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1. INTRODUCTION

This two-part report presents plans for the Solidification and Stabilization treatment of contaminated materials in the Sydney Tar Ponds, and the construction of a waterway through the ponds to Sydney Harbour. These are part of the plan to clean up the Tar Ponds and Coke Ovens Sites and are known as design element TP6 Part A and TP6 Part B. Part A of the element involves re-routing water around the Tar Ponds, and Part B of the element is the actual treatment of the material in the Tar Ponds along with construction of a new waterway.

The work associated with Part B of the element will include:

- Assessing the Project Site using existing information;
- Identifying, from laboratory tests, a combination of materials to treat the contaminated sediments in the North Pond and South Pond;
- Testing various proportions of materials on sediments at the Project Site to find out which mixes of materials meet clean-up standards;
- Constructing a new channel in the North and South Ponds to convey the flow of water through the ponds to the harbour; and,
- Solidification and Stabilization of approximately 550,000 cubic metres of contaminated sediments within the Tar Ponds by mixing them with materials to reduce the spread of contaminants.

Protecting the environment, public and worker health and safety and benefits to local labour and contractors are also part of the clean up plan for the North and South Tar Ponds.

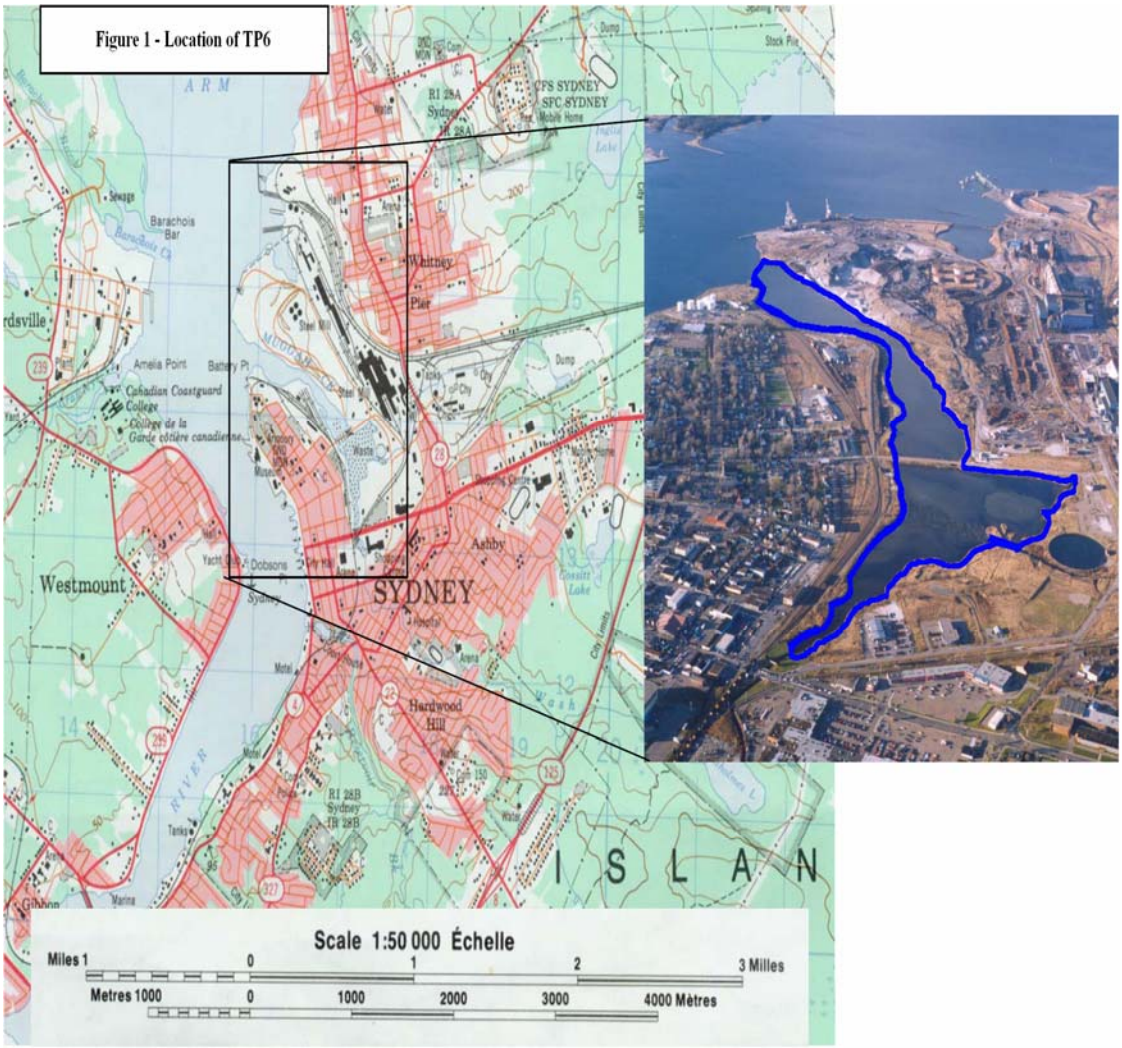
This part of design does not deal with the following parts of the clean up of the Tar Ponds Site:

- Detailed plans for temporary water, electricity and other utilities and the use of vehicles on the Site. Vehicle use on the Site is part of site traffic planning by another project team; and

- Treatment of water from Solidification and Stabilization activities. This will be also handled by another project team.

2. SITE DESCRIPTION

The Tar Ponds are located within the centre of the Town of Sydney, in Nova Scotia (See Figure 1). The Ponds cover an area of approximately 31 hectares and are divided into north and south sections. A causeway and bridge at Ferry Street have been constructed, at the dividing line, between the North Tar Ponds and South Tar Ponds. Both ponds have coal tar and fine coal from nearly 100 years of steel and coke production activities.



The sediments, in the ponds, have been polluted by:

- Heavy metals such as copper, lead, zinc and arsenic;
- Polycyclic aromatic hydrocarbons, which are also known as PAHs. PAHs include over 100 chemicals created by coking plants;
- Volatile organic compounds, which are also known as VOCs. VOCs such as benzene include 50 to 150 chemicals created by coking plants;
- Polychlorinated biphenyls, which are also known as PCBs. PCBs cause a variety of health problems in people and animals; and,
- Total petroleum hydrocarbons, which are also known as TPHs. TPHs come from petroleum products.

The majority of the sediments in the Tar Ponds were transported from Coke Ovens Site by Wash Brook and Coke Oven Brook.

3. ELEMENT DESCRIPTION

The following parts make up the TP6 Part B element of the Tar Ponds and Coke Ovens clean up plan:

Solidification and Stabilization Recipe Testing – This is a mix of materials to treat the contaminated sediments in the North and South Tar Ponds. Testing in a laboratory, and on Site, will give the information needed to confirm how the material in the Tar Ponds can be treated.

Channel Design – Gives the plan for construction of a new channel within the North and South Tar Ponds. This channel will permanently allow water from Wash Brook and Coke Oven Brook to pass into Sydney Harbour. It will also handle the waters collected by the original Tar Ponds from above and below the surface. The design of the channel will include a passage for fish at low tide. Natural bends will provide a natural fish territory and will help the channel to have a pleasing appearance.

Construction Contracts – Design and develop contract documents for:

- The new channel through the Tar Ponds; and
- Solidification and Stabilization of sediments throughout the Tar Ponds.

The design and construction of Solidification, Stabilization and the New Channel will meet federal and provincial standards for emergency procedures, the preservation of birds, protection of fish, transportation of dangerous goods and noise from construction activities. Provincial regulations for petroleum management, emergency spills, air quality, water quality, municipal waste and storm drainage will also be followed.

4. LINKS TO THE CLEAN UP PLAN

The Clean Up plan for the Tar Ponds and Coke Ovens Sites consist of many parts that are linked to each other. This Solidification, Stabilization and Channel Construction element is linked to:

Coke Oven Brook Connector Sediment Removal and Disposal – Sediment and other materials will be transported to the Tar Ponds for Solidification and Stabilization treatment. Also water from Coke Oven Brook will be redirected around work areas in the Tar Ponds. The Coke Oven Brook Connector Sediment Removal and Disposal is also known as CO1.

Coke Oven Brook Sediment Removal and Groundwater Collection System – Materials from Coke Oven Brook will be transported to the Tar Ponds for Solidification and Stabilization treatment. The Coke Oven Brook Sediment Removal and Groundwater Collection System is also known as CO7.

Material Processing Facility – Large objects, found in the sediments of the Tar Ponds, will be taken to the Material Processing Facility to be cleaned and sorted. Vehicles leaving the Project Site can be cleaned by the facility's truck wash service. The Material Processing Facility is also known as TP2.

Tar Ponds Surface Cap and Groundwater Trenches – A cap made from clean soil will be constructed over the solidified sediments of the Tar Ponds. Trenches will be constructed in the solidified sediments to allow groundwater to move freely. Tar Ponds Surface Cap and Groundwater Trenches are also known as TP7.

5. DEVELOPMENT OF THE SOLIDIFICATION-STABILIZATION RECIPE

A combination of materials is needed to be mixed with the 550,000 cubic metres of contaminated sediments in the Tar Ponds to achieve both Solidification and Stabilization. Solidification will prevent the movement of contaminated material, and Stabilization will prevent the contaminants from leaving the solidified material. A laboratory study has given the information needed to decide which base combinations of materials work best for each of the North and South Ponds. To do this, sediment samples for testing were collected from the North and South Ponds and various mixtures of slag, cement, fly ash and quicklime were mixed with the samples. These materials were chosen because they:

- Can be provided by local businesses;
- Cost less than other materials;
- Can be provided by more than one (1) supplier;
- Can be replaced by similar materials, if supply became unavailable;
- Can be transported and handled easily;
- Result in less bulking than other materials;
- Do not generate great amounts of heat when mixed with sediments;
- Can solidify the sediments and reduce the contamination levels of liquids leaking from the Site to project standards; and,
- Have proved to be effective on large scale projects with similar contaminants.

Recipes from the laboratory will be tested in the North and South Tar Ponds to see which combination of materials meet project standards at the scale of actual construction. The Project standards are in regard to the strength of the sediments after Solidification and Stabilization treatment, the amount of water able to flow through the solidified material and the contamination levels of that water.

The Earth Tech AECOM/CBCL team has developed a plan to carry out Solidification and Stabilization tests on the Tar Ponds Site. The plan will follow government requirements to:

- Conduct tests in the North and South Tar Ponds using successful recipes from a laboratory study;
- Check air emissions and odours from Solidification and Stabilization activities; and
- Report test results to government agencies.

In the North Pond, testing will take place in an area with high levels of PAHs. Testing in the South Pond will be conducted in an area with high levels of PCBs.

6. CHANNEL CONSTRUCTION

The channel to be constructed through the Tar Ponds to Sydney Harbour will be able to handle water from the Tar Ponds, Coke Oven Brook and Wash Brook. The New Channel will be constructed along the western shore of the North and South Ponds, with the exception of the Ferry Street crossing where the channel will be along the east side. The design addresses the need for a fish passage, the maximum flow of water, water levels, scraping and the building up of silt.

7. SEDIMENT SOLIDIFICATION AND STABILIZATION

Solidification and Stabilization treatment will be used to prevent contamination from the sediments in the Tar Ponds. Preparation for treatment includes removing large objects from the sediments to be taken to the Material Processing Facility and managing moisture content, by dewatering work areas by pumping water to adjacent work areas and the temporary Wastewater Treatment Facility. Solidification and Stabilization treatment will involve:

- Managing moisture content of work area;
- The use of traditional hydraulic excavation equipment and various techniques for pre-mixing sediments and mixing of additives; and,
- Using covers to control dust and odours from construction activity and material holding pads.

8. CONSTRUCTION CONTRACTS

Contracts will be needed for the various parts of the Solidification and Stabilization of Tar Ponds sediments and the Channel Construction through the ponds. Contracting concerns include:

- How to tender and award the Solidification and Stabilization contract because of the technical nature of the work and the environmental protection requirements;
- Setting prices that reflect Site conditions; and
- Ways to resolve contract disputes.

9. ENVIRONMENTAL PROTECTION

The Environmental Protection Plan for the Tar Ponds contains practices that protect the environment from activities to clean up the Tar Ponds and Coke Ovens Site. These practices:

- Restrict access to the work Site to protect the public;
- Allow the safe handling and storage of materials;
- Prevent and contain accidental spilling of fuels during equipment maintenance and refuelling;
- Deal with the disposal of waste and polluted water generated from construction on the Site;
- Control erosion and sediment;
- Manage clearing, grubbing and road building;
- Monitor the closing of wells; and,
- Cover the removal of contaminated materials from equipment and workers.

The Environmental Protection Plan also contains practices to protect the environment during Solidification, Stabilization and Channel Construction activities. These practices cover:

- Controlling noise levels during construction activities;
- Fish Management;
- Removing water from work areas;
- Transportation of fuel and materials for solidification and stabilization treatment;
- Storing materials for solidification and stabilization treatment;
- Handling sediments from other parts of the Site;
- Methods to add materials to sediments; and,
- Mixing of materials with sediments.

In addition, special measures have been put in place to prevent:

- Water contamination and the release of contaminated water;
- The release of contaminated materials outside the Project Site;
- The release of contaminants into the air; and,
- Increase in noise and vibration levels.

10. LOCAL ECONOMIC BENEFITS

The selection of locally available materials and trades, where possible, will benefit the local economy. In addition, there are opportunities for general contractors to train and employ local contractors to be subcontractors.

The contracts for the channel construction and Solidification and Stabilization of the sediments will require bidders to consider benefits to the local economy.