



CITY OF IQALUIT

Erosion and Sediment Control Plan

Landfill and Waste Transfer Station

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1.0

Introduction

The City of Iqaluit (City) retained Dillon Consulting Limited (Dillon) to develop an Erosion and Sediment Control (ESC) Plan as a component of the Landfill and Waste Transfer Station Project (the Project). The Project involves the construction and subsequent operation of two new waste management facilities to serve municipal solid waste generators within the City; a Waste Transfer Station (WTS) and a Landfill. The construction component of the Project is scheduled to commence in 2020 with completion and facility commissioning in 2022. The two facilities are being developed with an anticipated 75 year operational life.

Consistent with the Nunavut geological context, it is acknowledged that site surficial soils and selected construction materials for the Project are primarily sands and gravels; thus, the potential for significant issues associated with sediment-laden runoff is limited. As a result, measures relevant to the soil conditions in Nunavut (versus locations with fine grained surficial soils) are highlighted in this document.

1.1

Purpose and Goal

Within the context of overlying EMP and EPP documents for the Project, the purpose of this ESC Plan is to provide recommendations for erosion and sediment control measures to be implemented by the City of Iqaluit during both the construction and operations/closure/post-closure phases of the Project.

The goal of the ESC Plan (a supporting component of both the construction and operations/closure/post-closure EPPs) is to reduce the risk of sediment (from wind and water erosion) being transported off-site or into nearby water bodies, including the Sylvia Grinnell River.

1.2

Limitations

In recognition of the uncertainties related to soil types, water movement or weather that may be encountered during construction and operations/closure/post-closure activities, the Erosion and Sediment Control (ESC) Plan may change based on the observations of:

Construction Phase

- Construction Manager or Environmental Inspector (EI) and in consultation with the Project Environmental Lead.

Operations, Closure and Post-Closure Phase

- The City's Facility Manager in consultation with the Manager of Solid Waste and the Director of Public Works.

2.0

Project Components

Figure 2-1 identifies the location of the two Project areas. The WTS and Landfill sites are shown in greater detail in **Figures 2-2** and **2-3** and are described in the following subsections.

2.1

Transfer Station

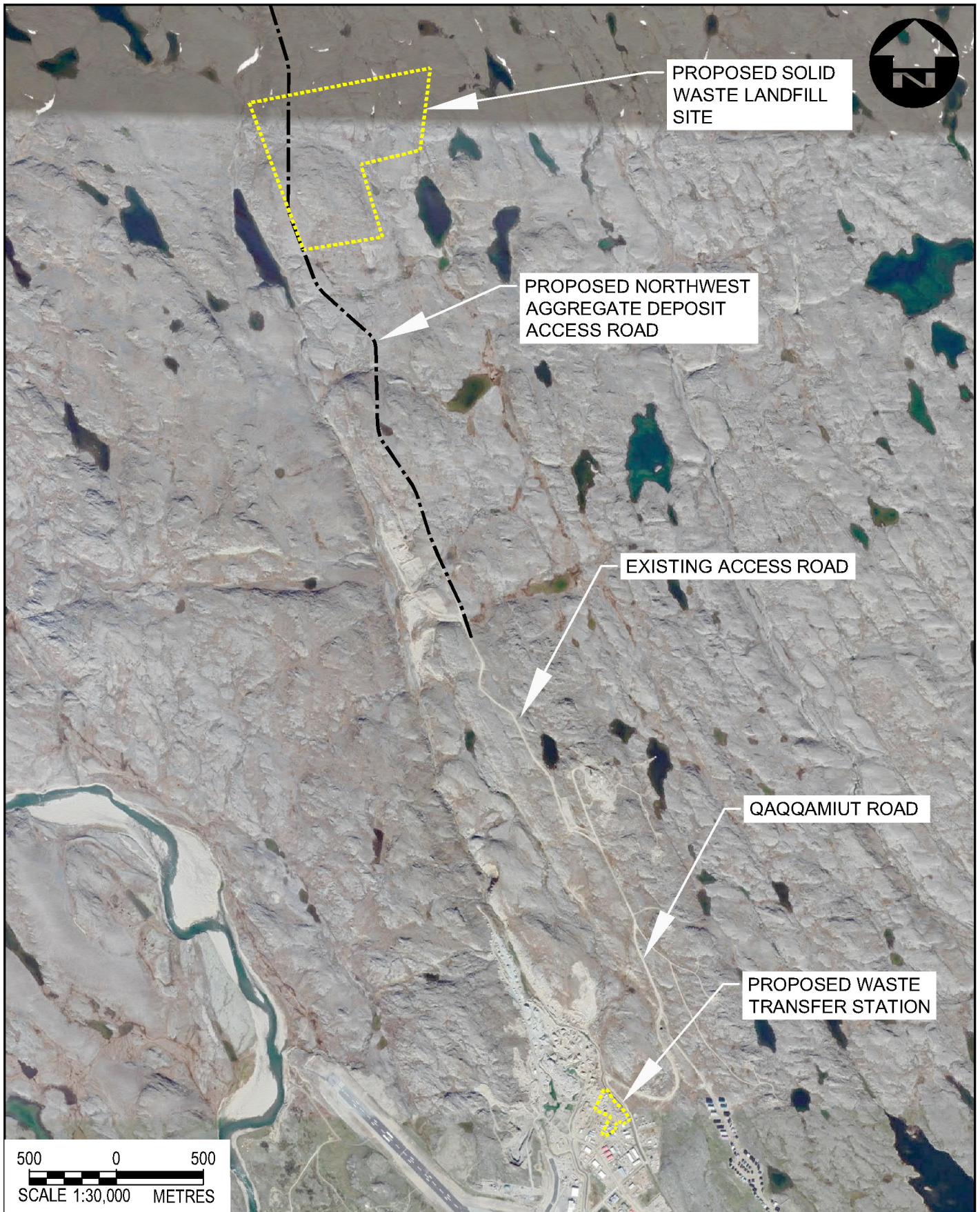
The WTS is located at the end of Kakivak Court in Iqaluit. The site occupies an area of approximately 2.4 ha and includes a fenced yard, transfer station, scale house, site office and exterior storage areas.

2.2

Landfill

The Landfill site is located approximately six kilometres northwest of the Iqaluit and occupies an approximate area of 22 ha. The landfill is comprised of site access roads, 12 lined waste disposal cells (developed in sequence), leachate collection and treatment infrastructure as well as an Attendant's Trailer.

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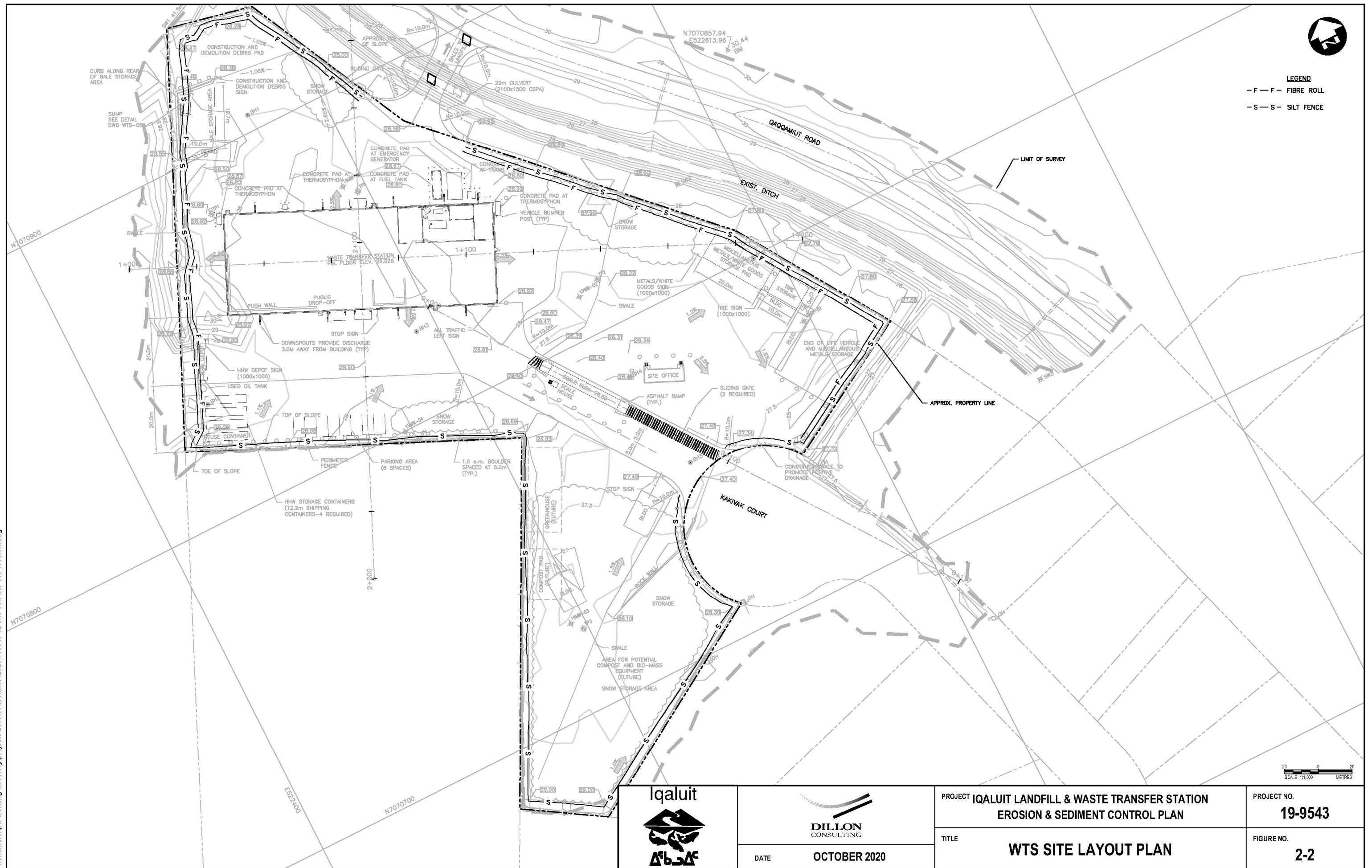
PROJECT
**IQALUIT LANDFILL & WASTE TRANSFER STATION
EROSION & SEDIMENT CONTROL PLAN**

PROJECT NO.
19-9543

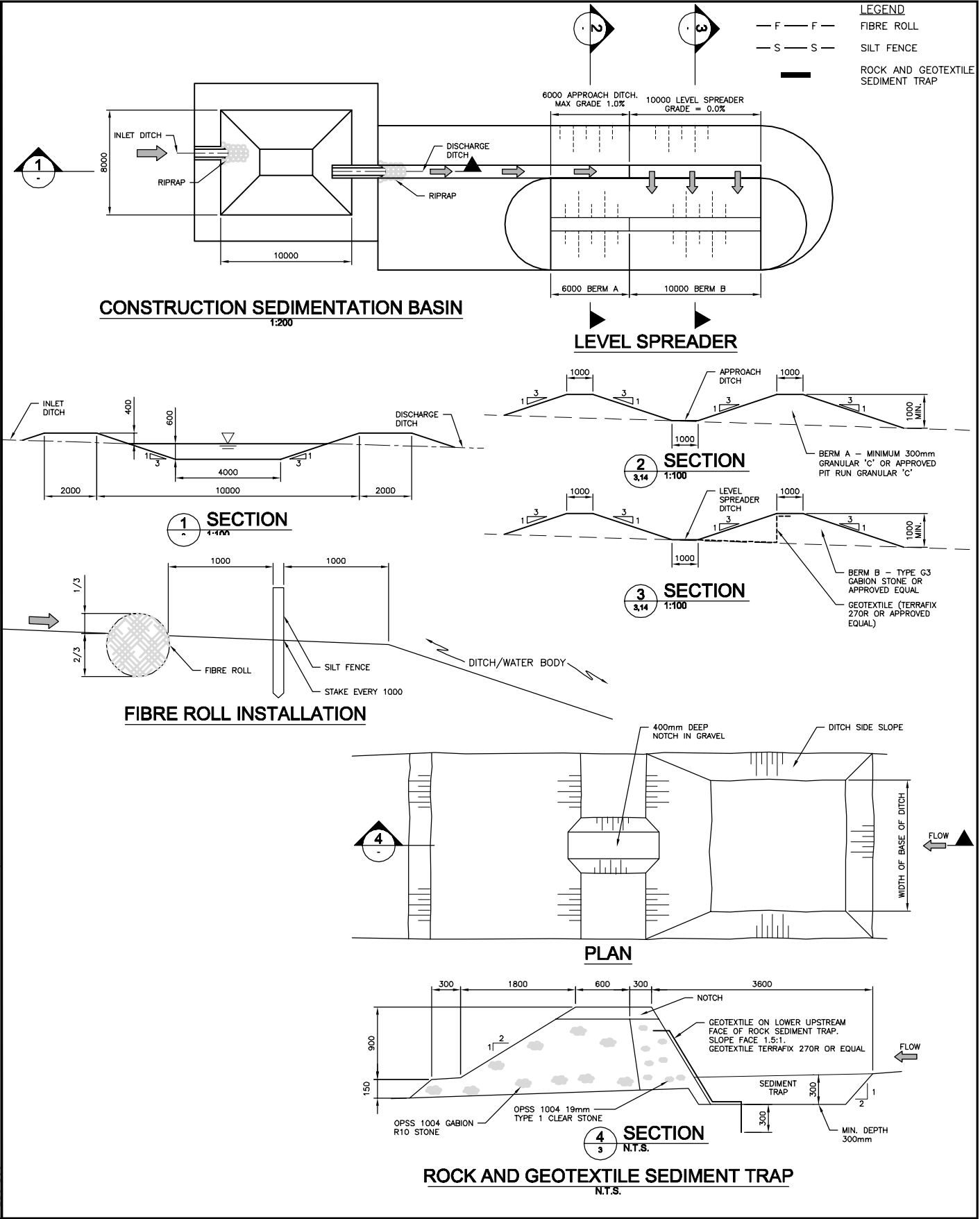
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TITLE
SITE LOCATIONS

FIGURE NO.
2-1



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 Iqaluit	 DILLON CONSULTING	PROJECT IQALUIT LANDFILL & WASTE TRANSFER STATION EROSION & SEDIMENT CONTROL PLAN	PROJECT NO. 19-9543
		TITLE LANDFILL LAYOUT PLAN	FIGURE NO. 2-3

Areas Susceptible to Erosion and Sedimentation

Areas susceptible to erosion expected throughout the Project area consist of slopes within and along site boundaries, areas stripped of vegetation, banks of water bodies, drainage swales and areas which require ground disturbance beyond basic grading (e.g., excavations) and constructed berms. Specific areas in which extra caution and care are required to minimize the potential for erosion are outlined below.

Waste Transfer Station

- Areas adjacent to the drainage ditch between the eastern property boundary and Qaqqamiut Road.

Landfill

- Existing streams, drainage swales and shallow ponds (flowing north to south), with discharge to Carney Creek.
- Constructed berms for the landfill and leachate treatment infrastructure.
- Capped surfaces of completed portions of the landfill.

Mitigation measures and guidelines described in the sections below are intended to address these areas with a greater risk of erosion and sedimentation.

4.0

Site Specific Mitigation Measures

4.1

Erosion and Sediment Control Best Management Practices

As detailed in their respective EPPs, a range of best management practices (BMPs) can be implemented to minimize erosion and the mobilization of sediments during both Construction and Operations, Closure and Post-Closure Phases. The use of adequate erosion and sediment control measures will prevent or reduce the potential of sediment transport both on- and off-site. The key to controlling potential erosion and sedimentation caused by site activities is to stabilize surfaces and control site runoff of surface waters. A wide variety of sediment control devices can be used on site with a selection of options being described in this section.

An additional reference for potential use to mitigate erosion impacts associated with the Iqaluit solid waste management project is *Government of the Northwest Territories Department of Transportation – Erosion and Sediment Control Manual* (January 2013). This manual provides guidelines for analysis, design, construction, and maintenance of erosion and sediment control systems for transportation construction projects in the Northwest Territories (NWT), but can be selectively applied (acknowledging the “Arctic Lowland” soils context of the project site) to construction and related activities in Nunavut. Notably, the manual includes Best Management Practice (BMP) summary sheets, incorporating concise descriptions of construction and maintenance requirements as well as installation details.

4.2

Erosion and Sediment Control Feature Installation Locations – Construction Phase

Recommended locations for specific erosion and sediment control features to be established during the initial Construction Phase to establish the Landfill and WTS are presented on two sheets included on the original project tendering package; LF-C03 and WTS-C03. Potentially, at the discretion of the City and depending on observed site conditions, a selection of these management feature locations could be maintained going forward into the Operations Phase. Further, depending on future site conditions and the details of required decommissioning activities, erosion and sediment control practices presented in this document could be incorporated into Closure and Post-Closure activities.

4.3

Surface Water Mitigation Measures and Best Management Practices

To prevent impacts to surface water resources at both the Landfill and WTS sites during the Project activities, the following BMPs should be implemented:

- Should there be overlap between site waterbodies and proposed work or access areas, retain existing riparian habitat along the waterbody where possible;
- Implement proven surface water management procedures at areas deemed susceptible to erosion, including:
 - Conduct sediment monitoring in relation to any project disturbances in or near water (e.g. in-stream construction).

- Conduct TSS/turbidity monitoring routinely during in-stream works, per thresholds outlined in Canadian Water Quality Guidelines for the Protection of Aquatic Life and the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life.
- Controlled collection/direction of surface runoff.
- Minimization of exposed areas.
- Project activity timing (e.g., avoidance of storm events).
- Application of surficial stabilization measures.
- Surface roughening.
- Granular material stockpile control (e.g., limiting extend/number and maintain setback distance from sensitive receptors).
- Implement dust control measures to reduce the potential for dust accumulation in and around surface waters. The Project Authority (consistent with the applicable EPP as well as the Facility Operations and Maintenance Manual) should recommend the implementation of dust control measures, should it be observed that dry conditions are resulting in the airborne mobilization of fine soil particles.

The recommended BMPs that are to be employed as part of this ESC Plan include those that will be used to control surface flows from rain events and/or snowmelt which have the potential to result in erosion and ultimately sediment transport. A combination of BMPs, structural or procedural, will be implemented at each of the sites to provide the necessary level of erosion and sediment control.

Design considerations, guidelines, and procedures for the installation or implementation of BMPs are summarized below. For ease of reference, the recommended BMPs are separated into erosion control and sediment control measures.

4.4 Erosion Control Practices

Erosion prevention (source control) is essential and is the most effective method in protecting downstream/receiving aquatic habitat during the construction and operational activities. Erosion control typically includes two categories of action:

- Source Control practices.
 - Protection of exposed surfaces using cover materials
- Runoff Control practices.
 - Modification of slope surfaces
 - Reduction of slope gradients
 - Control of flow velocity
 - Flow diversion
 - Upstream runoff storage

4.4.1 Source Control Practices

Riprap Armouring

- Typical for channel lining with a geotextile underlay.
- Effective for high velocities and flows.

Rolled Erosion Control Products (RECP)

- Provides a protective covering over bare surfaces.
- Not suitable for rocky surfaces.

4.4.2 Runoff Control

Slope Texturing*

- Contouring/roughening of slope using tracked equipment.
- Reduces runoff velocity and increases infiltration.

**: generally not suitable for permafrost areas.*

Offtake Ditch

- Collects and diverts sheet flow at the top of a slope to mitigated downslope erosion.

Energy Dissipater

- Reduces runoff velocity and dissipates flow energy allowing the collection of sediment.

Slope Drains

- Direct runoff into a pipe or lined channel.

Gabions

- Durable, suitable for resisting high flow velocities.

Rock Check Dams

- Permanent flow drop structure providing a degree sediment filtering.

Synthetic Permeable Barriers

- Reusable barriers that reduce flow velocities and provide a degree sediment filtering.

Fibre Rolls

- Effective in sheet flow conditions to reduce flow velocities.

4.5 Sediment Control Measures

Sediment control measures reduce off-site sedimentation by promoting the release of suspended soil particles from runoff before discharge from the construction or operational area. Sediment control typically includes two categories of action:

- Filter and Entrapment Practices.*
 - Filtering through a porous media
 - Entrapment using silt fences or coarse-material check dams
- Impoundment Practices.*
 - Sediment basins or traps
 - Temporary impoundment barriers

**: Permanent basins and traps should be avoided in areas of permafrost as ponding of water will contribute to increased rates of permafrost melt or degradation.*

4.5.1 Filter and Entrapment

Fibre Rolls

- Good performance in freeze/thaw conditions.

Silt Bags

- Typically applicable in emergencies only.

Silt Fence

- Effective in settling out coarse grained sediments.

Berm Interceptor

- Basic construction requirements.

Gabions

- Durable, suitable for resisting high flow velocities.

Rock Check Dam

- Permanent flow drop structure providing a degree sediment filtering.

Synthetic Permeable Barriers

- Reusable barriers that reduce flow velocities and provide a degree sediment filtering.

4.5.2 Impoundment

Sediment Traps/Basins

- Can be constructed from a range of materials, typically requires a large construction area and significant maintenance requirements.

5.0

Monitoring

Monitoring of erosion and sediment controls at work sites will be conducted once every two days during construction and clean-up to ensure controls are effective and are maintained in working order. It is anticipated that monitoring efforts will be increased to daily during periods of precipitation and that ESC measures will be repaired in a timely manner as needed to ensure the proper function of controls. Failed erosion and sediment control measures will be repaired as soon as possible. Erosion and sediment control measures are not static and may need to be upgraded and/or amended as site conditions change, as directed by the Construction Manager upon the recommendation of the EI.

Erosion and sediment controls left in place following the completion of construction and clean-up activities will be monitored via landfill staff conducted every two weeks. Failed erosion and sediment control measures will be repaired as soon as possible.