TRANSPORT CANADA

Port of Gaspé – Sandy Beach
Sediment Remediation Project

Environmental Impact Assessment Filed with the Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks (MDDEFP)

Summary

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RECORD OF REVISIONS AND ISSUES		
Revision No.	Date	Description of the modification and/or issuance
0A	2012-09-28	Table of contents
0B	2012-12-11	Preliminary version
0C	2013-01-09	Semi-final version
00	2013-01-14	Final version

1 BACKGROUND

The Port of Gaspé – Sandy Beach is located on the south shore of the Gaspé harbour, at the eastern end of the Gaspé Peninsula and approximately three kilometres east of the city of Gaspé. The commercial wharf at the Port of Gaspé – Sandy Beach has had an industrial and commercial vocation for more than a century. Over the years, several companies used the wharf to transship various goods, including copper concentrate, petroleum products, etc. In studies carried out in connection with its operations, Transport Canada (TC) discovered copper (Cu) and polycyclic aromatic hydrocarbon (PAH) contamination in the sediment located south of the commercial wharf of the Port of Gaspé – Sandy Beach.

In light of this, a toxicological and ecotoxicological assessment was conducted by QSAR in 2003, providing calculations of the integrated effect levels (IEL) for copper and total PAH specifically for the commercial wharf sector through a variety of toxicity tests on marine organisms. The tests determined at what concentration copper and total PAH in the sediment or in the pore water had a negative effect on the behaviour, development or survival of the organisms. The IEL was set at 2,400 mg/kg for copper and at 5 mg/kg for total PAH. These levels were used to delineate the sediment dredging area and represent the minimum threshold to attain in the sediment remediation work at the Port of Gaspé – Sandy Beach. The remediation area is approximately 50,000 m² and the volume of sediment to remediate is estimated at approximately 27,000 m^3 (volume in place, not bulked and not including overdredging) (see Appendix 1). In remediating the sediment south of the commercial wharf, TC is fulfilling its government obligations regarding the management of contaminated sites.

TC contracted Dessau to carry out an environmental impact assessment, which was filed with the Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks (MDDEFP) in March 2012. Following this, the MDDEFP analyzed the project and issued a series of questions and comments to which TC responded in the form of an addendum to the environmental impact assessment. This summary of the environmental impact assessment completes the Port of Gaspé – Sandy Beach sediment remediation project analysis file for the MDDEFP. Once the complete file is analyzed and a notice of admissibility issued by the MDDEFP, the project will move to the next phase of the environmental impact assessment and review process, the information and consultation period, which falls under the responsibility of the *Bureau d'audiences publiques sur l'environnement* (BAPE).

The project submitted by TC proposes a set of potential intervention activities to remediate the sediment that differ in certain technological, economic, social and environmental ways. The final scenario will be determined following the tender process that will get under way in spring 2013. In the tender process, suppliers' proposals will be required to meet the requirements of the performance specifications, which set out the technical and environmental boundaries of the project.

This document is designed as an information tool for the BAPE information session in Gaspé and for any other organizations and members of the public concerned with the project.

2 PROJECT DESCRIPTION

Due to the complexity of the work that must be done to remediate the sediment south of the commercial wharf at the Port of Gaspé – Sandy Beach, the significant cost and the numerous potential combinations of dewatering and treatment technologies available on the market, TC decided to adopt an intervention activity-based approach for the environmental impact assessment. The project thus proposes a number of potential intervention activities aimed at remediating the contaminated sediment that differ in a variety of aspects, whether technological, economic, social or environmental. The suppliers' remediation proposals will be weighed using performance specifications that will be developed notably on the basis of the remediation objectives to be achieved and the performance objectives for the structures, infrastructure and mitigation measures to be put in place. Thus no preferable intervention scenario has been chosen, so as to avoid favouring one remediation approach over another during the tender process.

However, to facilitate comprehension and illustrate the possible interactions among the various activities considered, the activities have been structured into three remediation options, under which a certain number of scenarios have been developed by TC for the purposes of designing and developing the performance specifications. In this section, the options developed for remediation of the contaminated sediment and the various scenarios under each option are described. The five scenarios are also presented in the form of figures in Appendix 2.

The project work zone refers to the sector directly involved by the sediment remediation project activities and includes the commercial wharf and surrounding port facilities. The dredging area refers to the expanse of sediment that will be dredged (see Appendix 1).

2.1 SCENARIO OPTIONS STUDIED

It should be noted that the supplier may propose management methods, technologies or options other than those considered or a different combination of dewatering or treatment techniques, as long as they meet the specification requirements and the regulations and authorizations issued for the project.

2.1.1 Option 1

Two scenarios under Option 1 were selected for their potential application to sediment remediation at the Port of Gaspé – Sandy Beach.

Option 1 – **Scenario 1** involves mechanical dredging of the sediment, followed by transportation of the sediment by barge to the commercial wharf or a temporary transshipment pier developed to the south of the dredging area. The sediment is then transshipped in watertight dump trucks and taken to a watertight storage/dewatering basin prepared on one or

more plots of industrial or commercial land near the commercial wharf. The sediment is then transported gradually to a watertight surface for dewatering in thin layers. Finally, the sediment is loaded and transported to an authorized size for burial, treatment or reclamation.

Option 1 – **Scenario 2** involves hydraulic or mechanical dredging of the sediment, transportation via a discharge line to geo-textile bags (e.g.: Geotubes®) located on watertight surfaces on one or more plots of industrial or commercial land near the commercial wharf. Following a dewatering period, the geo-textile bags are emptied using a hydraulic shovel and the sediment is then loaded and transported to an authorized site for burial, treatment or reclamation.

This option includes the following activities:

- Preparation:
  - Location and identification of debris on the seafloor;
  - Survey of condition of infrastructure and services in place;
  - Determination of the environmental reference state of the land to be used for the work.
- Pre-work:
  - Mobilization of labour and equipment;
  - Work site facilities set-up;
  - Preparation of a temporary pier (if needed) and transshipment area;
  - Preparation of sediment dewatering basins and/or areas;
  - Preparation of other storage areas required for the project;
  - Preparation of water treatment unit;
  - Preparation of truck washing areas;
  - Initial bathymetric survey.
- Dredging work:
  - Dredging;
  - Final bathymetric survey;
  - Sediment dewatering;
  - Liquid effluent management;
  - Transportation and final management of debris and sediment;
  - Characterization of the sediment after dredging.
- Post-work:
  - Dismantling of work site;
  - Restoration of land areas;
  - Environmental characterization of used sites upon completion of work.

2.1.2 Option 2

As in the case of Option 1, two scenarios were selected under Option 2 for their potential application to sediment remediation at the Port of Gaspé – Sandy Beach.

Option 2 – **Scenario 1** involves mechanical dredging of the contaminated sediment, loading onto high-capacity barges or one or more ships, transportation of the dredged sediment by barge or ship from Gaspé to the port(s) nearest the sediment disposal and/or treatment site, transshipment of the sediment in watertight dump trucks, transportation to the disposal and/or treatment site and disposal, reclamation or treatment at sites authorized by the MDDEFP.

Option 2 – **Scenario 2** is similar to Option 1 – Scenario 2 in that it involves mechanical or hydraulic dredging of the sediment and transportation via a discharge line to geo-textile bags (e.g.: Geotubes®). However, rather than laying them out on watertight surfaces on one or more plots of land, the geo-textile bags are filled directly on a high-capacity transportation barge or ship. After the bags are filled, the barges are towed or the ships travel to the port(s) nearest the sediment disposal and/or treatment site. The sediment is then transshipped on watertight dump trucks, taken to the disposal, reclamation and/or treatment site and then disposed of, reclaimed or treated at sites authorized by the MDDEFP.

This option includes the following activities:

- Preparation:
  - Location and identification of debris on the seafloor;
  - Survey of condition of infrastructure and services in place;
  - Determination of the environmental reference state of the land to be used for the work.
- Pre-work:
  - Mobilization of labour and equipment;
  - Work site facilities set-up;
  - Preparation of a transshipment area;
  - Preparation of storage areas (debris, materials and wastewater);
  - Preparation of water treatment unit;
  - Preparation of truck washing areas;
  - Initial bathymetric survey.
- Dredging work:
  - Dredging;
  - Final bathymetric survey;
  - Transportation of sediment by barge or ship;
  - Liquid effluent management;

- Transportation and final management of debris and sediment;
- Characterization of the sediment after dredging.

- Post-work:
  - Dismantling of work site;
  - Restoration of land areas;
  - Environmental characterization of used sites upon completion of work.

2.1.3 Option 3

Under Option 3, a single scenario was selected for sediment remediation at the Port of Gaspé – Sandy Beach. It involves mechanical or hydraulic dredging of the contaminated sediment, transshipment of the sediment to the Gaspé wharf, physicochemical treatment of the sediment (physical separation), mechanical dewatering of the fine fraction, followed by reclamation of the gravel, rocks and blocks of material and final management of the fine fraction and sand at authorized sites.

The activities to be undertaken for this option are different from those of the previous two options. The pre-work phase involves numerous sub-activities that must be completed in order to ensure success of the method. This option includes primarily the following activities:

- Preparation:
  - Location and identification of debris on the seafloor;
  - Survey of condition of infrastructure and services in place;
  - Determination of the environmental reference state of the land to be used for the work.
- Pre-work:
  - Mobilization of labour and equipment;
  - Work site facilities set-up;
  - Preparation of a temporary pier (if needed) and transshipment area;
  - Preparation of a buffer tank for temporary storage of the sediment;
  - Preparation of sediment treatment and dewatering unit;
  - Preparation of storage areas (debris, materials and wastewater);
  - Preparation of water treatment unit;
  - Preparation of storage area for dewatered or treated sediment;
  - Preparation of truck washing areas;
  - Initial bathymetric survey.
- Dredging work:
  - Dredging;
  - Final bathymetric survey;

- Sediment transshipment and transportation to buffer tank or sediment treatment unit;
- Treatment by physical separation and sediment dewatering;
- Transportation of dewatered sediment to temporary storage site;
- Transportation and final management of debris and sediment;
- Characterization of the sediment after dredging.

- Post-work:
  - Dismantling of work site;
  - Restoration of land areas;
  - Environmental characterization of used sites upon completion of work.

2.2 IMPLEMENTATION SCHEDULE

A number of phases are planned before the remediation work can begin. The following table outlines future activities and their associated dates in order to ensure the smooth flow of the project. It should be noted that dates may change based on deadlines for obtaining the necessary permits and authorizations.

Table 1 Implementation schedule

PHASES	DATES
1. Obtaining of order	Spring 2013
2. Start of tender period	Spring 2013
3. Awarding of construction contract to contractor	Fall 2013
4. Obtaining of authorizations (City, MDDEFP, DFO, etc.)	Spring 2014
4. Start of work	Spring 2014
5. Start of work in the water	After July 1, 2014
6. Completion of work	Winter 2016

3 DESCRIPTION OF THE ENVIRONMENT

The project study area is delineated by the mouths of the York and Dartmouth rivers to the west, the Gaspé harbour's northern shore (including the Penouille Peninsula) to the north, the Sandy Beach sand bar (also known as Boom Defence) to the east and a line approximately 1.5 kilometres south of Highway 132 to the south. The project work zone refers to the sector most directly concerned by the sediment remediation project activities and includes the commercial wharf and the surrounding port facilities (up to Route 132). The dredging area refers to the expanse of sediment that will be dredged (see Appendix 1). For the purposes of this document, the description provided below refers primarily to the work zone.

3.1 TOPOGRAPHY

The land surfaces in the work zone have an elevation of three to 10 metres, i.e. low elevation in relation to mean sea level. They have a relatively flat topography and the terrain is not very rugged. The commercial wharf's surface course is at an elevation of 2.3 metres relative to mean sea level.

In the area of the commercial wharf in general, the seafloor has a descending slope varying in grade from about 3% to 5%. The seafloor in the wharf sector is therefore relatively flat. The bathymetry in the dredging area is characterized by a maximum seafloor elevation of 0.53 metres and a minimum of -13.60 metres.

3.2 HYDROLOGY

The study area encompasses the Gaspé harbour. The mouths of two major waterways, the York and Dartmouth rivers, are located there. The southwest basin (which corresponds to the mouth of the York River) and the northwest basin (corresponding to the mouth of the Dartmouth River) are found in the study area. There is no waterway in the work zone, however. Surface water in the western part of the zone drains towards l'Anse au Homard while surface water in the eastern part drains towards the Gaspé harbour.

Flow velocity in the work zone is low, with values not exceeding 0.1 m/s in the immediate Port of Gaspé – Sandy Beach sector. Dredging simulations show that the maximum encroachment of the plume generated would be limited to the vicinity of the work, extending at most one kilometre southeast. The maximum encroachment of the plume generated would remain distinctly clear of the mussel farming sectors at the mouth of the Dartmouth River.

3.3 QUALITY OF THE ENVIRONMENT

3.3.1 Sediment quality

To confirm and clarify the extent of the contamination observed in the early 2000s, TC mandated the firm Mission HGE in the fall of 2011 to carry out a detailed characterization of the sediment south of the commercial wharf at the Port of Gaspé – Sandy Beach. In total, 129 boreholes were taken and a matrix was established showing silty sand to sandy silt with traces of gravel on the site.

The results of the analytical program were compared with the Integrated Effect Levels (IELs) established by QSAR in 2003, i.e.: 2,400 mg/kg for copper and 5 mg/kg total PAH. In the case of total PAH, approximately 52% of the samples analyzed (not including duplicates) exceeded the IEL. The excess was observed in nearly 60% of the surface samples (0-15 cm) and in 45% of the samples at the 45-90 cm layer. The analytical results obtained for copper exceeded the IEL in just 2% of the samples, not including duplicates. The 0-15 cm stratum had the largest number of samples with copper concentrations exceeding the IEL for that parameter, although excesses were observed in all strata sampled. In general, the highest PAH and copper concentrations were found near the wharf and near the remnants of infrastructure (fishing wharf and slipway) along the shore immediately to the south of the wharf (see Appendix 1). Further from the wharf and shoreline, the spread of the contamination was intermittent. Although high values were observed in some spots, the samples were isolated and at varying depths.

In the case of other metals analyzed, two of the 116 samples analyzed showed lead concentrations higher than the concentration of frequent effects (CFE), whereas two of the 116 samples analyzed showed mercury or zinc concentrations exceeding the CFE. The samples with excess CFE concentrations also had copper or PAH concentrations that were higher than the IEL. None of the 116 samples analyzed had arsenic, cadmium, chromium or nickel concentrations higher than the established CFE for those parameters. As for total PCBs, the CFE for this parameter was not exceeded in any of the 122 samples analyzed.

3.3.2 Groundwater quality

The main contaminants found in the groundwater of the work zone included C_{10}-C_{50} petroleum hydrocarbons, chlorides, fluoranthene (a PAH) and metals, mainly copper, but also nickel, chromium, selenium and zinc.

3.4 HABITAT

The aquatic vegetation found in the work zone may be divided into four main types of grass beds defined by the presence of distinct aquatic vegetation, i.e.: 1) sea cabbage, 2) eelgrass (*Zostera marina*), 3) brown algae, and 4) mixed (eelgrass and brown algae). Finally, it is important to mention that the work zone is not a choice habitat for the majority of the fish

species living in the bay of Gaspé. The fact that the seafloor alongside the commercial wharf is frequently agitated by boat propulsion systems may be a constraint in maintaining an environment that can support, in a stable and sustained manner, the breeding and rearing activities essential to the survival or production of a fish stock. That being said, it is an environment that is frequented by certain species and is conducive to feeding.

Terrestrial vegetation, disturbed by human activity, is poorly represented in the work zone. It is mainly concentrated south of the former site of Xstrata's sulphuric acid storage tanks and the Forillon shipyard, where there are uncultivated plants and shrubs as well as an uncultivated stand of shade-intolerant hardwoods.

No at-risk species of flora were inventoried in the work zone or within any of the project areas of influence.

3.5 AQUATIC WILDLIFE

The bay of Gaspé, a legally recognized fish habitat, has rich and diverse aquatic wildlife. A number of fish species have been inventoried within the area, including American eel (*Anguilla rostrata*), capelin (*Mallotus villosus*), rainbow smelt (*Osmerus mordax*), Atlantic cod (*Gadus morhua*), Atlantic mackerel (*Scomber scombrus*), Atlantic herring (*Clupea harengus*), white hake (*Urophycis tenuis*), Atlantic salmon (*Salmo salar*) and brook trout (*Salvelinus fontinalis*). Although the work zone is not a choice habitat for the majority of these fish species, they may be present. It should be noted that the Atlantic salmon, sea lamprey (*Petromyzon marinus*), brook trout and potentially rainbow smelt cross the bay of Gaspé in order to reach spawning grounds at the York and Dartmouth rivers.

As the work zone includes an eelgrass bed, it would be possible to inventory lumpfish (*Cyclopterus lumpus*), three-spined stickleback (*Gasterosteus aculeatus*), tomcod (*Microgadus tomcod*), banded killifish (*Fundulus diaphanus*) and American plaice (*Hippoglossoides platessoides*). Among marine mammal species, minke whales (*Balanoptera acutorostrata)* and harbour porpoises (*Phocoena phocoena*) may be present in the vicinity of the work zone, although there is little likelihood of finding minke whales.

Also noted in the work zone are starfish, a variety of species of crustaceans, gastropods, mussels, urchins and polychaetes. Their presence and concentration vary widely according to the type of grass bed found.

At-risk species of fauna have been inventoried in the work zone or within its area of influence. However, the types of habitats preferred by these species are not found in the work zone.

3.6 LAND USE AND INFRASTRUCTURE

The Port of Gaspé – Sandy Beach is an industrial area. The dredging work will take place on a private water lot owned by Succession Carpenter. As for the work on land, the definitive

location will be determined once the contractor is selected. The main infrastructure located in the work zone are the commercial wharf, underground pipes beneath the wharf, a structure protecting the shore to replace the old fishing wharf, the old slipway, the Forillon shipyard's active slipway, a lobster pound and water intake, a number of storage tanks, the wastewater treatment plant for the city of Gaspé and a variety of administrative, commercial, industrial and residential buildings. In addition are Highway 132 (Montée de Sandy Beach) and Du Quai, Cotton, Chantier Maritime and Quigley streets. Lastly, the Gaspé-Chandler leg of the railway, belonging to the *Société de chemin de fer de la Gaspésie*, which owns and operates it, crosses the study area from east to west in addition to serving the Port of Gaspé – Sandy Beach.

The Port of Gaspé – Sandy Beach is accessible 12 months a year. It is currently used for transshipment of petroleum products and general cargo, recreational tourism activities, export of wind turbine blades, refuelling of federal ships, loading of aggregate by Construction DJL, offloading of salt for road de-icing, as well as for fishing and aquaculture.

3.7 FISHING AND AQUACULTURE

Scallop and mussel farming are practised in the bay of Gaspé. The vast majority of the commercial scallop farm sites are located east of the Sandy Beach sand bar, near the Pointe de Penouille. However, one farm site is located west of the Sandy Beach sand bar. MAPAQ considers this area a priority for the development of the industry in Gaspésie. The study area contains several mussel farms, all located at the mouth of the Dartmouth River, in the northwest basin. All of the sites are located west of the line formed by Pointe Jacques-Cartier and Pointe de Penouille, outside the work zone. Of all the molluscs found in the bay of Gaspé, the species most commonly gathered and consumed by the population is the softshell clam (*Mya arenaria*).

While the groundfish crisis caused by declining stocks has affected the regional economy, commercial fishing is still practised in the bay of Gaspé. Shrimp, lobster (*Homarus americanus*) and rock crab (*Cancer irroratus*) are the main catches. There are also a few active edible crab (*Cancer pagurus*) fishers. Lobster is only fished commercially in the Gaspé harbour, known as fishing zone 20A, and rock crab is subject to limited fishing. Commercial rainbow smelt fishing takes place at the mouth of the Gaspé harbour, east of the line formed by the Pointe de Penouille and Pointe de Sandy Beach.

Mackerel fishing is practised on the wharfs, including the commercial wharf at the Port of Gaspé – Sandy Beach, and capelin and brook trout are fished in the harbour in the spring. In winter, ice fishing for rainbow smelt takes place at the mouths of the Dartmouth and York rivers.

4 EXPECTED IMPACTS AND MITIGATION MEASURES

Identification of the potential impacts of the project takes into consideration the technical features of the project, the work methods considered, knowledge of the area, the lessons learned from similar projects as well as the community's concerns regarding the project.

All of the environmental impacts have been identified and assessed for all technical aspects of the project, i.e.: the activities included in the pre-work, work execution and post-work phases, as well as their possible interaction with environmental components specific to the physical, biological and human environments.

The following subsections give a more detailed description of just the four main impacts associated with the project. First of all, it is important to note that there is one positive impact stemming from execution of the project, which is the remediation of the contaminated sediment located south of the commercial wharf. The impacts associated with the dredging work required for the project are the resuspension of sediment and the destruction of habitats used by fish and other aquatic species. Finally, impacts on shipping and use of the commercial wharf are also expected.

4.1 EXPECTED IMPACTS

4.1.1 Natural environment

There are both positive and negative impacts on the natural environment associated with the dredging work that is required for the project to remediate the sediment south of the commercial wharf.

4.1.1.1 Sediment remediation south of the commercial wharf

Removal of the contaminated sediment and implementation of the compensation project will have the following positive impacts:

- Improved physicochemical characteristics of the sediment south of the commercial wharf;
- Reduced risk of deterioration of the harbour water quality;
- Improved quality of the shoreline and aquatic habitats;
- Improved quality of the local environment as a result of the remediation.

4.1.1.2 Sediment resuspension

Sediment could be resuspended during the dredging work when the bucket is lowered, when it impacts the seabed or penetrates the layer of sediment, when sediment is returned to the environment as the bucket is raised or from the barge overflow (mechanical dredging), or due

to the action of the hydraulic dredge's cutterhead or entry of the pump head into the sediment. The impacts associated with sediment resuspension are:

- Increase in suspended particulate matter (SPM) concentrations in the water column, and;
- Potential release and transportation of contaminants (copper and total PAH) in the water column.

These two impacts could also have indirect effects on the quality of the habitat used by fish and other aquatic species, as well as on mussel and scallop farming activities presently carried out in the bay of Gaspé. Mussels and scallops feed by filtration and may bio-accumulate the contaminants found in the water column. The higher concentration of SPM may also affect respiration (deposits on the gills).

This impact was nonetheless categorized as isolated and of minor importance, mainly based on the results of the numerical modeling conducted by Groupe-Conseil LaSalle on the dispersal of the dredged sediment (2010). The results show that the majority of the particles (over 54%) are composed of sand and coarse silt that would settle in the immediate area around the dredger. The finer silt particles and all the clay represent a relatively small volume, thus favouring their dilution and quickly lowering SPM and contaminant concentrations below allowable levels. The results also show that the plume generated by the work, when the dredge is not sheltered by the wharf, does not exceed 900 metres in length and that this distance is reduced by at least half when the dredge is sheltered from currents by the wharf. Thus, the maximum encroachment of the plume remains distinctly clear of the mussel farming areas.

General good job site management practices and the more specific measures presented in Section 4.2.1.1 are considered sufficient to ensure that sediment resuspension is not a significant residual impact.

4.1.1.3 Destruction of habitat used by fish and other aquatic species

The destruction of habitat used by fish and other aquatic species is directly related to the dredging work, which will disturb the sediment and lead to the loss of the seagrass beds in the work zone and indirectly related to SPM settling in areas seaward of the dredging area. For fish specifically, these grass beds may be used as rearing and feeding grounds by species likely to be found in the work area.

For the habitats of fish and other aquatic species that will be lost in the dredging work and SPM settling in the areas seaward of the dredging area, general good job site management practices and the more specific measures presented in sections 4.2.1.1 and 4.2.1.2 will be put in place. These measures and the compensation project will help ensure that the dredging-related destruction of the habitat used by fish and other aquatic species is not a significant residual impact.

4.1.2 Human environment

Negative impacts on the human environment are associated with the dredging activities required for the project. Project execution may give rise to some constraints on shipping and use of the wharf, both commercial and by pleasure boaters.

The commercial wharf is used from early April until the end of December each year. Fishing boats use the south berth from April to November. Mussel farmers have three boats for their breeding activities. The Canadian Coast Guard docks there on a weekly basis. Boats owned by Construction DJL currently dock at the wharf seven or eight times a year and the company plans to increase that number to 16-17 per year in the next three years. A number of other commercial and industrial vessels use the wharf for transshipment of various goods and materials. It should be noted that only cruise ships carrying fewer than 1,000 passengers can use the commercial wharf. Larger ships anchor in the bay and passengers are ferried to the Gaspé marina.

A conflict over use of the space south of the commercial wharf and on a portion of the wharf could therefore arise during the dredging activities. General good job site management practices and the more specific measures presented in section 4.2.2 will be put in place. These measures will help ensure that the constraints on shipping and use of the wharf are not a significant residual impact.

4.2 SPECIFIC MITIGATION MEASURES

Implementation of the following mitigation measures will make it possible to reduce the significance of the expected impacts during completion of the project.

4.2.1 Natural environment

4.2.1.1 Sediment resuspension

- Install a turbidity curtain for the most contaminated area, i.e.: the area alongside the southern portion of the wharf and surrounding the old slipway. In the other areas, installing a turbidity curtain or other structure, or any other method approved by TC will be at the contractor's discretion. However, it must at all times meet the established SPM criteria at the control point in the bay of Gaspé (150 metres from the dredging equipment or turbidity curtain) and verified by measuring turbidity. Also ensure that the contractor is able to perform repairs quickly on site if needed;
- Take the necessary steps to ensure that the SPM plume generated by the dredging does not increase the ambient concentration by more than 30 mg/l at the control point for that parameter;
- Visually supervise in real time and monitor SPM concentration at the control point for that parameter;

- The contractor must adjust the speed at which the bucket is raised to the surface and out of the water to reduce the loss of material as much as possible. The contractor will be informed of the importance of working carefully. The contractor must also avoid needlessly resuspending disturbed sediment, namely by refraining from making abrupt movements, levelling the seabed with the bucket (mechanical dredging) or creating ripple marks (hydraulic dredging);
- The contractor must suspend the dredging work in inclement weather (storms, violent winds) to limit sediment dispersal;
- The barges used to transport the excavated material must be watertight to prevent the loss of material during transportation. During the dredging operations, the contractor must limit barge overflow into the environment;
- If the sediment is treated, ensure that the selected company has the necessary environmental authorizations to operate its technology, covering liquid effluent, before the work is set to begin.

4.2.1.2 Destruction of habitat used by fish and other aquatic species

- If the dredged area is to be confined, take the necessary steps (e.g.: hitting the surface of the water with the bucket of the mechanical shovel) to scare the fish and thus prevent them from becoming trapped in the enclosure. If needed, use fishing gear (seine nets or gillnets) to capture any live fish trapped in the dredging area and release them in open water. Obtain the necessary permits from the MRNF and Fisheries and Oceans Canada before making such catches;
- In order to protect the aquatic habitats that may be used as feeding or rearing grounds by numerous species, the contractor must respect the restriction period from May 15 to June 30, during which dredging work is prohibited, for the following species: brook trout, rainbow smelt and capelin;
- TC is committed to developing a compensation project to make up for the loss of habitat used by fish and other aquatic species. The project will aim to regenerate the seagrass bed affected by dredging through transplanting of seedlings.

4.2.2 Human environment

- Implement an information program for wharf users. The contractor must keep the wharfinger informed of project activities and notify this person, in advance and on a regular basis, of the progress and nature of the work;
- Maintain the conditions required for the use of the commercial wharf (by commercial and industrial boats, the Canadian Coast Guard and fishing and aquaculture boats);
- Issue shipping notices to ensure safe navigation;
- Notify the wharf managers and users in advance of the schedule and nature of the activities planned at the wharf.

5 ENVIRONMENTAL MONITORING AND FOLLOW-UP

5.1 ENVIRONMENTAL MONITORING

The project proponent, in this case TC, is responsible for implementing the environmental monitoring program. The specialized firm hired by PWGSC to monitor the work site will be responsible for validating the contractor's results and, where necessary, requiring action to minimize impact.

5.1.1 General monitoring activities

To ensure that the environmental measures proposed in this environmental impact assessment are respected, the proponent will take a number of actions:

- First, by including specific provisions in the tender specifications to ensure that the environment is protected. The proponent will make sure that all of the proposed mitigation measures are included in the plans and specifications. These provisions will be an integral part of the contracts awarded to the contractors;
- By requiring the chosen contractor to develop an Environmental Management Plan, which must be approved by TC before the work begins;
- By filing an Emergency Response Plan that covers, among other things, the risk of road, rail or marine accidents, as well as the presence of hazardous materials on the work site;
- By including environmental clauses (including those stipulated in the certificate of authorization) in the construction work monitoring plan. TC will ensure that this plan is completed before the work begins, that the contractor understands the monitoring activities as well as the tasks and responsibilities of each team member assigned to the project;
- By having industry experts develop a noise management plan, a detailed noise control program and a communications plan to inform the population before any noisy work begins.

5.1.2 Specific monitoring activities

5.1.2.1 Monitoring of dredging work

Besides the general monitoring activities, activities specific to the dredging work are proposed and will include controlling:

- The speed at which the dredge is lowered and raised (if the mechanical dredging option is chosen) to minimize sediment suspension;
- The effectiveness of the turbidity curtains at containing the suspended sediment during the dredging. A protocol will be developed to monitor the water column during the dredging work, and will combine 1) visual observation from shore, the wharf and the dredge throughout the work period and 2) follow-up of the SPM and contaminants (copper and Cu

and total PAH) at a certain distance from the dredge, or monitoring of the water quality throughout the work. Monitoring of water quality will make it possible to ensure that the plume generated by the work does not increase the surrounding SPM concentration by more than 30 mg/l at the control point for that parameter;

- The installation of the turbidity curtain according to the manufacturer's recommendations to ensure that it isolates the work area, as best, effectively and continuously as possible. Check if adjustments are required when water levels rise due to the tide or water masses move due to the currents;
- After dredging work is complete, perform a characterization of the sediment left in place to verify whether the remediation objectives have been met.

5.1.2.2 Monitoring of sediment management

5.1.2.2.1 Sediment dewatering

Besides the general monitoring activities, activities specific to the dewatering work are proposed and will include controlling:

- The effect of wind on the dewatered sediment deposits and generation of airborne dust. Cover the piles of dewatered contaminated sediment that have potential for emitting dust that are stored for over 24 hours with geo-textile, polythene, geo-membrane or other effective means;
- The quality of soil, groundwater and water discharged from the basin, the geo-textile bags and the treatment unit, if used. The discharge water must respect the regulations in effect or the environmental objectives for discharge developed by the MDDEFP;
- The condition of the dewatering surfaces or storage basins to ensure watertightness;
- The condition of the mechanical dewatering equipment to avoid any unscheduled work stoppages;
- The adequate management of the debris collected.

5.1.2.2.2 Physicochemical sediment treatment

Besides the general monitoring activities, activities specific to physicochemical treatment are proposed and will include controlling:

- The quality of the discharge water. The water must respect the regulations in effect;
- The quality of the treated sediment;
- The condition of the treatment equipment to avoid all accidents or spillage leading to unscheduled work stoppages;
- The management of hazardous materials required for the treatment and equipment maintenance.

5.1.2.3 *Monitoring of sediment transportation*

Besides the general monitoring activities, activities specific to the transportation of the sediment are proposed and will include controlling:

- The operating condition of the transportation vehicles to avoid any breakdown;
- The watertightness of the transportation vehicles to avoid all leaks of the transported material. Regarding marine transportation, open-top barges must be supplied with a hard cover system to make them watertight;
- The condition of the loads on the barges or vessels used to transport the wet sediment over a long distance, where applicable, prior to departure from Gaspé and again upon arrival at the sediment receiving port to ensure that no spillage of sediment takes place during transportation;
- The effectiveness of the splashguards installed on the trucks;
- Transshipment activities at the wharf to ensure that the sediment is transferred in a way that minimizes the risk of sediment being released into the water or onto adjacent surfaces;
- Manifests, weight tickets and receiving slips issued by the sites selected for the disposal, treatment or reclamation of the treated sediment. Proof of compliance from the sites must be supplied;
- Invasive exotic species as per application of the TC protocol to monitor such species.

5.2 ENVIRONMENTAL FOLLOW-UP

This project includes two separate follow-up programs:

- A program to follow up on the copper and PAH concentrations, as well as various biological parameters in mussel and scallop meat before, during and after the dredging work;
- A program to validate the success of the fish habitat remediation project to regenerate the seagrass bed affected by dredging (transplanting of seedlings).

6 CONCLUSION

The Port of Gaspé – Sandy Beach sediment remediation project is necessary to ensure the integrity of the aquatic environment south of the commercial wharf and to meet TC's government obligations for the management of contaminated sites. TC is committed to carrying out this project in harmony with the natural and human environments by limiting the negative impacts it may have through the introduction of effective and recognized mitigation measures. This summary of environmental impacts shows that the project will have negative effects that are of low to medium significance. All of these effects are considered insignificant once the mitigation measures and the compensation project to make up for the loss of the aquatic habitat are implemented.

The sediment remediation will have a number of positive impacts, including improved physicochemical features of the sediment south of the commercial wharf, eliminated risk of deterioration in water quality in the harbour and improved quality of shoreline and aquatic habitats, as well as quality of the local environment.

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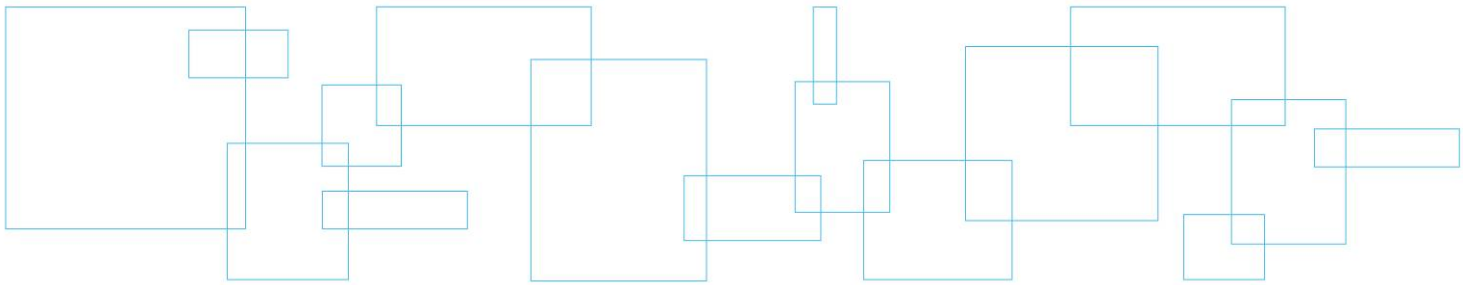
Appendix 1 Location of Work Zone and Dredging Area



DESSAU

Transport Canada Transports Canada

Port of Gaspé – Sandy Beach sediment remediation

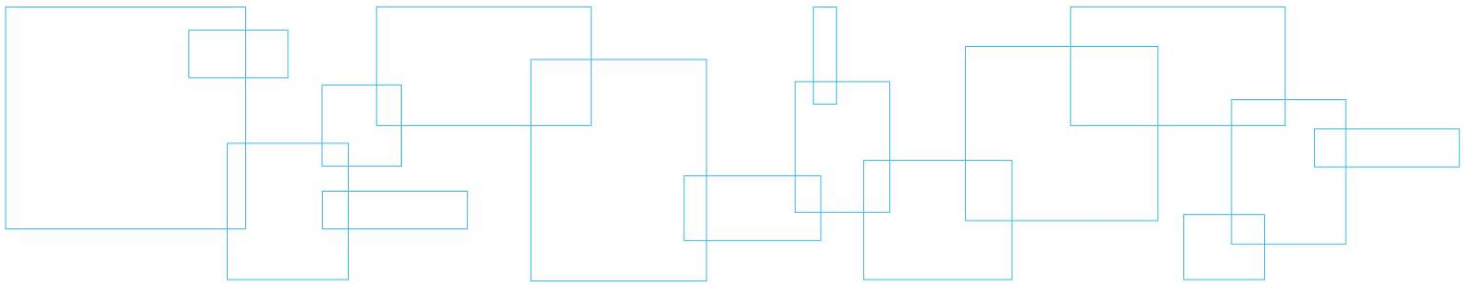
Work Zone

DESSAU

February 2013

Canada

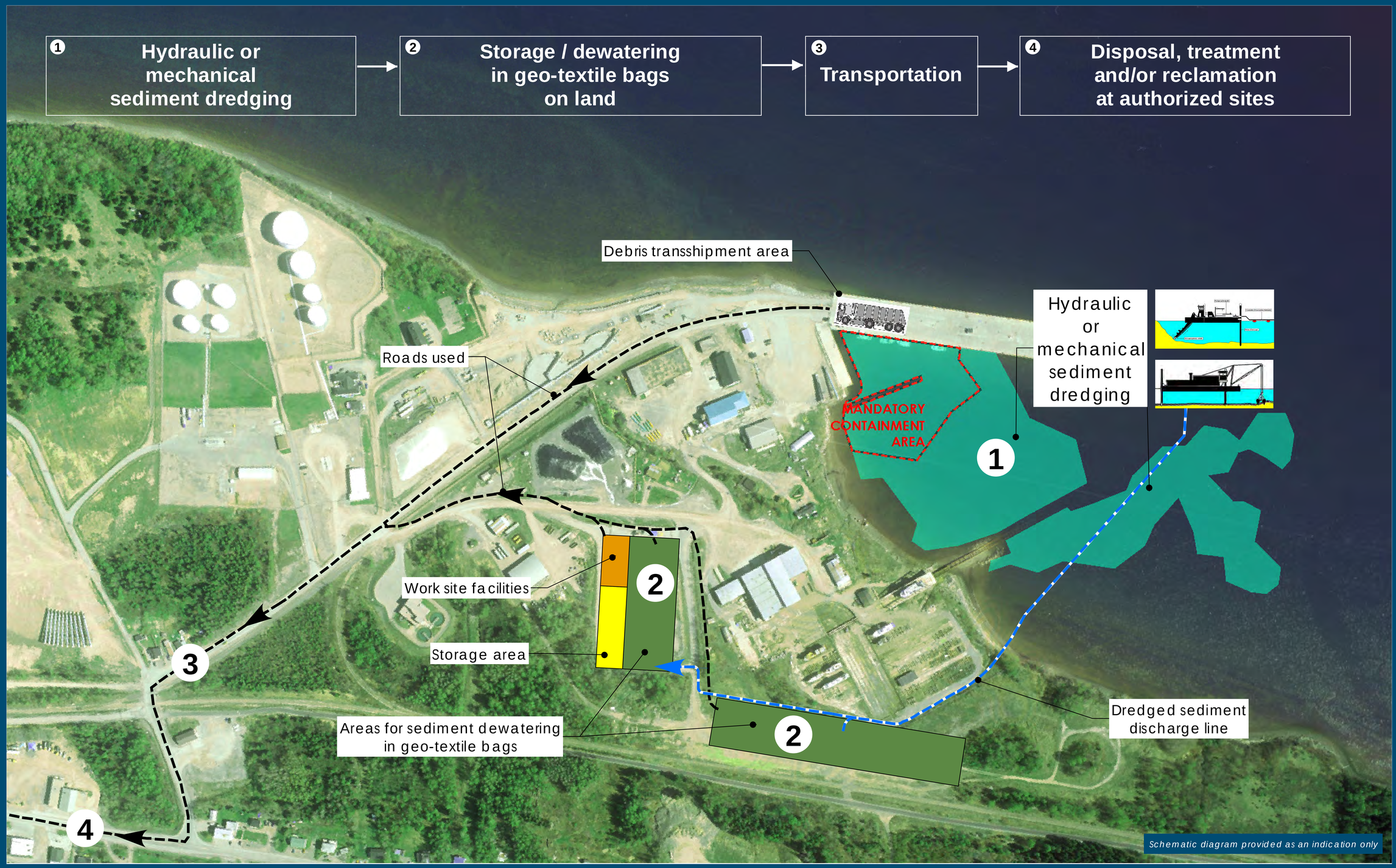
Appendix 2 Figures Presenting the Five Scenarios



OPTION 1 – Scenario 1

❶ Mechanical sediment dredging → ❷ Storage / passive dewatering in basin and/or in thin layers within a 2-km radius of the commercial wharf → ❸ Transportation → ❹ Disposal, treatment and/or reclamation at authorized sites

OPTION 1 – Scenario 2



OPTION 2 – Scenario 1

OPTION 2 – Scenario 2

❶ Hydraulic or mechanical sediment dredging → ❷ Barge transportation with dewatering in geo-textile bags → ❸ Disposal, treatment and/or reclamation at authorized sites

OPTION 3

❶ Hydraulic or mechanical sediment dredging → ❷ Physicochemical treatment → ❸ Transportation → ❹ Disposal, treatment and/or reclamation at authorized sites