to the site by means of northern approach roads. These existing roads, in one case only a single lane dirt road, required substantial upgrading and rehabilitation to suit this requirement. In addition a condition of the CNSC license is that a new water treatment plant must be constructed and operational before waste excavation and relocation can take place.

The above factors led to an (almost obvious) breakdown of the overall work into the three separate, major contracts. The key components of the CDN $273 million Port Granby Project are:

1. Upgrades to municipal roads for site access (Contract "A");
2. Construction of a new water treatment plant to treat surface water and groundwater from the existing facility as well as leachate from the emplaced waste (Contract "B"); and
3. Construction of the new aboveground engineered mound and remediation of the existing waste site (Contract "C").

Each of these three major contracts are presented in this paper in terms of a description of the works to be undertaken, an update on the current status and a review of the more significant issues faced, or expected to be faced during the work. In addition to these three major PWGSC-led contracts, a number key enabling works that are being carried out separately by AECL will be described. Fig. 2 below shows the overall Port Granby Project Site Plan with the existing Port Granby WMF south (down) of Lakeshore Road, the new LTWMF and associated site features, as well as the new water treatment plant on the north (up) side of Lakeshore Road. The components of Contract "A" – in orange – include upgrading Elliott Road, two clean water storm water management ponds, construction site perimeter fencing and a general vehicle parking and equipment lay-down areas.

The scope of the new water treatment plant – Contract "B" – is shown in blue.

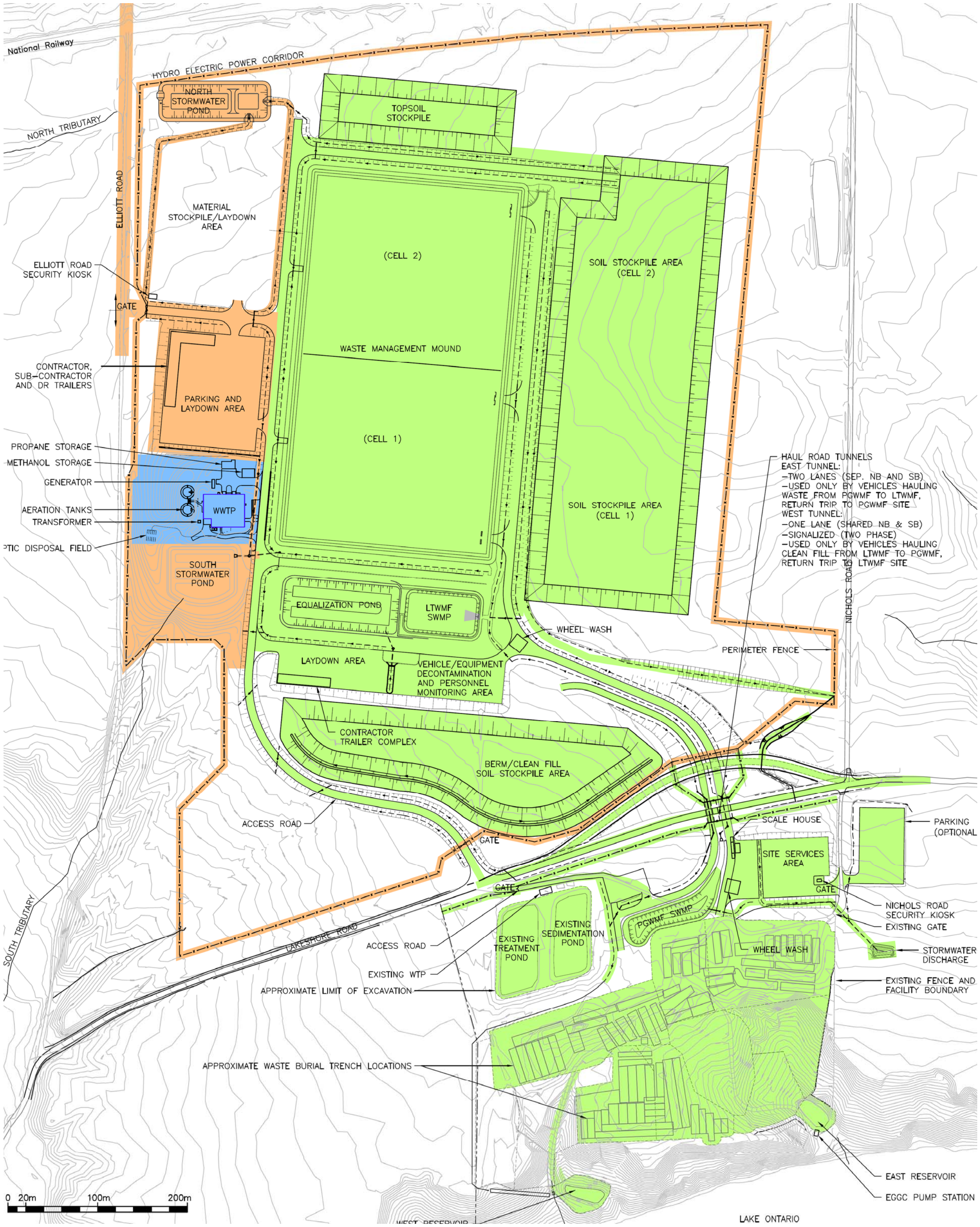

Figure 2 Overall Site Plan and Division of Major Contracts

In addition to the water treatment building and facilities, Contract “B” also includes the installation of the pipelines to convey contaminated water from the existing Port Granby WMF and the treated water return lines to Lake Ontario (not shown in Fig. 2). Contract “C” – shown in green – includes the remediation (waste excavation and site restoration) of the existing Port Granby WMF, the transport of the waste to the new LTWMF, the construction of the LTWMF and all final site development.

To avoid disruption and to address nearby residents’ concerns about the movement of radiological materials on public roads, strongly expressed during the project environmental assessment, a dedicated waste haul route, complete with an underpass structure that passes some 8 metres beneath Lakeshore Road – a scenic route critical to the local tourism industry –will be constructed for the project trucking operation. The underpass will consist of two arch-shaped tunnels (Fig.3). The installation and removal of the underpass at the end of the project will both require temporary detours for public traffic on Lakeshore Road. The locations of the waste trenches at the existing Port Granby WMF are evident by the numerous adjoining clusters of rectangular outlines.

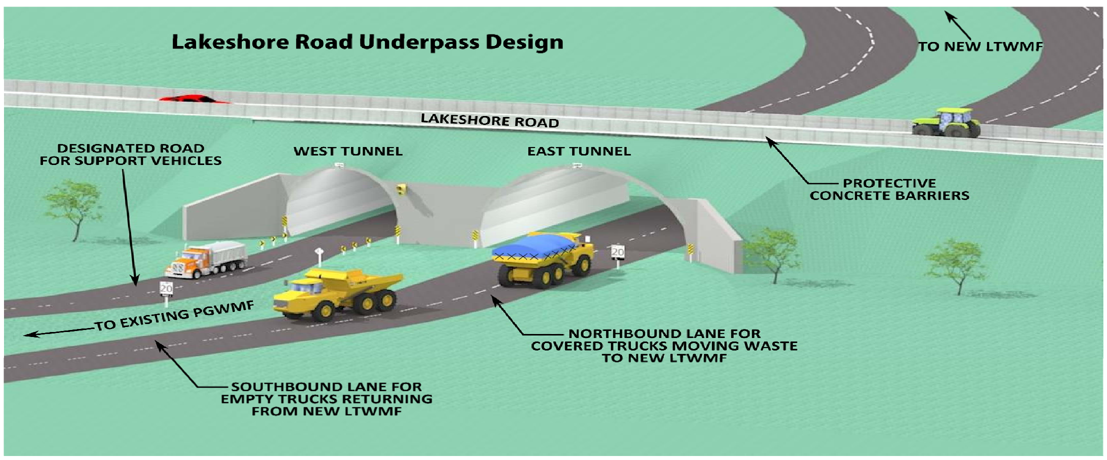

Figure 3: Grade Separation of Waste Haulage Route from Public Roadway.

ELLIOTT ROAD AND OTHER MUNICIPAL ROADS UPDGRADES AND REHABILITATION

Description

A significant mitigation measure originating from the environmental assessment of the Port Granby project was the requirement that the transportation of construction materials for the mound – many 10s of thousands of cubic metres –must be along roadways leading to the site from the north. The west entrance to the Port Granby LTWMF site is about 4 km by road from the nearest intersection of a major multi-lane highway in the area – see Fig. 4 below. The first 2.4 km of this “primary access route” consist of existing, two-lane paved municipal roads. The second 1.6 km is a north-south road known as Elliott Road, the southern section of which is shown in orange in Fig 2 above. Prior to the start of Phase 2 of the Port Granby Project, this part of Elliott Road consisted of a single lane, unmaintained dirt road within a designated municipal Road Allowance. The Port Granby Project therefore includes components for the rehabilitation of the 2.4 km of existing municipal roads and the complete 1.6 km upgrade of Elliott Road.

Figure 4 Port Granby Project Roads Network.

From its northern intersection with the nearest east-west municipal road, Elliott Road crosses two fresh water stream channels of important fish habitat quality as well as two high-volume railway corridors before arriving at the new LTWMF site. One of these rail crossings is a one-lane tunnel under the rail line and the other is a double track level crossing. Due to the rustic condition of Elliott Road, substantial improvements were also required at each of these four crossings – two water and two rail.

Status of Work

Work on Elliott Road started in 2012 February with the clearing of approximately 3,000 trees from within the municipal road right-of-way where the upgrade construction is required. A road construction contract was awarded in May and work was started in early June. A separate contract was issued in 2012 October for the rehabilitation of the existing municipal roads. These roads were considered to be in good condition, other than the poor quality of the existing asphalt surface.

These two projects were completed in 2012.

Construction Issues and Challenges

Due to the extensive widening of Elliott Road and the need to replace relatively short and aged steel culverts at the two major stream crossings with longer concrete box culverts it was determined that there would be a quantifiable loss of productive fish habitat. As a result, the regulatory authorization stipulated that a Fish Habitat Loss Compensation Plan also needed to be developed and implemented.

At one of the major stream crossings along Elliott Road, extremely poor sub-surface soil conditions were encountered, which rendered the planned installation method unfeasible. The alternative which was devised included the installation of the new culvert within a sheet piled enclosed work zone. The normal regulatory authorization for doing “in-water” work specifies it must be completed during the window July 1 through September 15 for the protection of fresh water fish spawning activity. However, the requirement for the design, approval and installation of the sheet pile enclosure resulted in pushing the culvert installation work into November and a corresponding extension of the various authorizations. This added substantially to the administrative project oversight functions.

During the tendering of the Elliott Road upgrade Project, the railway crossing at Elliott Road, was closed to all traffic – vehicular and pedestrian – as a response to rail safety concerns. The PHAI had earlier entered into a contract with this railway owner to install an upgraded crossing and the work, to be done by the railway owner, was already underway when the closure was announced. The railway owner's rationale was that the existing crossing control – limited to a STOP sign and a Railway Crossing warning sign – was suitable for a minimally used single lane dirt road but could not be used as such for a construction project involving a greater volume of traffic, including heavy equipment and material deliveries. It was the railway owner's expectation that the crossing could not be opened again until the road upgrades – to full two-lane configuration – and the crossing upgrades – consisting of suitable warning signals and automated barricades – were completed.

The closure of the crossing introduced a major logistical challenge to the Project team because it meant that the primary access route for construction traffic to the Port Granby Project site was no longer available to complete any of the work to the south of the rail line, including the upgrade of the 350-metre section of Elliott Road south of the rail line as well as extensive works on the LTWMF site. In addition to the need to seek an exemption (from the Municipality of Clarington) for the requirements of using only the primary access route, the need to use the secondary haul roads to the site – from the south – introduced a number unplanned overall inefficiencies to the Elliott Road contractor. The independent nature of the railway owner meant that their work on the crossing upgrade did not always synchronize effectively with the road upgrade work, thereby introducing a number of delays and extra costs to the project.

NEW WATER TREATMENT PLANT

Description

Environmental sampling in the 1960s determined that aqueous discharges from the site to Lake Ontario contained contaminants from the wastes at concentrations that exceeded applicable regulatory water quality guidelines. The contaminants of primary concern included radium-226, uranium and arsenic. Water collection and treatment facilities were installed at the PGWMF in 1977 to limit the loading of targeted contaminants to the environment. Initially, the treatment system was based on barium chloride ($BaCl_2$) and aluminum sulphate ($Al_2(SO_4)_3$) addition for co-precipitation of radium-226 and ferric chloride ($FeCl_3$) addition for arsenic removal. Historic accounts indicate that these processes exhibited respectable removal effectiveness [4]. Although these processes did also achieve some limited uranium reduction, other treatment processes that would specifically focus on uranium was not pursued.

By the early 1980s, it was observed that $FeCl_3$ alone was satisfactory for both arsenic and radium-226 removal. However, in the mid 1980s, it became evident that the treatment process was losing efficiency in terms of arsenic removal. Eldorado's investigations into the cause of the decreasing performance concluded that it was due to a shift in the predominant chemical form of the arsenic in the collected waters to arsenic hexafluoride (AsF_6^-), which was also found to not be amenable to removal by common precipitation techniques. Alternate treatment processes for arsenic removal were investigated by Eldorado and by Cameco Corporation (Eldorado's successor) but no practicable solution was found.

Use of the ferric chloride process only for water treatment at the Port Granby WMF has been ongoing to the present. Treatment system performance data for the 12-year period from 1997 through 2008 show moderately good removal efficiency exists for Ra-226 – about 62% on average and it consistently meets the licensed release limit. The average removal efficiency for arsenic during this period was only 23%. Uranium removal efficiency was not determined because it was not a targeted species.

During Port Granby Project Phase 2 activities associated with the existing waste site remediation and new LTWMF construction, it is expected that the quantities of contaminated water requiring treatment will increase substantially from current levels. This is due primarily to the fact all water arising from the new LTWMF facility, with its 8-hectare footprint area, while it is open and receiving wastes will require collection and treatment in addition to the existing flows. Further, appreciable quantities of contaminated water are expected to result from equipment decontamination (wash) operations that will be ongoing throughout the Project. It is also expected that once waste materials are exposed to more direct contact with precipitation, either at the waste excavation face or at the waste placement site, contaminant concentrations in the collected water will be higher than current treatment system inflow concentrations.

The above factors – more water and higher inflow contaminant loadings – as well as regulatory directives to investigate improved water treatment removal effectiveness – both in terms of removal efficiencies and contaminant species targeted, especially to also include uranium – compelled the PHAI to embark on a program to examine options for enhancing overall treatment effectiveness, starting in 2008. The goal of this program was to specify water treatment requirements for the Port Granby Project that would be an example of a Best Available Technology (BAT) and that will result in substantially reduced loadings of radium-226, arsenic, uranium and the other contaminants associated with the waste to Lake Ontario, when compared to the option of simply continuing to use existing water treatment facilities at the project sites.

Bench-scale studies were carried out in 2009 and pilot-scale studies in 2010. These confirmed that a BAT water treatment process for the Port Granby Project can achieve the high contaminant removal efficiencies required to meet the water quality improvement objectives. Results of the pilot scale studies have also successfully provided the necessary detailed design requirements and specifications to enable completion of the water treatment facility construction and commissioning stages as part of the PHAI. The outcome of these studies was a state-of-the-art water treatment plant design that will employ a membrane bioreactor technology to remove nitrogenous compounds from the inflows followed by a reverse osmosis process to remove radionuclides and metals.

The rated capacity of the new Port Granby water treatment plant will be 960 m^3/d. Details about the new water treatment process as well as design factors applicable to the construction of the new plant are presented in Tillhammer et al, (WM2013-13227) – "Protecting Lake Ontario - Treating Wastewater from the Remediated Low-Level Radioactive Waste Management Facility" [5] and Vandergaast, 2011 [6].

Status of Work

The initial detailed designs for the new water treatment plant were completed in 2011 March. Additional refinement of the design was carried out during late 2011 and into 2012 to address Radiation Protection requirements issues and to modify the design of the final residuals management process from a conventional evaporation process to one utilizing a Mechanical Vapour Compression process. The latter requirement resulted in a slight modification to the layout and size of the proposed new water treatment plant

Detailed designs and specifications were finalized in 2012 September and a call for tenders was posted on the MERX© system in mid 2012 October. The contract was awarded on December 20, 2012 and it is expected that construction will start in the spring of 2013.

An approximate one-year construction period followed by about 5 months of commissioning activities are expected to result in the new Port Granby water treatment plant to be fully operational by about mid 2014. This status is a requirement under the CNSC license for the Port Granby Project to enable the start of waste excavation and transport to the LTWMF site for containment.

Construction Issues and Challenges

Physical construction of the new Port Granby water treatment plant is expected to be relatively straightforward. The new facility will be constructed in a currently open field area with relatively good road access and with favourable topography and soil conditions. Three construction project challenges that the Port Granby Project is paying attention to in its planning of the work in Contract “B” include 1) the provision and availability of contaminated flows to the new water treatment plant at the specific time required for the commissioning process to be carried out 2) the management of contaminated residual solids from the process prior to the availability of the new LTWMF site being ready to receive these and 3) the potential to encounter contaminated materials on the existing Port Granby WMF during the installation of the contaminated water pumping stations and force mains when the option to manage these materials into the new LTWMF.

In order to meet the requirement of a new functional water treatment plant to be in place before waste excavation and transfer operations can begin, it was decided that the construction of the new water treatment plant would be carried out under a separate contract (Contract “B”) from that of the main LTWMF and waste site remediation contract (Contract “C”). However, since the new water treatment plant will be located an appreciable distance away from the existing Port Granby WMF, it will need to be supplied with contaminated water feed when the time for commissioning the process is ready to begin. To ensure that the new plant can be commissioned when ready and to be able to implement the new water treatment process full time upon successful completion, it was decided that the installation of new pumping stations and force mains from the Port Granby WMF, as well as treated water return lines to Lake Ontario, would be moved from Contract “C” to Contract “B”. This however creates a second concern about what to do in the event that the installation of these features encounters contaminated materials, since the new LTWMF site will not yet be available. It may therefore be necessary to locally move and store impacted soils on the

Port Granby WMF. The scope of this possibility will be investigated in the stage of the Contract "B" work.

The new water treatment process will generate certain quantities of contaminated solids from the residuals treatment stages that will also require management until the new LTWMF is available to receive them. A significant challenge for the Port Granby Project therefore will be to ensure an appropriate synchronization of the two separate new water treatment plant and the new LTWMF contracts, very likely to be undertaken by separate contracting companies. The following section on the new LTWMF elaborates further on the timing challenges inherent in this aspect of the Port Granby Project. Nevertheless, the design of the new water treatment plant has been enhanced to include a larger solids storage area than initially planned. Note that in the long term (Phase 3) it is expected that the volume of solids requiring disposal will be very minor due to greatly reduced water inflows once the LTWMF cap is in place. Such small quantities are expected to be disposed through a commercially available off-site facility.

LONG-TERM WASTE MANAGEMENT FACILITY AND EXISTING SITE REMEDIATION

Containment Mound

The containment mound will consist of two adjoining and contiguous cells of equal size – each 230 m by 200 m. The cells will be constructed and are expected to be filled over a 6 year construction period. When finished, the mound shall have a somewhat naturalized shape to blend with the general landscape of the area. Each containment cell will incorporate environmental protection measures including a composite liner system and a leachate collection system (Fig. 5). The base liner system is the barrier that will limit the release of contaminants to the subsurface and groundwater. The primary features of the exfiltration barrier are a 750 mm thick Compacted Clay Liner overlain by a 2 mm (80 mil) thick geomembrane.

The leachate collection system will be constructed on top of the composite base liner systems and serves to control the accumulation and mounding of leachate and hydraulic head on the base liner system. The leachate collection system will consist of drainage layers composed of granular materials with a network of coarse sand and gravel drains (stone drains) leading to a sump area, one in each cell to facilitate the monitoring, collection and removal of leachate by active pumping.

The mound design includes a divider berm between Cell 1 and Cell 2 to prevent the escape of leachate from Cell 1 into the adjoining area before Cell 2 is developed. The divider berm will rise to a limited height and once the base of Cell 2 is complete and ready to receive wastes, the two cells will merge at the elevation of the top of the divided berm into a single upper section over both cells. The final mound cover system (one system over both cells) will reduce infiltration into the waste and hence leachate generation, and limit the release of contaminants to the atmosphere. The final cover also eliminates exposure to potential direct contact with the waste materials and provides gamma shielding. The individual components used in the liner and cover designs are similar to materials and methods used in modern landfill site construction.

The key components of the cover system (Fig. 5) and their main functions are as follows (from the top layer down):

- Topsoil layer 0.15 m thick that is grassed to enhance evapo-transpiration, and reduce soil erosion.
- Soil fill 1.2 metres thick (Upper Till excavated from the mound excavation) provides gamma radiation shielding, a barrier against radon migration, additional water retention and a root zone for grass vegetation, as well as freeze-thaw protection and confining pressure for the GCL.

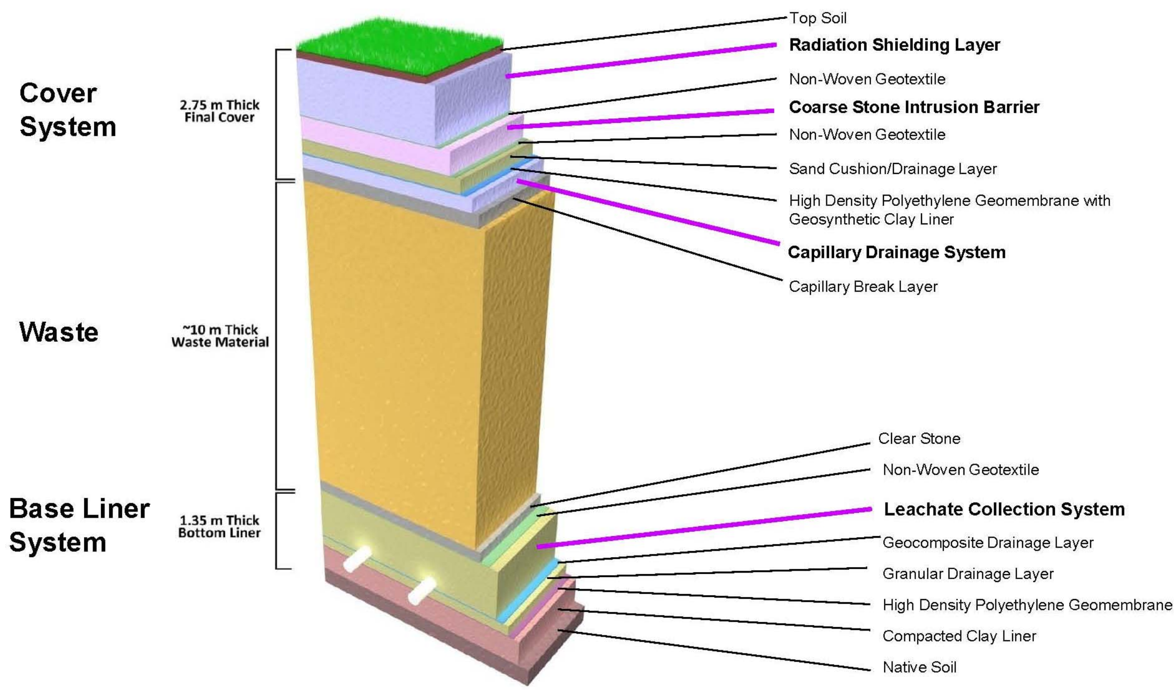

Figure 5 Cross section of mound showing layers and leachate collection

- Non-woven geotextile serves as a filter to minimize fines migrating into the intrusion layer.
- Intrusion barrier 0.5 metre thick of 50 mm to 300 mm sizes coarse gravel and cobbles to prevent burrowing animals and/or plant roots from reaching the underlying layers.
- Non-woven geotextile serves as a filter to minimize fines migrating into the intrusion layer.
- Sand layer consisting 0.3 m thick concrete sand provides lateral drainage and acts as a cushion layer for geomembrane layer beneath it.
- Outlet drains within the sand layer to reduce drainage length along the sand layer and the geocomposite below. The outlet drains will convey collected water to the perimeter of the mound.
- Geocomposite drainage layer to facilitate drainage.

- Composite infiltration barrier, consisting of a 2 mm thick geomembrane on top of a geosynthetic clay liner (GCL) with maximum hydraulic conductivity of $5x10^{-9}$ cm/s. to minimize moisture infiltration into the waste.
- Capillary barrier system, consisting of a capillary drainage layer and a capillary break layer with a network of outlet drains, provides an additional level of protection against moisture infiltration into the waste. As with the outlet drains situated above the composite barrier, the outlet drains will convey water from the capillary drainage layer to the perimeter of the mound.

Additional details of the Port Granby LTWMF containment system design have been presented in Sungaila et al, 2011 [7]

Port Granby WMF Remediation

The waste burial area at the existing Port Granby WMF has been divided into 14 sub-regions based on local topography issues, waste type contents variations and other logistical aspects as the basis for a waste excavation plan. A remediation sequence to address these 14 regions during a planned five-year waste excavation schedule has been developed to address issues of overall site stability, runoff management requirements and other health, safety, radiological and environmental concerns. The detailed approach to the remediation of these 14 regions is described by Fairclough et al, 2011 [8]. As depicted in the graphic of the Lakeshore Road underpass in Fig. 3, the transportation of the waste materials to the new LTWMF will use conventional quarry-type haul trucks. These will be covered to prevent spillage and dust release and have their wheels washed prior to leaving the site to prevent the spread of contaminated materials on the roadway, and their possible re-suspension as dust

Rehabilitation of the existing Port Granby WMF site will take place in a sequential manner, following in step behind the waste excavation. Excess clean soils and fill from the construction of the LTWMF site will be used for on-site fill and grading. There will however be a net deficit of materials (by about 150,000 m^3) on the existing site following this effort. The site will however be graded to provide for safe and stable slopes, which will be seeded and planted to revert the site back to a natural ecological condition.

Status of Work

The initial detailed designs for the Contract “C” work were completed in 2011 March. Additional refinement of the design was carried out during late 2011 and into 2012 to address moving some components to Contract “B” and to address an issue regarding the Lakeshore Road underpass – see below.

Contract “C” designs and specifications are being finalized at the time of writing and it is expected that there will be a call for tenders by posting on the MERX© system in the Spring of 2013 followed by a construction contract award by the end of 2013. It is expected that waste transfer to the new LTWMF can therefore start in the fall of 2014, providing the new water treatment plant will be operational and approved for use. If the proposed waste excavation schedule proves achievable, the final LTWMF cover system would be installed in 2019.

Select Construction Issues and Challenges

At the new mound site, spreading and compaction of the some of the chemical waste materials will be a challenge because of their relatively high moisture content and soft consistency. Further, the variety of discarded equipment, building waste and unusual objects may also compound the difficulty of proper handling and placement within the containment mound. The design approach to the placement of the waste at the new LTWMF relies on the fact that the ratio of the potentially problematic materials to typical soil and soil-like materials is at worst 1:3. However, it may become necessary at the time of the waste excavation stage to augment the soils volumes, or to implement alternate waste placement/compaction processes to ensure suitable stability and compaction.

Complicating the remediation work are location and topographic factors. The PGWMF is located adjacent to eroding bluffs along the Lake Ontario shoreline (Fig. 1). The waste is generally buried within two deep gorges (east and west) and approximately 80 trenches on the 18 hectare site that has steep slopes due to a vertical drop of 30 metres over a distance of about 200 metres. Due to these terrain and topography issues, as well as the waste physical quality issues notes above, the PHAI's design consultant recommended specific sequencing of the cleanup work as well as a complex bench excavation regime to prevent slope failure during progress of remediation activities.

Synchronization of the work between Contracts "B" and "C" will also result in an appreciable project management challenge. Waste excavation and haulage to the new LTWMF cannot get started until the new water treatment facility is ready and operational. Commissioning of the new water treatment plant with contaminated water cannot get started until the pumping stations and force mains are in place. This latter work may generate contaminated soils requiring temporary management prior to the new LTWMF being available to receive them. The PHAI intends to continue to work closely with the site regulator, the CNSC, to develop strategies for managing these potential waste encounter issues in an acceptable fashion.

As already noted, transporting the waste material from the PGWMF to the location of the new LTWMF site, some 700 metres to the north, requires the crossing of Lakeshore Road through a planned underpass. However, geotechnical investigations conducted in 2011 and groundwater pumping tests carried out in the summer of 2012 provided evidence that local groundwater issues necessitated a redesign of the underpass so that the grade of Lakeshore Road above the underpass needs to be raised by about 2 metres.

CONCLUSIONS

Notwithstanding the above-mentioned challenges, with Phase 2 of the Port Granby Project having started in 2012, it will put a close to the decades of environmental and political challenges caused by the deposition of the LLRW, marginally contaminated soils and other wastes at the Port Granby site that first began adjacent to Lake Ontario almost 60 years ago. Needless to say, a project of this nature and magnitude presents a variety of public concerns and challenges as well. However, the PHAI believes that public issues and concerns have largely been successfully managed as demonstrated in the WM 2013 paper 13152, "Building a Successful Communications Program Based on the Needs and Characteristics of the Affected Communities" [2].

REFERENCES:

[1] W. Van Veen and D. Lawrence, "From Pushing Paper to Pushing Dirt – Canada's Largest LLRW Cleanup Gets Underway – 13111", Phoenix, Arizona, USA, 2013 February 24-28, WM Symposium.

[2] J.L. Herod, A. Mahabir, and S. Holmes, "Building a Successful Communications Program Based on the Needs and Characteristics of the Affected Communities – 13152", Phoenix, Arizona, USA, 2013 February 24-28, WM Symposium.

[3] C. Fahey, T. Palmeter, and M. Blanchette, "Finally Underway: Implementation of the PortHope Area Initiative – 13151", Phoenix, Arizona, USA, 2013 February 24-28, WM Symposium.

[4] Atomic Energy of Canada Limited, "Addendum to the Environmental Assessment Study Report – Port Granby Project (LLRWMO-03710-ENA-13011 (Revision 0)), 2008 September

[5] Tillhammer et al, "Protecting Lake Ontario - Treating Wastewater from the Remediated Low-Level Radioactive Waste Management Facility- 13227", Phoenix, Arizona, USA, 2013 February 24-28, WM Symposium.

[6] G. Vandergaast, "Implementing Best Available Technology for Water Treatment at the Port Hope and Port Granby Low-Level Radioactive Waste Cleanup Projects", Toronto, Ontario Canada, 2011 September 11-14, Waste Management, Decommissioning and Environmental Remediation Conference

[7] M. Sungaila and E.K.W. San and T. Palmeter, "Complex Containment Design for Long-Term Encapsulation of Radioactive Waste", Toronto, Ontario, Canada, 2011 September 11-14, Waste Management, Decommissioning and Environmental Remediation Conference

[8] J. Fairclough, N. Rudolfo, D. Wilson, M. Sungaila, G. Case, and T. Palmeter, "Material Management and Site Condition Challenges during LLRW Removal and Transport at the Port Granby Project", Toronto, Ontario, Canada, 2011 September 11-14, Waste Management, Decommissioning and Environmental Remediation Conference