

REPORT

Government of Northwest Territories Department of Infrastructure

Hay River Harbour Restoration – Sediment and Erosion Control Plan (Version 2.0) 2023-8461



DECEMBER 2023





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REVISIONS PAGE

Hay River Harbour Restoration – Sediment and Erosion Control Plan (Version 2.0)

Client:	Consultant:
Government of Northwest Territories Department of Infrastructure	Associated

Associated Environmental Consultants Inc.

Date	Description	Prepared by/ Reviewed by	Client Review
2023-03-31	Submission for MVLWB water licence application	Associated	GNWT-INF
2023-06-20	Revised submission for IFT Specifications addendum	Associated	GNWT-INF
2023-07-06	Revised submission, incorporating MVLWB comments in the Type B Water Licence (Version 2.0)	Associated	GNWT-INF
2023-12-15	Annual plan review and update for 2024 operations	Associated	GNWT-INF
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LIST OF ABBREVIATIONS

Abbreviation	Definition
BMP	best management practice
CEMP	construction environmental management plan
EM	environmental monitor
GNWT	Government of Northwest Territories
INF	Department of Infrastructure
MTS	Marine Transportation Services
MVLWB	Mackenzie Valley Land and Water Board
SEC	sediment and erosion control
SNP	surveillance network program
TSS	total suspended solids

1 INTRODUCTION

The Government of Northwest Territories (GNWT) – Department of Infrastructure (INF) retained Associated Environmental Consultants Inc. (Associated) to prepare a sediment and erosion control (SEC) plan for dredging works taking place in the Hay River, near its outlet into Great Slave Lake (Dredge Area A), and within the three fingers of the East Channel of the river (Dredge Area B) (Figure 1-1). Dredging was proposed to begin July 16, 2023, and continue until September 14, 2023. In 2023, dredging occurred only in Dredge Area A, from August 11–13, 2023, and September 18–October 7, 2023, due to a major wildfire evacuation in the Town of Hay River and the surrounding community. Dredging for Dredge Area B and the remainder of Dredge Area A is planned for July 16 to September 14, 2024; however, that window may begin earlier based on discussions ongoing with Fisheries and Oceans Canada (DFO) and stakeholders at the time of this submission. The SEC plan follows the Mackenzie Valley Land and Water Board (MVLWB) Standard Outline for Management Plans (MVLWB 2021).

The contractor is responsible for implementing the SEC plan under the direct 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 had not been regularly maintained (removed) since 1997, had begun to fill the navigation channel. This caused an emergency scenario, since the shallow water in the navigation channel poses a risk to vessels (i.e., MTS barges, Coast Guard, fishing, and recreational vessels) getting stuck in the sediment and not being able to enter or exit the Hay River Harbour. The goal of the dredging project is to remove the accumulated sediment so that marine users can travel along the navigation channel. If vessels cannot enter or exit the harbour, the supply for essential goods, including fuel for power and heat could be interrupted for up to 12 communities who rely on the sea barging system. The problem was further exacerbated by unusually low water levels in 2023, leading to limited access to the Hay River Harbour and the surrounding communities connected via Great Slave Lake.

GNWT-INF has proposed dredging the navigation channel to mechanically excavate a channel 30 m wide and 2.4 m deep for emergency use, to be completed by local contractors, where possible, in coordination with GNWT – Marine Transportation Services. The material dredged from the navigation channel would be loaded onto a barge and allowed to passively dewater; when the barge is at capacity, the dredged material would be offloaded to haul trucks located on shore. The haul trucks would transfer the dredged material to temporary storage sites on Vale Island. The dredged material would be temporarily stored on Vale Island, contained with 1 m high berms, for ongoing passive dewatering. Once moved from the barge to land, the sediment¹ (dredged material) 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 (project total) volume 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 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).

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;
- Transfer of dredged material from the barge to haul trucks;
- Transport of dredged material to temporary storage sites on Vale Island;
- Passive dewatering at the temporary storage sites; and
- Active dewatering (i.e., pump-off) at the temporary storage sites (if applicable).



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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
 2023-06-01

 REV
 03

 DRAWN BY
 SC

 CHECKED BY
 JB

GOVERNMENT OF NORTHWEST TERRITORIES-DEPARTMENT OF INFRASTRUCTURE

HAY RIVER HARBOUR RESTORATION

Government of Northwest Territories Department of Infrastructure

1.2 Regulatory Requirements and Guidelines

This section discusses several federal and territorial acts and regulations in force that direct the project.

1.2.1 Federal Legislation

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.

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 project review has been requested from Fisheries and Oceans Canada, who provided a letter of advice (23-HCAA-00530) on June 28, 2023.

1.2.2 Territorial Legislation

Mackenzie Valley Resource Management Act

The Mackenzie Valley Resource Management Act (SC 1998, c. 25) establishes public boards to 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 River valley. The MVLWB commonly requires management plans with applications and as conditions of land use permits and water licences. The following management plans, in addition to the SEC plan, were included in the application:

- Engagement plan;
- Monitoring plan;
- Waste management plan and;
- Spill contingency plan.

Northwest Territories Waters Act

The Northwest Territories Waters Act (SC 1992, c. 39) governs the use of water. The project required 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 sediment being dredged is considered waste. A Type B water licence (MV2023L8-0005) was issued on June 27, 2023.

2 GENERAL SEDIMENT AND EROSION CONTROL MEASURES

Construction activities will follow the mitigation recommendations described in this SEC plan and any approvals or permits from Fisheries and Oceans Canada, the MVLWB, and any other relevant regulations for construction works. In this document, SEC measures fall into the following categories:

- Activities in water (Section 3); and
- Activities on land (Section 4).

Erosion is the process in which particles are detached and mobilized for transport, primarily by wind and/or water. Sedimentation is the deposition of soil particles, and sediment can be considered a deleterious substance. The

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

2.1 Best Management Practices

Construction works will adhere to the protection measures outlined in this SEC plan 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);
- Standards and Best Practices for Instream Works (MWLAP 2004); and
- Erosion and Sediment Control Manual (GNWT 2013).

2.2 Construction Sequencing

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

- An excavator situated on a barge will remove sediment from Dredge Areas A and B and stockpile it onto the deck of another barge adjacent to the first. The barge deck that receives the dredged material will be lined with engineered filter media, which will allow water to flow freely off the barge but will trap the dredged material on the deck. This allows the dredged material to passively dewater on the barge deck to reduce the amount of dredged material re-entering the waterbody.
- 2. When the barge is at capacity, it will be brought to shore, and the dredged material will be offloaded onto to a haul truck. The truck will transport the dredged material to multiple temporary storage sites on Vale Island to passively dewater further.

At the temporary storage sites on Vale Island, the water from the dewatering process will infiltrate onto the underlying soil and/or will be directed to pool in sumps. Each stockpile will be approximately 3 m high and will be contained within a berm (approximately 1 m high). Surface waterbodies will be protected to mitigate the potential for a direct hydraulic connection to groundwater and surface water.

2.3 Contractor Responsibilities

The contractor will be responsible for ensuring compliance with the SEC measures outlined in this document. The contractor will develop a detailed SEC plan, which will discuss the proposed SEC measures and specific locations (including at each of the temporary storage sites planned to be used), as part of the construction environmental management plan (CEMP). The contractor will implement the SEC measures in the following sequence:

- 1. A qualified environmental professional will conduct wildlife and nest sweeps within 7 days of planned initiation of a temporary storage site location. Initiation includes any disturbance including temporary storage site preparation (e.g., development of berms) or dredgeate placement. Appropriate mitigations proposed in the sweeps must be in place prior to the temporary storage location being used. Wildlife and nest sweep reports will be provided to GNWT-INF within 14 calendar days of the sweeps. If a temporary storage site is used, then dormant, a new wildlife and nest sweep will be completed. At storage site locations with potential hydraulic connectivity to surface watercourses or waterbodies, silt fencing (or an approved equivalent) will be installed downslope of the storage site in the event of berm failure. Proposed locations of SEC measures in the event of a berm failure or uncontrolled release will be included in the CEMP.
- Temporary storage locations will be prepared including clearing and grubbing, constructing berms around the perimeter of the stockpiles, drainage to sumps (Section 2.3) and sump excavations as required (Section 4.1.3). Topsoil (if present) at each storage site will be carefully salvaged and stored at the location of origin. Topsoil

stored for more 30 days will have temporary SEC measures (e.g., tackifier) installed within 30 days of when the topsoil is salvaged.

- 3. Before any storage site is used, grading will occur to ensure drainage is directed to a sump to contain any potential runoff. The sumps will serve as the surveillance network program (SNP) station locations. The drainage grading must be inspected and approved by GNWT-INF before the temporary storage sites are used. Perimeter berms will be at least 1 m high and sufficiently compacted to mitigate for potential seepage. The sump at each temporary stockpile location must be appropriate for positive drainage, physically demarcated (i.e., by signage), and the location coordinates for the SNP station provided to GNWT-INF. Excavation of more than 0.5 m for sumps must be approved by GNWT-INF. Additional construction material requested to be brought on site by the contractor must be clean and free of contaminants and must be approved by GNWT-INF before it is transported to the site.
- 4. Monitoring wells at each temporary storage location will be field verified by the contractor, and GPS coordinates provided to GNWT-INF. A surface mound is required around each monitoring well and will consist of compacted clay. The compacted clay will be placed around the casing of each well to move surface water away from it. Concrete jersey barriers (or approved alternative) will be installed in a triangular shape around each monitoring well to prevent physical damage to the wells. Water (resulting from precipitation and/or dewatering) will not be allowed to accumulate near the monitoring wells and will be actively managed by the contractor on an as needed basis per the Hay River Harbour Restoration Monitoring Plan (Associated 2023a).
- 5. Silt fencing or berms will be installed at the offloading point as necessary to trap sediment-laden water and prevent it from re-entering watercourses while dredged material is offloaded from the barge to the haul truck on shore.
- 6. Silt fencing (or an approved equivalent) will be installed as necessary to protect riparian areas, watercourses, and other sensitive habitat along the transportation route.² Using haul trucks with sealed truck beds to transport dredged material would negate the need for this step.

After these measures are implemented, dredged material stockpiling may begin.

2.4 Maintenance

At all times during construction, the contractor must inspect and maintain SEC measures to ensure proper function. SEC measures will be installed according to GNWT's Erosion and Sediment Control Manual (GNWT 2013). SEC measures should remain in place until the EM deems them no longer necessary, until the temporary storage site has been stabilized, or until the dredged material has dried and been removed for reuse elsewhere.

2.5 Inspections and Monitoring

SEC measures, on land and on water, must be inspected on a daily basis, and records of the daily inspection must be included in daily reports. A sample inspection report is included in Appendix A. For further details on inspections and monitoring requirements, refer to the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a).

Inspections will include:

• Monitoring total suspended solids (TSS) in the river or lake every 30 minutes, using real-time sensors, at several proposed locations (Associated 2023a);

² The transportation route begins on the water, continues to the offloading point and along the truck route, and terminates at the stockpile properties. Silt fencing will be installed in areas where sediment deposition or erosion may occur and result in sediment entering the water. The EM will assess the need for silt fencing (and adapt when necessary) throughout the project to minimize environmental impacts. Overall, the transportation route is expected to have negligible impacts as the truck beds will be sealed while material is transported.

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- Evaluating waters using appropriate technology (i.e., hand-held water quality meter) for quality control purposes. The EM will measure the background TSS at each monitoring location before dredging starts each day and will compare the results to those of the sensor stations to determine whether the sensors are operating correctly;
- Visually monitoring the dredging operations and offloading location for sediment plumes; and ensuring the excavator is operating the excavator bucket in a slow and controlled manner;
- Formally inspecting the engineered filter media daily (or as indicted by GNWT-INF). The engineered filter media inspection and maintenance will be documented in the EM daily report. Maintenance will include:
 - Physical removal of the accumulated sediment from the engineered filter medium;
 - Replacement of the engineered filter media with observable limited function (i.e., torn, damaged, or poorly secured); and
 - Additional maintenance as directed by the on-site engineer.
- Inspecting silt fencing and berms, reporting any functional issues to the site manager and project manager, and providing timely response to any deficiencies identified;
- Sampling soil stockpiles at storage sites as per the Hay River Harbour Restoration Monitoring Plan (Associated 2023a);
- Reporting the results of the inspection and recommending improvements, if any to the contractor and GNWT-INF; and
- Evaluating the implementation of specified measures, adding additional SEC measures as site conditions change or new information becomes available, and ensuring that measures are installed in accordance with project drawings and manufacturer specifications.

2.6 Emergency Response

If there is an imminent risk of SEC failure, or if SEC measures fail, the on-site EM and the contractor site supervisor will be informed immediately. The contractor will take immediate action to isolate the erosion or sediment plume. Excavation and transportation of dredged material will be temporarily paused until failures are rectified. Reporting will follow the Hay River Harbour Restoration – Spill Contingency Plan (Associated 2023b).

In the event of a large storm or SEC failure, the contractor must immediately control and respond to sediment release (terrestrial or aquatic). Appropriate action includes the following:

- Assess the hazard: Assess the source, extent, and quantity of the discharge.
- Contain and eliminate the source: Cease transportation and stockpiling of dredged material and use additional SEC measures to contain sediment transport.
- Clean up the area: When containment is complete, verify that levels of turbidity and sediment are within acceptable levels (Associated 2023a), or allow to settle out before works are resumed.
- Notify applicable authorities as required.

The response framework for contingency planning in presented in Table 2-1. This approach represents adaptive management, or the application of best practices, and specific details are presented in Section 4. Reports of actions under the response framework will be provided to the MVLWB as requested and required under the Type B water licence.

Threshold	Description	Action Level	Task
SEC measures require maintenance, but there is no risk of failure	 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	 Pause works and inspect SEC measures and materials for deficiencies. Replace or 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	 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 work areas and/or storage sites, and risk of failure exists. 	Medium	 Notify the project supervisor or a delegate. Pause works and replace or repair SEC measures and materials as necessary before resuming works. This includes the engineered filter media on the barge. Investigate turbidity levels outside the work areas/storage sites. Increase scheduled inspections and monitoring.
SEC measures have failed	 Sediment (or TSS, in the case of turbidity monitoring during dredging¹) is no longer being contained, and SEC measures have failed. 	High	 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.

Table 2-1 Response Framework for SEC Measures

¹ Additional information regarding the response framework for turbidity monitoring in receiving waters during dredging activities is presented in Section 4.1 of the monitoring plan (Associated 2023a).

2.7 Materials

During construction mitigation, materials should be stored on site and be in a ready-to-use manner in the event of an uncontrolled release or imminent risk of an uncontrolled release. The materials are to be stored appropriately per manufacturers' directions (i.e., out of direct sunlight). The mitigative materials should include but are not limited to:

- GNWT-INF approved engineered filter media
- Dewatering (i.e., silt) bags
- Slotted buckets (or approved equivalent)
- Pumps and additional hose
- Material tarping/poly sheeting
- Drain pipe
- Spring berms
- Silt fencing
- Sandbags
- Minimum four spare complete turbidity monitoring stations (i.e., buoy, sensor, and chain)

The SEC emergency response materials should be inspected and restocked on weekly basis for the duration of the project, including during site reclamation, and inspections documented in the daily report.

3 SEDIMENT AND EROSION CONTROL MEASURES IN WATER

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

The levels of 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 engineered filter media filtration on the barge. Based on the short duration of the project, the naturally high turbidity of the river and observations and data from 2023 operations, a turbidity 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 turbidity curtain would be ineffective. In Dredge Area B, deploying a turbidity curtain in extreme shallow waters could be problematic with the potential to cause additional turbidity through drag from close contact with the bottom. Fish and vessel movement considerations could also pose significant challenges with turbidity curtain use. Site conditions can change, however, and turbidity curtain use will remain as an adaptive management tool under specific applications, as approved by Fisheries and Oceans Canada (DFO) and GNWT-INF.

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.
- Excavators shall have sufficiently long reach to avoid tug boats moving the barges unnecessarily.
- Vegetation in riparian zones along the shore will not be disturbed for barge loading and unloading.

- Clean (or pre-construction condition)³ 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 the fish species present in watercourses. The fish timing window for Zone 1, Northwest Territories, is July 16 to September 14, but may be adaptable based on factors including but not limited to local knowledge.
- Materials for sediment containment and control on the barge, including engineered filter media for sediment filtration and passive dewatering, will be available on site during construction. Additional SEC measures (Section 2.7) must be readily available on site and stored in a ready to use manner.
- Equipment will arrive to the site clean and in good working order. Equipment will be inspected regularly, and equipment inspection records will be provided to GNWT-INF on a weekly basis. 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.
- Waste, including wastewater, will not be disposed of within 100 m of the ordinary high-water mark of any watercourse (Associated 2023c). Waste or chemical storage will not be established within 100 m of the ordinary high-water mark.
- In the event of a sediment release, the area will be restored to the satisfaction of an inspector (per the Type B water licence).

3.1.1 Engineered Filter Media

One of the primary goals of the project is to maximize water loss from the sediment through passive dewatering before the sediment is offloaded onto land. An excavator situated on a barge will remove the dredged material and stockpile it onto a barge deck. An engineered filter media (TE-8 8 oz., civil woven geotextile, manufactured by Titan Environmental Containment, or an approved equivalent) will be installed on the deck. This will let water flow freely off the barge but will keep the dredged material on the deck, allowing for passive dewatering. The engineered filter media will be inspected daily and actively maintained on a weekly basis, at a minimum (or as approved by GNWT-INF). Maintenance will include:

- Physical removal of the accumulated sediment from the engineered filter media;
- Replacement of the engineered filter media with observable limited function (i.e., torn, damaged, or poorly secured); and
- Additional maintenance as directed by the on-site engineer.

Records that show the engineered filter media has been maintained weekly will be provided in the applicable daily report and include before and after photos. When the barge is at capacity, the dredged material will be transferred to Vale Island, where it will be stockpiled at multiple properties and allowed to passively dewater further. No free standing water will be visible on the barge prior to dredgeate movement on shore. If free standing water is observed, adaptive management will include increasing the residence time on the barge (i.e., overnight), ensuring dredgeate is not piled up against the engineered filter media and increasing maintenance frequency of the engineered filter media.

3.1.2 Silt Fencing

Silt fencing and berms allow surface water to pond so that sediment particles can settle. At the discretion of the EM, silt fences may be installed at the barge offloading location to protect riparian habitat or contain any potential release

³ The Hay River outfall has a naturally high sediment load.

of sediment-laden water during transfer to haul trucks. Silt fencing is to be maintained throughout the project until the EM deems it no longer necessary. All temporary SEC measures will be removed after vegetation has been reestablished (or as approved by GNWT-INF).

4 SEDIMENT AND EROSION CONTROL MANAGEMENT ON LAND

The dredged material will be transferred from the barge to land via haul trucks to several temporary storage sites located above the high-water mark on Vale Island for further passive dewatering. Trucks will drive at or below the speed limit to prevent dry silt from becoming airborne. A containment berm will be constructed around the perimeter of the storage sites to contain the stockpiled dredged material (where it will be considered soil after it is adequately dry). The berm will prevent dredged material and sediment-laden water from being transported back to the Hay River or Great Slave Lake during passive dewatering, or during flood or rainfall events.

4.1 General Sediment and Erosion Control Measures

The following SEC measures will minimize the migration of sediment and sediment-laden water from the temporary storage sites and manage passive dewatering on site:

- The pre-disturbed storage sites will be at least 30 m away from watercourses.
- Topsoil, where present, will be removed and stored separately from subsoil when the storage sites are prepared and when berms, drainage channels, and sumps are created.
- The contractor will develop a specific SEC plan for each storage location and will include these plans in the CEMP. Each SEC plan or drawing will include the specific location and type of proposed SEC measure, and will identify sensitive environmental features (e.g., monitoring wells, drainage paths, proximity to waterbodies, etc.). The SEC plan will include mitigations in the event of berm failure for each storage location.
- Sediment control structures, such as silt fences or berms, will be in place before stockpiles are established. These fences will be located on the downslope side of the storage sites and located so as to not hinder construction traffic. Material used in the silt fences will be appropriate for the sediment grading.
- The dredged material stockpiles will be managed so that they are:
 - located away from natural flow paths; and
 - surrounded by SEC structures (i.e., berms, sumps).
- The environmental monitor (EM) will perform daily inspection of transportation routes for loss of material and/or water accumulation and include these inspections, with supporting photos, in daily reporting. Dredged material on transportation routes is to be removed at the earliest available opportunity.

SEC structures will be formally inspected on a weekly basis and within 24 hours of a major precipitation event (>12 mm of precipitation within 24 hours, or precipitation on wet or thawing soils). Records of the weekly SEC inspections will be included in regular reporting. Deficiencies or maintenance identified in the weekly inspections will occur at the earliest available opportunity.

4.1.1 Stockpiles

The dredged material to be stockpiled will not have visible free standing water on the barge prior to being brought to shore (Section 3.1.1). Before any stockpile location is used, the site will be prepared as described in Section 2.3, and SEC measures will be installed as per the approved CEMP. When a temporary storage site is used, the environmental

monitor (EM) will assess the site daily for water accumulation and erosion risk. If water accumulation (i.e., resulting from precipitation and/or dewatering) is noted at the stockpile location, it must be managed actively (Section 4.1.5) to mitigate the potential release of water off site. Excess water that does not infiltrate into the ground will be managed using various techniques depending on the volume of water and the amount of dredged material (Section 4.1.5). Additional SEC measures may be required during or after a temporary stockpile location is used. Stockpiles will not exceed 3 m in height, unless approved by GNWT-INF.

The daily inspections performed by the EM will be included in the daily reporting, including supporting photographs of each active temporary storage site being used. A monthly summary of the requirements in Schedule 1 of the Type B water licence will be provided to GNWT-INF by the EM within 10 calendar days of the month being reported.

Stockpiles for each deposition day will not be mixed until sampling results have confirmed that mixing can occur, as described in the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a).

4.1.2 Berms

Before any dredged material is stockpiled, earthen berms will be constructed up to 1 m high around the storage sites to prevent the migration of sediment and sediment-laden water off site. Berms will be sufficiently compacted by the contractor to mitigate the potential for seepage, and daily inspections of the berms by the EM included in the daily reports. Erosion of the berms or seepage noted by the EM or other project personnel shall be managed at the earliest available opportunity.

4.1.3 Sumps

In addition to positive drainage grading (see Section 2.3), sumps will be constructed to capture potential excess water within the bermed temporary storage sites to settle the water (i.e., from passive dewatering of the stockpile and precipitation accumulation). Sumps will be identified for each temporary stockpile location per the SNP as outlined in Schedule 1 of the Type B water licence. Where sump excavation of more 0.5 m is approved by GNWT-INF, sumps may be required (per GNWT-INF) to be lined with an impermeable geomembrane (or an approved equivalent). The sump at each temporary stockpile location must be appropriate for positive drainage and physically demarcated (i.e., by signage), and the location coordinates of the SNP station provided to GNWT-INF. When sediment has collected to one-third of the sump capacity, it will be removed and returned to the same stockpile location it came from. Additional sumps may be required at each stockpile location depending on water accumulation, and will be added to the SNP as required.

The water quality of excess water that accumulates on site and/or in sumps (if present) will be monitored on a weekly basis, evaluating for various parameters, including TSS, per the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a). The resulting water quality data provide (1) information regarding the quality of the water that is returned to source via infiltration and (2) information to better understand options for discharge as they pertain to the quality of the excess water. Additional information regarding the parameters of interest and the response framework related to the excess water from sumps can be found in the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a).

4.1.4 Silt Fencing

Silt fencing allows surface water to pond so that sediment particles can settle. Silt fences should be used as a secondary sediment control measure downslope of bermed storage sites, where necessary. At the discretion of the

EM, silt fences may also be installed along access routes between the barge offloading location and the storage sites where sedimentation is a concern, especially areas directly adjacent to streams, drainage courses, or riparian areas. Silt fencing is to be maintained throughout the project until the EM deems it no longer necessary.

4.1.5 Active Management

If excessive water is found to be collecting in any temporary storage site and results in sumps reaching capacity or the risk of release off site, from either precipitation events and/or slow infiltration, adaptive management measures will be enacted by the contractor under the guidance of the EM. This may include but not limited to:

- A temporary slow-down of new dredged material being brought to the site and/or increase of residence time of the dredged material on the barge before it is brought onto land;
- Verification of engineered filter media performance on barges and enact maintenance or replacement protocols, as described in this Plan or as directed by GNWT-INF;
- Redirection of new soil to alternative temporary storage sites and/or use of multiple temporary storage sites concurrently;
- Collection of water into on-site tanks, with potential removal by truck and/or pump-off;
- Addition of more sumps, excavated sumps and/or lined sumps at each temporary storage site location;
- Pump-off off site to a well-vegetated area, with appropriate sediment and erosion control (SEC) measures in place. Note that pump-offs may occur only with GNWT-INF approval and in coordination with the water licence inspector, after the submission and approval of a specific pump-off plan. The plan must include detailed water quality and quantity (i.e., volume) considerations and measurements, specific proposed SEC measures and on-site guidance, and monitoring (including documentation) by an environmental professional. Direct re-entry to a watercourse will be avoided.

4.2 Wind Erosion and Dust Control

Wind erosion occurs in areas that are not adequately protected from high-velocity winds that blow across the land. It can be minimized by forming a new less-erodible surface. Dust is commonly generated by sweeping and maintenance operations on paved surfaces and is generated from vehicle traffic or wind on construction sites. The following methods are used to reduce wind erosion and to control dust:

- Covering stockpiles with wind-impervious fabrics or materials;
- Covering haul trucks and driving at low speeds to minimize fugitive dust;
- Spraying water as necessary on transport routes to compact and weigh down the soil particles and reduce dust generation; and
- Restricting vehicular traffic entering and leaving the site to reduce sediment transport and mobilization to roadways.

4.3 Transport Management

4.3.1 Access Roads

The contractor will select a dedicated transport route between the barge offloading site and the storage sites. At the discretion of the EM, silt fences may also be installed along access routes between the barge offloading location and the storage sites where sedimentation is a concern, especially in areas directly adjacent to streams, drainage courses, or riparian areas (Section 4.1.4). This measure may not be necessary if using sealed haul trucks that will not leak sediment-laden water during transport.

Before transporting the dredged material, trucks and equipment should be inspected for mud and debris and cleaned in designated areas only. The entrance to the storage sites may require stabilized worksite entrances per best management practice #26 (GNWT 2013) as an adaptive management strategy if transport routes begin to accumulate material from transportation operations. Trucks should be instructed to always remain on designated transport routes.

4.3.2 Truck and Equipment Washing

To prevent contamination of soil, haul trucks and equipment should be washed and maintained at designated areas that have no direct contact with natural or constructed stormwater conveyance infrastructure. Designated wash areas should be equipped with a containment pad before the water is discharged, or disposed of at an approved waste facility if potentially contaminated.

5 SPRING FRESHET MANAGEMENT

Precipitation, freeze-thaw events, and rapid snowmelt during spring freshet may increase the risk of erosion and potential sediment release off site from the temporary storage sites. The perimeter berms may be prone to failure if they are excessively saturated, and sediment-laden water may migrate through the stockpile entrances. Monitoring and mitigation measures will focus on minimizing the amount of water inside the temporary storage sites and adaptive management as required. Temporary storage sites 2, 3, 4, and 5 did not receive dredged material but were cleared and had perimeter berms built in 2023 (Table 5-1). Vegetation removal can impact infiltration capability, and the runoff from snowmelt may cause erosion and sediment to leave the area. While temporary storage sites 1 is the main focus of spring freshet (i.e., contains stockpiled sediment from 2023 operations), temporary storage sites 2 to 5 will also be checked on a regular basis.

Mitigation measures for temporary storage sites 1 to 5 include but are not limited to:

- Weekly formal SEC inspection (and supporting photographs) of temporary storage sites (per the Type B water licence) during non-frozen months;
- Potential snow removal in winter to reduce potential freshet volume; and
- Active management during spring freshet.

5.1 Temporary Storage Sites

The status of the temporary storage sites following the 2023 dredging season (as per December 2023) is provided in Table 5-1.

Storage Site Number	Contains Dredged Sediment	Sump Present	Ground Cleared and Berm Constructed ¹
1	Yes	Yes ²	Yes
2	No	No	Yes
3	No	No	Yes
4	No	No	Yes

Table 5-1	Status of	Temporary	Storage	Sites

Storage Site Number	Contains Dredged Sediment	Sump Present	Ground Cleared and Berm Constructed ¹
5	No	No	Yes
6	No	No	No
7	No	No	No
8	No	No	No
9	No	No	No
10	No	No	No

¹ The contractor is responsible for preparation of temporary storage sites prior to use (Section 2.3) for 2024 dredging operations. ² This location is a non-excavated depression.

5.2 Spring Freshet 2024

After dredging operations were complete in October 2023 (late in the season due to wildfire evacuations), approximately 5,600 m³ of stockpiled material was stored at temporary storage site 1 and approximately 150–200 m³ of water remained pooled on site. The water was observed frozen in late October 2023 with limited erosion risk.

Regular inspections will occur during frozen conditions (winter 2023–24) to evaluate site condition changes and potential erosion risk. Depending on snow accumulation in winter 2023–24 at temporary storage site 1, snow removal may occur to other GNWT-owned properties (including but not limited to temporary storage sites 2 to 10). From April 1, 2024, to June 1, 2024 (anticipated spring freshet), weekly site inspections will occur to monitor spring freshet and water accumulation levels on site. The action level response framework (Table 2-1) will be followed, and active management may include:

- Addition of more sumps, excavated sumps, and/or lined sumps at each stockpile storage location;
- Collection of water into on-site tanks, with potential removal by truck and/or pump-off;
- Pump-off off site to well vegetated area with appropriate SEC measures in place. Water sampling may occur before pump-offs if contamination is suspected (e.g., foul odours, visible sheen, presence of foam, etc.). Pump-offs will be under the on-site guidance of an environmental professional and be documented for project records. Note that pump-offs may occur only with GNWT-INF approval in coordination with a Water Licence inspector after a specific pump-off plan is submitted and approved. Direct re-entry to a watercourse will be avoided.

After June 1, 2024, it is anticipated that limited standing water will be present on the temporary storage sites, in time for when 2024 dredging operations begin.

5.3 Spring Freshet 2025

Active water management will occur during dredging operations and will include accumulated water removal (from dewatering and precipitation) and pump down of any sumps, per the Hay River Harbour Restoration – Monitoring Plan (Associated 2023a). Within 1 week of when dredging is complete (anticipated September 14, 2024), the contractor and GNWT-INF representatives will conduct a site walk-through. The purpose of the walk-through is:

- To assess the current site condition;
- To review SEC measures installed and additional SEC measures that may be required; and

• Ensuring limited to no standing water is on site before freeze-up.

Contingency planning for unexpected site conditions will entail active management, as described in Section 5.2.

6 SITE RESTORATION

When the project is complete, areas on the site that are appropriate for reclamation or restoration (pending proposed future land use) will be reclaimed or restored to equivalent land capability. Areas disturbed by the dredging activities may be revegetated with native trees and shrubs, and/or reseeded with a local certified weed-free seed mix.

Storage sites from which dried dredged material (now soil) is removed and reused elsewhere will be recontoured to match the pre-disturbance topography and will be revegetated. Otherwise, the stockpiles of dried soil may be planted with a local native seed mix or similar stabilizing material to prevent silt and sand from being mobilized during storm or strong wind events.

Government of Northwest Territories Department of Infrastructure

CLOSURE

This report was originally prepared for the Government of Northwest Territories – Department of Infrastructure to guide sediment and erosion control during the emergency works of dredging the Hay River at Great Slave Lake and the Hay River Harbour. This report is provided as an annual review and update in winter 2023 to reflect changes in operations, contact information, or other details.

The services provided by Associated Environmental Consultants Inc. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

Associated Environmental Consultants Inc.

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Aindroom

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Mackenzie Valley Land and Water Board (MVLWB). 2021. Standard Outline for Management Plans.

Mackenzie Valley Resource Management Act, SC 1998, c. 25.

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APPENDIX A – SAMPLE INSPECTION REPORT

Associated Environmental	Project Number: Client Name: DATE (dd/mm/yyyy):					
EROSION AND	SE	DIMENT CONTROL C	HECK	LIST		
Contractor Title:		Location:				
Contractor Name:		SITE STAFF:				
TIME ON SITE:		INSPECTED BY:				
CURRENT WEATHER CONDITIONS:		FORECAST:				
PREVIOUS 24hr WEATHER CONDITIONS: TOTAL RAINFALL (mm) – PREVIOUS 24hr:		LAST 7 DAYS:		STAT	ION:	
REPORT OF ONSITE CONSTRUCTION ACTIVITIES:						
SITE SUPERVISOR(S) MET WITH DURING SITE	EV	ISIT:				
SITE ACCESS/OFFSITE SEDIMENT TRANSPOR	RT		YES	NO	N/A	COMMENT
Are the designated construction site access poin	nts	in use and stable?				
Are the designated parking areas established, in	use	e, and stable?				
Are the measures in place to reduce offsite trans	spc	ort of sediment?				
Are the access roads free of sediment and being	g ma	aintained?				
Are additional ESC measures required to contain	n th	ne offsite transport				
of sediment to public roads?						
Have the previously recommended SEC measure	es l	been implement?				
Has the contractor modified the existing SEC me	eas	ures since last				
inspection?						
Are the SEC modifications installed and function	ning	g as intended?				
Additional SEC measures required at site access	s po	oints (street sweeping,	, whee	l wash	etc.):	
EROSION CONTROL			YES	NO	N/A	COMMENT
Are inactive soil stockpiles covered or otherwise	e pr	rotection?				
Are erosion control measures functioning as inte	end	led?				
Are additional erosion control measures required for the soil stockpile?						
Are swales or other water conveyance measures in place to direct						
stormwater runoff?						
Are swales or other water conveyance measures construction as per						
SECP specifications?						
Are swales or other water conveyance measures	s fu	inctioning as				
Are additional water conveyance measures requi	iire	d?		<u> </u>		

Has the contractor modified the existing erosion control measures				
since the previous inspection?				
Are the erosion control modifications installed and functioning as				
intended?				
Have previously recommended erosion control or water conveyance				
modifications been implemented since the previous inspection?				
Recommendations for additional erosion control measures:				
Sediment Control	YES	NO	N/A	COMMENT
a). Sediment Stockpiles				
Are the sediment control measures in place to contain sediment				
mobilization from soil stockpiles?				
Are sediment control measures installed according to the SECP and				
functioning as intended?				
Are additional sediment control measures required around inactive				
sediment stockpiles?				
b). Water Conveyance				
Do swales or other water conveyance measures include sediment				
control features as per the SECP?				
Are the sediment control features constructed as per SECP				
specifications and functioning as intended?				
Are additional sediment control features required and/or are				
modifications required to existing features?				
c). Perimeter Controls		1	1	Γ
Are the required perimeter sediment control measures in place?				
Are the perimeter sediment controls installed as per the ESCP and				
functioning as intended?				
Are additional perimeter controls required and/or are modifications				
required to existing features?				
d). Sediment Basins and or Settling Ponds				1
Are the required sediment basins or infiltration trenches installed				
according to the SECP specifications?				
Are the required sediment basins or infiltration trenches functioning as				
intended?				
Are additional sediment basins required or are modifications required				
to existing features?				
e). Catch Basin Inlet Protection				
Are the catch basin inlet barriers in place to protect on or offsite storm				
drains?				

Are the catch basin inlet barriers installed as per SECP and/or manufacturers specifications?			
Are the catch basin inlet barriers functioning as intended?			
Are additional or alternative catch basin inlet protection measures required?			
Have the recommended sediment control modifications been implemented since the last inspection?			
Has the contractor modified the existing sediment control measures since last inspection?			
Are the sediment control modifications installed and functioning as intended?			
Describe any recommendations for additional sediment control measu	ıres		

GENERAL SITE CONDITIONS	YES	NO	N/A	COMMENTS
Are litter barrels available onsite and is construction waste being sorted				
for recycling?				
Are designated areas for concrete wash out, available, and being used?				
Is there evidence of oil or other fluid leaks from vehicle and or heavy				
equipment?				
Are designated fuelling areas available for heavy equipment and are				
they being used?				
Are emergency spill kits available in designated areas?				
Leaks or spills?				

Government of Gouvernement des Northwest Territories Territoires du Nord-Ouest

Kathy Racher Executive Director Mackenzie Valley Land and Water Board PO Box 2130 Yellowknife, NT X1A 2P6

Dear Ms. Racher:

Submission of Updated Management Plans for the Hay River Harbour Restoration Type B Water Licence MV2023L8-0005

Despite an unprecedented summer, the Hay River Harbour Restoration project proceeded and was able to successfully dredge a portion of the navigable channel. However, due to the evacuation of Hay River and extremely low water levels, the full scope was not completed, and the project will be carried over to Summer 2024. Therefore, as required by Part B, Condition 9 of the Mackenzie Valley Land and Water Boards (MVLWB) issuance of the Water Licence (WL) and Reasons for Decision for the Hay River Harbour Restoration, the Government of the Northwest Territories Department of Infrastructure (GNWT-INF) is submitting updated management plans to reflect the 2024 open water season, as follows:

- Version 2.0 of the Monitoring Plan
- Version 2.0 of the Sediment and Erosion Control Plan
- Version 2.0 of the Spill Contingency Plan
- Version 2.0 of the Waste Management Plan
- Version 2.0 of the Engagement Plan

The plans were revised based on execution of the summer 2023 program and reflect efficiencies and lessons learned. These efficiencies focus primarily on strengthening dewatering techniques on the barges and in the stockpile sites, strengthening dredgeate management approaches, and increasing adaptability for monitoring and water management. The appended conformance table illustrates the specific updates incorporated into each of the management plans.

Further updates to the program are being pursued for the 2024 dredging season to improve productivity. These are activities that are authorized by other federal bodies and are outside the purview of the Mackenzie Valley Land and Water Board; however, aspects of the activities are captured in the management plans. These authorizations are being pursued in parallel to the WL Management Plan updates and include:

- Extension to the DFO fish timing window
 - The Letter of Advice (LOA) issued by the Department of Fisheries and Oceans (DFO) for the 2023 project year includes an allowable on-water working window of July 16 to September 14, to be protective of fish.
 - GNWT-INF has heard from local knowledge holders, through our recent stakeholder engagement activities, that fish movement in the project area is not a concern once



the ice has melted. It has been suggested by multiple parties that the on-water work should begin earlier in the season.

- Initial dialogue with DFO indicates that an extension to the fish timing window to begin earlier in the season is reasonable.
- GNWT-INF will be submitting a revision of our LOA to DFO seeking an operating window of June 3 to September 14, 2024, which will include continued prioritization of dredging areas. Specifically, on-water work in the Plug will strive to be completed by end of August 2024, while work in the Fingers and inner channel would continue to September 14, 2024.
- o The WL's updated management plans reflect this revised fish timing window.
- Off-shore refueling:
 - The project is seeking to incorporate fuel storage and dispensing onboard the spud barges as a measure to eliminate the daily transit of the spud barges to shore for equipment refueling and return to position in the channel. Refueling on the spud barge will reduce the daily transit time to and from the dredging site, reducing vessel traffic in the harbour and increasing project productivity.
 - o These fuel-related marine activities are authorized by Transport Canada.
 - o Specifically, GNWT-INF is presently seeking authorization from the Marine Transportation Review Board, which will capture both storage and dispensing equipment requirements, in addition to health, safety and environmental protocols.
 - Protocols associated with spills prevention, response and management for the proposed off-shore refueling activities are mirrored in the WL's updated Spill Contingency Plan.

GNWT-INF will be submitting the 2023 annual Water License report, to satisfy requirements outlined in Schedule 2 of MV2023L8-0005, separately from this Updated Management Plan submission.

Should you have any questions or concerns please contact Aileen Stevens, Senior Technical Officer, at (867) 767-9048 ext. 32066 or by email at Aileen_Stevens@gov.nt.ca at your earliest convenience.

Sincerely,

Mark Cronk Director, Design and Technical Services Department of Infrastructure



Government of Gouvernement des Northwest Territories Territoires du Nord-Ouest

Attached:

- Conformance table
- Version 2.0 of the Hay River Harbour Restoration Monitoring Plan •
- Version 2.0 of the Sediment and Erosion Control Plan
- Version 2.0 of the Spill Contingency Plan
- Version 2.0 of the Waste Management Plan
- Version 2.0 of the Engagement Plan

Conformance Table

Plan Title	Revisions
Monitoring Plan Version 2.0	Section 1.0 Introduction - revisions to update the project completion to date, and assumptions (Section 1.4) about the following: - earlier start to DFO window - adaptive management for TSS monitoring and mitigation, and water management at the stockpile properties
	Section 2.3 Historical Water and Sediment Quality - revisions to include 2023 dredgeate sampling results
	Section 3.1.1 Monitoring Locations - revisions to TSS monitoring locations (Dredge Area A) based on 2023 data and observations
	Section 3.1.2 Frequency and Parameters - revisions to the TSS monitoring to require daily reporting from the environmental
	monitor (instead of weekly) and clarified the reporting requirements Section 3.2 Water Quality Monitoring for Dewatering Activities on Vale Island - revisions to include additional guidance on
	dredgeate saturation management, drainage and grading of the stockpile properties, protection of monitoring wells, and daily
	monitoring of water accumulation and erosion risk Section 3.3 Monitoring for Dewatered Dredged Material - revisions to include additional guidance on the sampling by placement
	and georeferencing. This applies to Sections 3.3.1 and 3.3.2
	and high action level response
	Section 4.2 Water Quality Monitoring for Dewatering Activities on Vale Island - revisions to include requirements for sump monitoring and the Surveillance Network Program, and additional guidance related to accumulated water management
	Section 4.3 Stockpile Monitoring - revisions to include guidance on demarcating stockpiles and sampling frequency Section 5 Contingencies - revisions to include requirements for additional turbidity monitoring equipment to be onsite in a ready to deploy condition
Sediment and Erosion Control Plan Version 2.0	Section 1.0 Introduction - revisions to update the project completion to date and updates on the following:
	- earlier start to brown to window - adaptive management for TSS monitoring and mitigation, and water management at the stockpile properties Cestion 2.0 Congress Sediment and Erector Control Management are reviside additional avidence on construction sequencing
	and stockpile storage site management, and contractor responsibilities for SEC measures such as drainage preparation, sump
	installation, silt fence installation, site inspections, protection of monitoring wells and maintenance/replacement of filter media
	Section 2.5 - Inspections and Monitoring - revisions to include inspections of filter media and reference to SEC installation
	Section 2.7 - Materials - revisions include additions of materials onsite for emergency response and proper storage of materials
	Section 3 Sediment and Erosion Control Measures on Water - revisions to include adaptive management of dredging window and TSS mitigation, monitoring and maintenance of filter media on the barge (new Section 3.1.1 Engineered Filter Media Filtration)
	Section 4 Sediment and Erosion Control Management on Land - revised to include sediment and erosion control plans for each stockpile storage location in the CEMP, and guidance on required regular inspections. In addition: - new Section 4.1.1 Stockpiles - additional guidance on moisture content, dewatering and admixing of dredgeate - revisions to Section 4.1.2 and 4.1.3 about berm construction and inspection, dewatering and sump management, including the Surveillance Network Program sump data submission requirements - revision to 4.3.1 Access Road - addition of adaptive management option (stabilized worksite entrance) - new Section 4.1.5 about Active Management of potential excessive water that may collect in any of the stockpile sites New Section 5 Spring Freshet Management - added this section to provide guidance for additional mitigation measures that may be required at the storage areas for Spring Freshet 2024 and 2025
Spill Contingency Plan Version 2.0	Section 1.0 Introduction - revisions to update the project completion to date and updates on the following:
	 earlier start to DFO window Section 1.5 Health Safety and Environmental Policy - revisions include additional guidance on spill training, and additional health and safety requirement and notification if floating equipment is located overnight or in the waterway Sections 1.8 Site Description and 1.9 Type, Amount, and Location of Main Hazardous Materials, and addition of Section 1.9.1 for Fuel and contingencies for refueling activities. Table 1-1 is new that provides details on refueling options. Note that refueling on water will only be allowable contingent on Transport Canada Authorization.
	Section 2.0 Response Organization - revisions to include spill response training and additional guidance on initial spill response responsibility, details on storage of spill response equipment, and listing of additional supplies, and updated contact information
	Section 3.0 Spill Prevention - revisions to include use of a vegetable-based biodegradable hydraulic fluids in the excavator, formal inspections of contractor supplied boats, and storage tanks, requirement for a daily tailgate meeting with the environmental monitor
	Section 4.0 - Spill Response Action Plan - revisions to include requirement of a detailed incident response in the contractors CEMP, and details to be included in a spill incident report - new sections on 4.2.1 immediately reportable spills and 4.2.2 minor spills - new section 4.6 Worst Case Scenario to document guidance if there was a large aquatic spill or release into the river or lake
Waste Management Plan Version 2.0	Section 1.0 Introduction - revisions to update the project completion to date and note potential earlier start to DFO window
	Section 3.0 Methods of Waste Management - revisions to include required documentation of waste records by the contractor,
Engagement Plan	guidance on the engineered filter media on the barges and protection of monitoring wells Revisions to Table 9.2 Engagement Triggers During Construction. Added affected parties to the list of recipients if a spill were to
Version 2.0	occur.