

Hay River Harbour
Historic Water Quality Results

Location ID	Location Name	Latitude	Longitude	Sample Date	Sample Time	Parameter	Result	Unit	Detection Condition/ Quantification Limit	Detection Limit (mg/L)	Detection Limit Type	Result Comment
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2017-08-08	14:50:00	Total suspended solids			Below Detection/ Quantification Limit	3	Method Detection Level	CBM-2017-00021-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2017-08-08	14:50:00	Total suspended solids			Below Detection/ Quantification Limit	3	Method Detection Level	CBM-2017-00021-001
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2017-08-08	14:50:00	Total suspended solids			Below Detection/ Quantification Limit	3	Method Detection Level	CBM-2017-00021-001
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2017-09-06	14:15:00	Total suspended solids	13	mg/l				CBM-2017-00031-004
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2017-09-06	14:15:00	Total suspended solids	13	mg/L				CBM-2017-00031-004
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-07-10	12:00:00	Total suspended solids	82	mg/l				CBM-2018-00008-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-07-10	12:00:00	Total suspended solids	76	mg/l				CBM-2018-00008-001
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-07-10	12:00:00	Total suspended solids	76	mg/L				CBM-2018-00008-001
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-07-10	12:00:00	Total suspended solids	82	mg/L				CBM-2018-00008-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-08-15	00:00:00	Total suspended solids	22	mg/l				CBM-2018-00026-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-08-15	00:00:00	Total suspended solids	22	mg/L				CBM-2018-00026-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-09-18	00:00:00	Total suspended solids	28	mg/L				CBM-2018-00040-002
HAY-GSL	Hay River at Mouth of Hay River / Great Slave Lake	60.81978333	-115.7692333	2018-09-18	00:00:00	Total suspended solids	28	mg/l				CBM-2018-00040-002

REPORT

Government of Northwest Territories Department of Infrastructure

Hay River Harbour Restoration – Sediment and Erosion Control Plan 2023-8356



MARCH 2023

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LIST OF ABBREVIATIONS

Abbreviation	Definition
EM	environmental monitor
GNWT	Government of Northwest Territories
MTS	Marine Transportation Services
MVLWB	Mackenzie Valley Land and Water Board
SEC	sediment and erosion control
SECP	sediment and erosion control plan
TSS	total suspended solids

1 INTRODUCTION

The Government of the Northwest Territories (GNWT) – Department of Infrastructure (INF) retained Associated Environmental Consultants Inc. (Associated) to prepare a sediment and erosion control plan (SECP) for dredging works taking place in the Hay River, near its outlet into Great Slave Lake (Dredge Area A, Figure 1-1), and within the three fingers of the East Channel of the river (Dredge Area B, Figure 1-1). The dredging is proposed to begin July 16, 2023 and continue until September 14, 2023. The SECP follows the Mackenzie Valley Land and Water Board's (MVLWB) Standard Outline for Management Plans (MVLWB 2021).

The contractor is responsible for implementing the SECP, under the guidance of the on-site environmental monitor (EM).

1.1 Project Description

In 2022, the Hay River experienced unusually high-water levels, resulting in increased sediment being deposited in the Hay River Harbour and Great Slave Lake at the river outfall. The sediment, which has not been regularly maintained since 1997, has begun to fill the Dredge Areas. This has caused an emergency scenario, since the shallow water in the navigation channel poses a risk to boats (i.e., sea barge, Coast Guard, fishing, and recreational vessels) getting stuck in the sediment deposit and not being able to enter or exit the Hay River Harbour. Removing sediment so that boats can travel along the navigation channel. If boats cannot enter or exit the harbour, the supply for essential goods, and fuel for power and heat could be interrupted for up to 12 communities who rely on the sea barge system.

The GNWT-INF has proposed dredging the navigation channel to mechanically excavate a 30 m wide and 2.4 m deep navigation channel for emergency use, to be completed by local contractors in coordination with GNWT-MTS. The excavated sediment from the navigation channel would be loaded onto a barge, allowed to passively dewater, and when the barge is at capacity, the sediment would be offloaded to haul trucks located on shore. The haul trucks would transfer the sediment to GNWT-INF property on Vale Island, using a sealed truck bed to mitigate further dewatering on roads. The sediment would be temporarily stored on Vale Island, contained with 1 m berms, for ongoing passive dewatering. Once moved from the barge to land, the sediment¹ will be considered soil (CCME 1999) and may be made available for public use, if appropriate, or would be transferred to a final management area.

This emergency dredging program will include removal and temporary storage of the following estimated volumes of sediment:

- Dredge Area A: the shipping lanes approaching the outfall to Great Slave Lake to a width of 30 m, dredging 16,000 m³; and
- Dredge Area B: the three fingers in the East Channel, dredging 68,000 m³.

1.1.1 Project Activities with the Potential to Affect the Environment

The following project activities have the potential to result in environmental impacts from erosion and sediment transfer:

- Dredging sediment instream;
- Passive dewatering on the barge;

¹ Sediment is unconsolidated material deposited on the bed of a waterbody or in a low spot or depression on land where the water velocity is insufficient to move the material (CCME 1999).

- Transfer of sediment from the barge to haul trucks;
- Transport of sediment to temporary storage sites on Vale Island; and
- Passive dewatering at the temporary storage sites.



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SERVICE LAYER CREDITS: WORLD IMAGERY, MAXAR



- LEGEND**
- Dredging Areas
 - Temporary Soil Storage (GNWT)
 - Temporary Soil Storage (Town of Hay River)

AE PROJECT NO. 2023-8356
 SCALE 1:36,000
 COORD. SYSTEM NAD 1983 UTM ZONE 11N
 DATE 2023-03-28
 REV 03
 DRAWN BY SC
 CHECKED BY JB

FIGURE 1-1
DREDGING AND PROJECT AREA
 GOVERNMENT OF NORTHWEST TERRITORIES- DEPARTMENT OF INFRASTRUCTURE
 HAY RIVER HARBOUR RESTORATION

1.2 Regulatory Requirements and Guidelines

Several federal and territorial acts and regulations are in force that direct the project, as detailed below.

1.2.1 Federal Legislation

1.2.1.1 *Canadian Navigable Waters Act*

Great Slave Lake is listed as a scheduled water under the *Canadian Navigable Waters Act*, RSC, 1985, c. N-22. Transport Canada classifies the project works as minor works, which are regulated under the Act.

1.2.1.2 *Fisheries Act*

The *Fisheries Act*, RSBC 1985, c. F-14, is the main federal legislation for Canadian fisheries management through the conservation and protection of fish and fish habitat. The project works involve temporary disturbance and alteration of potential fish habitat. A request for review was submitted to Fisheries and Oceans Canada for the project.

1.2.2 Territorial Legislation

1.2.2.1 *Mackenzie Valley Resource Management Act*

The *Mackenzie Valley Resource Management Act*, SC 1998, c. 25, establishes public boards regulate the use of land and water, prepare regional land use plans to guide development, and carry out environmental assessment and review of proposed projects in the Mackenzie Valley. The MVLWB commonly requires management plans with applications and as conditions of land use permits and water licences.

1.2.2.2 *Northwest Territories Waters Act*

The *Waters Act*, SC 1992, c. 39, governs the use of water. The project will require a Type B water licence from the MVLWB and is regulated under the Act because the works are classified as miscellaneous undertakings for a deposit of waste. The accumulated sediment to be removed is considered waste.

2 GENERAL SEDIMENT AND EROSION CONTROL MEASURES

Construction activities will follow mitigation recommendations described in this SECP and any approvals or permits from Fisheries and Oceans Canada, the MVLWB, and any other relevant regulations for construction works.

The following best management practices and mitigation measures will be implemented during project construction to protect against sedimentation and erosion.

2.1 Best Management Practices

Construction works will adhere to the protection measures outlined in this SECP and in the following documents:

- Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2018);
- Code of Practice: Routine Maintenance Dredging for Navigation (DFO 2022); and
- Standards and Best Practices for Instream Works (MWLAP 2004).

2.2 Construction Sequencing

The project is expected to be undertaken in the following sequence:

1. An excavator situated on a barge will remove sediment from Dredge Areas A and B and stockpile it onto a barge deck. The deck will have geotextile fabric installed, which will allow water to flow freely off the barge but will trap sediment on the deck. This will allow the sediment to passively dewater on the barge deck to reduce the amount of sediment re-entering the waterbody.
2. When the barge is at capacity, the sediment will be offloaded using the excavator onto to a haul truck on shore and will be transferred to multiple temporary storage sites on Vale Island to passively dewater further.
3. At the Vale Island temporary storage sites, the water from the dewatering process will infiltrate onto underlying soils, excess water from the piles (if any) will be directed to sumps, where the water will infiltrate into the ground. Stockpiles will be approximately 3 m high and more than 30 m from monitoring wells and surface water bodies to mitigate the potential for a direct hydraulic connection to groundwater and surface water.

The recommended sequencing for the implementation of the sediment and erosion control (SEC) measures is as follows:

1. Prepare the storage sites, including clearing and grubbing, berm construction, and excavation of sumps.
2. Install silt fencing or berms as necessary to protect riparian areas, watercourses, and other sensitive habitat along the transportation route. Using haul trucks with sealed truck beds to transport sediment would negate the need for this step.
3. Install silt fencing or berms as necessary to trap sediment-laden water and prevent it from re-entering watercourses while sediment is offloaded by excavator from the barge to haul truck located on the shore.

After these measures are implemented, sediment stockpiling may begin.

2.3 Contractor Responsibilities

The contractor will be responsible for ensuring compliance with the SEC measures outlined in this document (Section 3 and 4).

When the construction works are completed and the permanent SEC measures (e.g., storage site berms) are functioning correctly, the temporary best management practice measures (e.g., silt fencing along the transportation route and/or at the shore) may be removed.

2.4 Maintenance

At all times during construction, the contractor must maintain SEC measures in working order, clean, and adjust them as required to achieve the desired objective. SEC measures should remain in place until the EM deems them no longer necessary, until the receiving site has been stabilized, or until the dried sediment has been removed for reuse elsewhere.

2.5 Inspections and Monitoring

During dredging, total suspended solids (TSS) are to be monitored. For further details on inspections and monitoring requirements, refer to the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a).

Inspections will include:

- Inspecting silt fencing and berms regularly and reporting any functional issues to the site manager or project manager;
- Monitoring TSS every 30 minutes in the river, using real-time sensors, at several proposed locations (Associated 2023a);
- Evaluating waters using similar technology (i.e., hand-held water quality meter) for quality control purposes; the EM will measure background TSS at each monitoring location before the start of dredging each day and will compare the results to those of the sensor stations to determine whether the sensors are operating correctly;
- Sampling soil stockpiles at storage sites within a week of placement. Stockpiles will be organized into grided cells based on their removal location (geo-referenced) and volumes;
- Reporting the results of the inspection and recommended improvements, if any, to the contractor; and
- Evaluating the implementation of specified measures and ensuring that installation is in accordance with the drawings and manufacturers' specifications.

Inspections will be completed weekly and after major rainfall events. Copies of the inspection reports will be kept on site during the life of the project and will be available for review on request. A sample inspection report is included in Appendix A.

2.6 Emergency Response

If SEC measures fail, the on-site EM and the contractor (to be determined) will be informed immediately. The contractor should take immediate action to isolate the sediment plume or erosion site. Excavation and transport of sediment will be temporarily paused until failures are rectified.

In the event of a large storm or SEC failure, the contractor must immediately control and respond to turbid water, discharges, and sediment transport. Appropriate action includes the following:

- Hazard assessment: Assess the source, extent, and quantity of the discharge.
- Containment and elimination of the source: Cease transportation and stockpiling of sediment and use additional SEC measures to contain sediment transport.
- Cleanup: When containment is complete, turbid water and sediment levels should be verified to be within acceptable levels (Associated 2023a) or allowed to settle out before works are resumed.

The response framework for contingency planning is presented in Table 2-1. This approach represents passive adaptive management, or the application of best practices. Reports of actions under the response framework will be provided to the MVLWB as requested and required under the Type B water licence.

Table 2-1 Response Framework for Sediment and Erosion Control Measures

Threshold	Description	Action Level	Tasks
SEC measures require maintenance, but there is no risk of failure	<ul style="list-style-type: none"> Sediment is being contained by proposed measures, but measures are no longer functioning as required Signs of minor sedimentation/turbidity are present outside work area and/or storage sites, but no risk of failure exists 	Low	<ul style="list-style-type: none"> Pause works and inspect SEC measures and materials for deficiencies. Replace/repair berms or silt fencing as necessary before resuming works. Continue with scheduled inspections and monitoring.
SEC measures require maintenance, and there is risk of failure	<ul style="list-style-type: none"> Sediment is being contained by proposed measures, but measures are no longer functioning as required, and risk of failure due to accumulation exists Signs of sedimentation/turbidity are present outside working areas and/or storage sites, and risk of failure exists 	Medium	<ul style="list-style-type: none"> Notify the project supervisor or a delegate. Pause works and replace/repair SEC measures and materials as necessary before resuming excavation. Investigate turbidity levels outside the work area/storage sites. Increase scheduled inspections and monitoring.
SEC measures have failed	<ul style="list-style-type: none"> Sediment is no longer being contained and measures have failed 	High	<ul style="list-style-type: none"> Stop works. Notify the project supervisor or a delegate. Follow spill response protocols as per the spill contingency plan, if required. Implement secondary SEC measures to contain sediment from travelling off site, if required. Increase frequency of inspections and monitoring until turbidity reaches acceptable levels before resuming works.

2.7

2.8 Materials

During construction mitigation, materials should be stored on site in case of an emergency that requires immediate SEC attention. The mitigative materials should include but are not limited to:

- Material tarping/poly sheeting
- Drain pipe
- Spring berms
- Drain rock
- Silt fencing
- Sandbags

After construction is completed, the mitigation materials shall be restocked and permanently maintained on site, in an accessible location, until site restoration is complete.

3 SEDIMENT AND EROSION CONTROL MEASURES ON WATER

Dredging will be undertaken using an excavator, and machinery will be operated from a barge.

Suspended sediment (coarse sand to fine silt) will increase in the water during dredging. The project is designed so that fine sediment will largely be filtered during passive dewatering, which will occur by filter fabric filtration on the barge. Based on the short duration of the project and on the naturally high turbidity of the river, a curtain is not considered essential for dredging in these areas. Due to the strong currents in the river and the large size of Dredge Area A, a curtain would be ineffective. Also, a curtain cannot be used in Dredge Area B due to the large size of the Hay River and the potential of disrupting boat traffic. Curtains in strong currents tend to drag along the bottom, which results in more sediment being released, rising the turbidity levels in the water.

3.1 General Sediment and Erosion Control Measures

The following general mitigation measures are intended to protect surface water resources during instream works:

- Excavators used for dredging will be operated from a barge only.
- Vegetation in riparian zones along the shore will not be disturbed for barge loading and unloading.
- Clean (or pre-construction condition)² water flow will be maintained downstream of the work area during dredging.
- Dredging will occur only during periods of high water and during a time of least risk to fish species present in watercourses. The fish timing window for Zone 1, Northwest Territories is July 16 to September 14.
- Materials for sediment containments and controls on the barge, including filter fabric for sediment filtration and passive dewatering, will be available on-site during construction.
- Equipment will be in good working order and inspected regularly. Any equipment cleaning or maintenance will be done in areas designated for vehicle maintenance, and cleaning will be done before dredging and/or transportation of sediment to storage sites.

² The Hay River outfall has a naturally high sediment load.