



**TALTSON HYDRO - CONSTRUCTION OF REPLACEMENT FACILITIES AND  
OVERHAUL**

**EROSION AND SEDIMENT CONTROL PLAN**

**LAND USE PERMIT MV2020X0004**

**TALTSON HYDROELECTRIC FACILITY  
TALTSON RIVER, NORTHWEST TERRITORIES**

**APRIL 2022**

DOCUMENT HISTORY				
Version #	Revised Sections	Description of Revision	Prepared by	Issue Date
0	All	Initial Publication of Report	NTPC	March 2021
1	Sections 2, 6.5, and 6.6 Added Sections 6.1, 6.4, and 6.8	Additional information added as required by initial MVLWB conformity review. Addition of new sections for Erosion and Sediment Potential and Management, Water Management and Emergency Response Framework and Contingency Planning as per additional MVLWB conformity review. Revisions to the Sediment Control Inspection and Monitoring section	NTPC	April 2021
2	All	Revisions to Document History table, Table of Contents, page numbering, updates to all sections to include removal of permanent water intake installation, addition of Rock Filter Berm, updates to include daily monitoring for moderate to high-risk areas, and references to Appendix B updates to include drawing names. Appendix B drawing attachments updated to remove internal CAD comments	NTPC	July 2021
3	Figure 2, Sections 3, 4.1, 6.1, 6.2, 6.4, 6.6	Revision to Document History table, Table of Contents, page numbering, updates to include permanent water intake, new construction schedule and addition of Appendix C – TSS Monitoring Plan	NTPC	April 2022

## TABLE OF CONTENTS

<b><u>SECTION</u></b>	<b><u>PAGE</u></b>
1. Introduction	1
2. Existing Erosion and Sediment Control Plans	1
3. Existing Facility	1
4. Proposed Facility	5
4.1. Proposed Construction Activities	5
4.2. Proposed Material Borrow Activities	5
5. Regulatory Requirements and Guidelines	6
6. Erosion and Sediment Control Management	6
6.1. Erosion and Sediment Potential and Management	6
6.2. Construction Sequencing	8
6.3. Contractor Responsibilities	8
6.4. Water Management	8
6.5. Erosion and Sediment Control Maintenance	8
6.6. Erosion & Sediment Control Inspection and Monitoring	9
6.7. Emergency Response Framework and Contingency Planning	9
6.8. Emergency Response Framework and Contingency Planning	10
7. Proposed Erosion and Sediment Control Measures	11
7.1. Rock Filter Berm	11
7.2. Silt Fencing	11
7.3. Straw Wattle/Silt Sock	11
7.4. Culverts and Inlet/Outlet Protection	11
7.5. Drainage Swales/Roadside Ditching	12
7.6. Rock Check Dams	12

## **FIGURES**

Figure 1- Existing Taltson Hydroelectric Facility

Figure 2- Proposed Taltson Hydroelectric Facility

## **TABLES**

Table 1- Erosion and Sediment Potential and Mitigation Measures

Table 2- Response Framework for Erosion and Sediment Control Measures

## **APPENDICES**

Appendix A- Erosion and Sediment Control Design Drawings

Appendix B- NTPC Taltson River Work Camp - Erosion & Sediment Control Plan

Appendix C- TSS Monitoring Plan – Taltson Camp Water Supply

# 1. Introduction

This Erosion and Sediment Control Plan (ESCP) was prepared by the Northwest Territories Power Corporation (NTPC) as required by Conditions 19 and 20 of Mackenzie Valley Land and Water Board (MVLWB) Land Use Permit MV2020X0004 which regulates the construction of replacement facilities and overhaul project for the Taltson Hydroelectric Facility.

The purpose of the ESCP is to reduce the potential for negative impacts on air and water quality and to control, respond to, and dispose of sediment and turbid water during the construction of replacement facilities, overhaul of generation plant and operation of borrow locations across the site. The plan presents current industry standards and implements best management practices. This work is regulated under the MVLWB Land Use Permit MV2020X0004 and Government of Northwest Territories Lands Department Quarry Permit 2020QP0019.

This ESCP presents erosion and sediment control measures for all construction under LUP MV2020X0004 including work areas, staging areas, equipment, fuel, and material storage areas and material borrow sites and stockpiles. As site conditions change, continued evaluation and adaptive mitigation measures may be necessary to suit the changing conditions. This report does not address any potential or existing geotechnical concerns that may be present.

## 2. Existing Erosion and Sediment Control Plans

The *Taltson River Work Camp- Erosion & Sediment Control Plan* was submitted to the MVLWB in 2020. The *Taltson River Work Camp- Erosion & Sediment Control Plan* presented erosion and sediment control measures for the construction of the new staff accommodation facilities and operation of borrow locations across the site completed in 2020. The *Taltson River Work Camp- Erosion & Sediment Control Plan* is included in Appendix B.

The *Taltson Hydroelectric Project Sediment and Erosion Monitoring Program Updated Erosion Management Plan V3 (THPSEMPV3)* was approved by the MVLWB in 2020. The THPSEMPV3 provides erosion and sediment management practices and monitoring results related to the operation of the Taltson Generation Facility under the Type A Water Licence MV2011L4-0002. The THPSEMPV3 focuses mostly on erosion and sediment management in relation to water management and the operation of the generation plant. No water management will fall under the land use permit other than the water use by the camp accommodations that is outlined in the Construction, Wildlife Management and Reclamation Plan and management of turbid runoff outlined in Section 6.4. However, one recommended erosion and sediment control measure from the THPSEMPV3, the proposed rock filter berm along the powerhouse road, will be included in the 2021 work and is included in this report.

## 3. Existing Facility

The Taltson Hydroelectric Facility was built in 1965 to supply electricity to the Pine Point Mine. The mine site was decommissioned and closed in 1986. Following the mine closure, the Taltson Generating Station has continued to supply power to the South Slave Region and is the sole source of power, with the exception of back up diesel generators, to the South Slave communities of Hay River, K'atlodeeche First Nation, Fort Smith, Fort Resolution and Enterprise.

The Taltson Hydroelectric Facility is comprised of the Twin Gorges Generating Station, Twin Gorges Forebay Reservoir, South Valley Spillway, Trudel Creek and the Nonacho Lake Dam and is outlined in Figure 1. The Twin Gorges Generating Station is an 18 MW hydroelectric facility located within the Taltson River watershed



56 km northeast of Fort Smith in the Northwest Territories. The facility operates under the MVLWB Type A Water Licence MV2011L4-0002. The facility is a fly in access only using the airstrip or landing on the Twin Gorges Reservoir. In the winter of 2019/2020 a historical winter road from Fort Smith was reconstructed that will be operated for the duration of the overhaul under MVLWB Type B Water Licence MV2019L8-0008 and Type A Land Use Permit MV2019F0015.

The Taltson facility consists of a hydroelectric plant, substation and surge tower situated on the east side of the Taltson River 250m southwest of the main dam. The headgate house sits on the upstream side of the dam in the forebay.

Support facilities include two staff houses and a garage located east of the plant. The 800m airstrip is located 3km southeast of the plant with a storage shed and fuel storage building at its western end. The facility also includes a backup diesel generator, waste incinerator, septic field and fuel storage areas. The existing facility is presented in Figure 1.

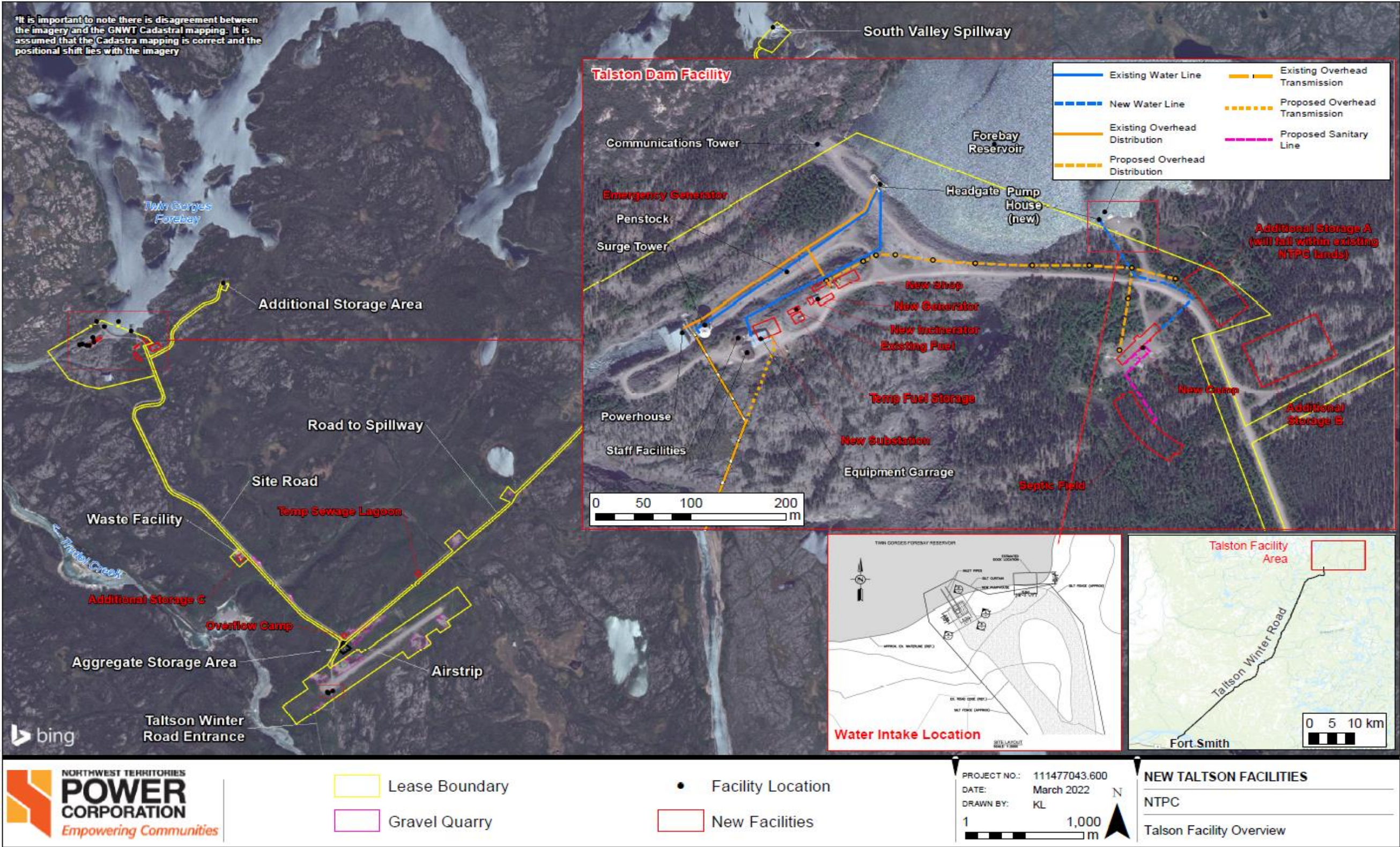


Figure 1- Existing Taltson Hydroelectric Facility





Figure 2- Proposed Taltson Hydroelectric Facility





## 4. Proposed Facility

The Taltson Hydroelectric Facility was built in 1965 and a refurbishment of key infrastructure at the facility is required to ensure the continued reliability of power generation for the South Slave Region. This includes refurbishment of the generating station, replacement of the camp for staff lodging, replacement of the garage for vehicle and equipment storage/maintenance, replacement of the substation and construction of additional storage facilities. The proposed facility is outlined in Figure 2.

### 4.1. Proposed Construction Activities

The construction of replacement facilities and overhaul project includes the following activities that were completed in 2020:

- Construction of replacement staff lodging facilities including:
  - New staff camp
  - Septic field for new camp
- Construction of site storage areas
  - Clearing of Storage Area A and B
- Upgrading of waste facility
- Operation of quarries

The construction of replacement facilities and overhaul project includes the following activities that will be completed in 2021:

- Completion of replacement staff lodging facilities including:
  - Installation of temporary water intake for the lodging facility
- Operation of quarries
- Maintenance of site roads and airstrip
- Installation of rock filter berm adjacent to the generation plant and tailrace

The construction of replacement facilities and overhaul project includes the following activities that will be completed in 2022:

- Completion of replacement staff lodging facilities including:
  - Installation permanent water intake for the lodging facility
- Construction of site storage areas
  - Construction of heated and cold storage facilities in Storage Area A
- Operation of quarries
- Construction hazardous waste storage berm
- Construction of temporary sewage lagoon
- Maintenance of site roads and airstrip
- Installation of temporary fuel storage and distributions systems

The construction of replacement facilities and overhaul project includes the following activities that will be completed in 2023:

- Generator and turbine overhaul
- Operation of quarries
- Removal of waste

### 4.2. Proposed Material Borrow Activities

The construction of replacement facilities and overhaul project includes the borrow and import of soils from the following pit locations:

- Lake Pit
- Middle Pit;
- ABC Pit (3 pits);
- D Pit;
- Y Pit;
- Gertrude Pit
- Z Pit
- V Pit
- W Pit
- South Clay Pit
- North Clay Pit

The borrow locations and procedures are outlined in detailed in the *Taltson Hydro Facility Aggregate and Borrow Locations- Quarry Operations and Reclamation Plan*.

## 5. Regulatory Requirements and Guidelines

All erosion and sediment control measures should be installed and operate as per the standard specifications found in the applicable guidelines and be in accordance with territorial and federal legislation which includes:

- National Guide to Erosion and Sediment Control of Roadway Projects
- DFO Land Development Guidelines for the Protection of Aquatic Habitat
- MVLWB Land Use Permit MV2020X0004 including approved management plans
- GNWT Quarry Permit 2020QP0019 including approved management plans
- Federal Fisheries Act
- NWT Forest Management Act
- NWT Wildlife Act
- NWT Mackenzie Valley Resource Management Act
- Northwest Territories Waters Act

## 6. Erosion and Sediment Control Management

### 6.1. Erosion and Sediment Potential and Management

In accordance with Condition 19 a) i) of MVLWB Land Use Permit MV2020X0004 the proposed activities and associated areas that could be susceptible to erosion and/or sedimentation are presented below along with corresponding mitigation measures. The location of the proposed works and mitigation measures are outlined in detail in the ESCP Design Drawing package in Appendix A, Design Drawings in Appendix B and at a high level in Figure 2.

In accordance with Condition 19 a) ii) of MVLWB Land Use Permit MV2020X0004 the proposed activities and associated areas that could be susceptible to erosion and/or sedimentation are assigned a potential risk of low, medium and high. The potential risk for erosion is based upon:

- Proximity to a water course
  - The closer to a water course the higher the risk
- Slope of working and downstream areas
  - The steeper the slope the higher the risk
- Level of disturbance to existing ground
  - The more ground disturbance the higher the risk

The proposed activities, potential impacts, areas susceptible, risk and mitigation measures are presented below in Table 1.

Table 1- Erosion and Sediment Potential and Mitigation Measures

Proposed Works	Potential Impacts	Areas Susceptible	Risk	Mitigation Measures
Construction of replacement staff lodging facilities including new staff camp and septic field for new camp	1- Sedimentation from exposed earthworks 2- Erosion of exposed slopes	1-Area around replacement camp including low lying area west of septic field 2- Access road to septic field	1-Medium 2-Medium	1-Silt fence installed around perimeter of replacement camp (Drawing ESCP-1, included in Appendix B attachments) 2- Roadside drainage swales, check dams and sediment basin at low point for septic field (Drawings ESCP-1 and ESCP-2, included in Appendix B attachments)
Operation of quarries as outlined in Taltson Hydro Facility Aggregate and Borrow Locations- Quarry Operations and Reclamation Plan	1- Sedimentation from exposed earthworks and operation of equipment 2- Erosion of exposed slopes 3- Alterations to local drainage	1,2,3-All borrow locations	1-Low for all locations other than North and South Clay Pit 1- High for North and South Clay Pit 2- Low 3-Low	1-Check Dams at downstream end of pit and roadside ditching downstream of North and South Clay Pit (Appendix A, and drawings ESCP-1 and ESCP-2, included in Appendix B attachments) 2, 3-Grading procedures outlined in Taltson Hydro Facility Aggregate and Borrow Locations- Quarry Operations and Reclamation Plan to ensure stability of slopes and positive drainage
Construction of heated and cold storage facilities in Storage Area A	1- Sedimentation from exposed earthworks 2- Erosion of exposed slopes	1-Area downstream of Storage Area A including low lying area and Taltson Forebay 2-Site Road downstream of Storage Area A	1-High 2-Medium	1-Drainage swales, roadside ditching, rock check dams and culvert inlet/outlet protection has been designed for this area to capture and direct sediment away from the Taltson Forebay (Appendix A) 2-Rock check dams and culvert inlet/outlet protection has been designed to minimize erosion (Appendix A)
Construction hazardous waste storage berm	None	Area is flat and already cleared	n/a	None
Installation of rock filter berm adjacent to the generation plant and tailrace <sup>1</sup>	None	Use of existing concrete will be employed.	n/a	None
Construction of temporary sewage lagoon	1- Sedimentation from exposed earthworks 2- Erosion of exposed slopes 3- Alterations to local drainage	1,2,3-temporary sewage lagoon	1,2,3-Low	1- Perimeter of lagoon will have berm and silt fence (Appendix A) 2-Lagoon has been designed to ensure stable slopes and minimize erosion (Appendix A) 3- Location of temporary sewage lagoon will be flat sandy area.
Maintenance of site roads and airstrip	1- Sedimentation from exposed earthworks 2- Erosion of exposed slopes 3- Alterations to local drainage	1-Airstrip 2,3-Areas where maintenance of site roads will occur	1-Low 2,3- Low for all areas other than ditching downstream of North and South Clay Pit	1-None 2,3,- Check Dams at downstream end and roadside ditching downstream of North and South Clay Pit (Appendix A, and drawings ESCP-1 and ESCP-2, included in Appendix B attachments)
Installation of temporary fuel storage and distributions systems	1- Sedimentation from exposed earthworks and movement of vehicles	1-Area around temporary fuel storage area and downstream towards tailrace	1-Low/Medium	1-Straw wattles and silt socks will be installed around the perimeter of temporary fuel storage area (Appendix A)
Installation of temporary water intake for the lodging facility	1- Sedimentation from exposed earthworks and operation of equipment for road crossings	1-Existing dock area and Taltson Forebay	1-Medium	1-Drainage swales, roadside ditching, rock check dams and culvert inlet/outlet protection has been designed for this area to capture and direct sediment away from the Taltson Forebay (Appendix A)
Installation of permanent water intake for the lodging facility	1-Sedimentation from exposed earthworks and operation of equipment 2- Sedimentation in watercourse from earthworks	1-Existing dock area and Taltson Forebay 2-Taltson Forebay	1-Medium 2-High	1-Silt fencing will be installed around perimeter of working area (Figure 2) 2- Turbidity Curtain will be installed around working area (Figure 2 and Appendix C TSS Monitoring Plan Taltson Camp Water Supply)

<sup>1</sup>This mitigation measure was recommended in the *Taltson Hydroelectric Project Sediment and Erosion Monitoring Program Updated Erosion Management Plan V3* under the Type A Water Licence MV2011L4-0002 for the Taltson Generation Facility

## 6.2. Construction Sequencing

The implementation of the recommended erosion and sediment control measures should be completed in sequencing that mitigates any increased sediment transportation from the development area due to the construction. The proposed erosion and sediment control measures for the 2021 construction are outlined in detail in the ESCP Design Drawing package in Appendix A.

Only once the Erosion and Sediment Control measures are in place should major construction work begin. The recommended sequencing for the implementation of the measures are as follows:

- Install perimeter silt fencing and/or straw wattles as per standard details indicated on the attached ESCP drawings.
- Install culverts and inlet and outlet protection at all road culvert crossings as per standard details indicated on the attached ESCP drawings.
- Installing drainage swales and drainage ditches as indicated on the attached ESCP drawings
- Install rock check dams as indicated in the attached ESCP drawings.
- Install sediment basins and ESC measures at material borrow sites.
- Install turbidity curtains around in-water working areas.

After the above measures are completed all other proposed construction can be completed. Seeding will not be completed at the Taltson site but given the long days during growing season in the N.W.T. exposed soils should naturally revegetate within 1 year of disturbance.

## 6.3. Contractor Responsibilities

The contractor will be responsible for ensuring compliance with all erosion and sediment control measures outlined within this document. At all times during construction, erosion control measures are to be maintained in working order, cleaned, and adjusted as required to achieve the desired objective. When the construction works are completed, and the permanent erosion and sediment control measures are functioning correctly, any temporary best management practices measures can be removed and any collected sedimentation during construction works is to be removed.

## 6.4. Water Management

No water management is included in the scope of work under this permit other than the water use by the camp accommodations that is outlined in the Construction, Wildlife Management and Reclamation Plan and management of turbid runoff by proposed erosion and sediment control measures in Section 7. In general turbid water will be managed by:

- Containment and Elimination of Source – contain the discharge with silt fences, turbidity curtains, pipes, sandbags, or a soil berm down-slope from the affected area.
- Cleanup – when containment is complete, turbid water and sediment will be directed to the most logical settling pond to either infiltrate or settle the suspended particles.

## 6.5. Erosion and Sediment Control Maintenance

The Erosion and Sediment Control's shall be maintained for the life of the facility operations. Should any new areas of the project become subject to erosion, the same best management practices and procedures outlined in this document should be used to stabilize the area and eliminate erosion and sedimentation from recurring. The sediments removed during maintenance should be placed in a designated location with silt fencing and permanently stabilized with the use of hand seeding or hydro-seeding. Once the area is established with vegetation it is considered stabilized and silt fencing can be removed.

## 6.6. Erosion & Sediment Control Inspection and Monitoring

During construction, the ESC measures shall be monitored and inspected on a weekly basis and after significant rainfall events. For areas that are considered moderate to high-risk as noted in Table 2, the ESC measures will be monitored on a daily basis where work is actively occurring. Deficiencies identified during inspections shall be remediated immediately to prevent sediment mobilization, as directed by the ESC Monitor.

The inspections will include:

- Observe runoff leaving the site during storms checking for turbid water.
- Inspect downslope areas surrounding the site for tracking of sediment.
- Report the results of the inspection and recommended improvements, if any, to the contractor.
- Evaluate the implementation of specified measures and ensure installation is in accordance with the drawings and manufacturers specifications.

Inspection reports will be completed to summarize results of daily monitoring, weekly inspections, and inspections after major rainfall events. Copies of the inspection reports, included in the attachments of *Taltson River Work Camp- Erosion & Sediment Control Plan* in Appendix B, will be kept onsite during the life of the project and available for review upon request. If the ESC measures were to fail and turbid water reached a watercourse NTPC may also complete TSS/turbidity monitoring if required. TSS monitoring will be completed during the construction of the permanent water intake, these details are provided in Appendix C.

After construction is completed, inspections should be performed in the spring and fall to evaluate the performance of the permanent ESC measures and provide recommendations for maintenance and/or improvements as required.

## 6.7. Emergency Response Framework and Contingency Planning

In the event of a large storm event, the contractor shall immediately control and respond to turbid water discharges and sediment transport outside of the developed site area. Appropriate action includes the following:

- Hazard Assessment - assess the source, extent, and quantity of the discharge.
- Containment and Elimination of Source – contain the discharge with silt fences, pipes, sandbags, or a soil berm down-slope from the affected area.
- Cleanup – when containment is complete, turbid water and sediment will be directed to the most logical settling pond to either infiltrate or settle the suspended particles.
- Notification – all discharges of turbid water to tributaries or natural drainage courses leading to Taltson River should be reported immediately to the ESC Monitor.

After construction, the operations staff will be responsible for maintaining and implementing the emergency response actions as required.

The response framework for contingency planning is presented in Table 2. This approach constitutes passive adaptive management, or the application of best practices. Reports of actions under the Response Framework will be provided to the Mackenzie Valley Land and Water Board as requested and required under the permit.



## 6.8. Emergency Response Framework and Contingency Planning

General erosion control measures for reclamation of the temporary camp, temporary sewage lagoon and aggregate storage area are presented in the Construction, Wildlife Management and Reclamation Plan and include general site grading for positive drainage, proper sloping of edges, etc.

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

Threshold	Description	Action Level	Tasks
Erosion and Sediment Control Measures are functioning as required	<ul style="list-style-type: none"> <li>Sediment is being contained by proposed measures</li> <li>Erosion is not present in working areas and on slopes</li> </ul>	None	<ul style="list-style-type: none"> <li>Continue with construction with no further mitigation actions required</li> <li>Continue with required ESC weekly and post-rainfall monitoring and inspections</li> </ul>
Erosion and Sediment Control Measures require maintenance but there is no risk of failure	<ul style="list-style-type: none"> <li>Sediment is being contained by proposed measures, but measures are no longer functioning as required</li> <li>Signs of minor erosion are present in working areas and slopes, but no risk of failure is present</li> </ul>	Low	<ul style="list-style-type: none"> <li>Remove sediment so that the ESC measure can properly function</li> <li>Repair erosion as required</li> <li>Investigate areas upstream of sedimentation and/or erosion for any deficiencies</li> <li>Continue with required ESC weekly and post-rainfall monitoring and inspections</li> </ul>
Erosion and Sediment Control Measures require maintenance and there is risk of failure	<ul style="list-style-type: none"> <li>Sediment is being contained by proposed measures, measures are no longer functioning as required and risk of failure due to accumulation is present</li> <li>Signs of erosion are present in working areas and slopes, risk of failure is present</li> </ul>	Medium	<ul style="list-style-type: none"> <li>Notify the Project Supervisor or designate</li> <li>Mobilize resources within 24-48 hours to remove sediment and/or repair erosion as required so risk of failure is no longer present</li> <li>Investigate areas upstream of sedimentation and/or erosion for any deficiencies</li> <li>Increase monitoring to daily inspections until stability is confirmed</li> <li>Continue with required ESC weekly and post-rainfall monitoring and inspection</li> </ul>
Erosion and Sediment Control Measures have failed	<ul style="list-style-type: none"> <li>Sediment is no longer being contained and measures have failed</li> <li>Erosion has resulted in failure of slopes in working area</li> </ul>	High	<ul style="list-style-type: none"> <li>Notify Project Supervisor or designate</li> <li>Stop all earthworks and mobilize equipment to repair measures that have failed</li> <li>Follow spill response protocols in the Taltson Spill Contingency Plan if required</li> <li>Implement additional ESC measures outlined in Section 7 to contain sediment from travelling offsite if required</li> <li>Increase frequency of monitoring to every two hours until stability is confirmed, complete TSS monitoring if required</li> <li>Continue with required ESC weekly and post-rainfall monitoring and inspection</li> </ul>

## 7. Proposed Erosion and Sediment Control Measures

The proposed erosion and sediment control measures for the 2021 construction are outlined in detail in the ESCP Design Drawing package in Appendix A.

### 7.1. Rock Filter Berm

The rock filter berm that is proposed for the site road adjacent to the generation plant and tailrace is outlined in drawing P109-51759-C1601 in the attached ESCP Design Drawing package in Appendix A. This mitigation measure was recommended in the *Taltson Hydroelectric Project Sediment and Erosion Monitoring Program Updated Erosion Management Plan V3* under the Type A Water Licence MV2011L4-0002 for the Taltson Generation Facility. It was recommended to mitigate increased turbidity that was being recorded at the Taltson tailrace monitoring gauge during rainfall events due to runoff from the gravel and sand roads on the site. It will employ the use of the existing concrete barriers along the road, Nilex 4545 fabric and 25mm rock to filter sediment from runoff before it flows into the tailrace.

### 7.2. Silt Fencing

Silt fencing allows surface water to pond so sediment particles can settle. It is to be installed where sheet flow run-off is expected or is occurring and are not to be used within drainage channels or ditches. Silt fences should be utilized as a sediment control measure as outlined in drawing P109-51776-C1603, P109-51776-C1604 and P109-51776-C1609 in the attached ESCP Design Drawing package in Appendix A. As outlined in the drawings silt fencing will be installed at Storage Area A, Storage Area B, the water intake area and the temporary sewage lagoon. At the discretion of the ESC Monitor, silt fences should be installed at the base of new fill/cut slopes, along temporary access construction, and at any location where sedimentation is of concern, especially areas directly adjacent to streams, drainage courses or riparian areas. Silt fencing is to be maintained regularly until a solution can be implemented to manage the source of sheet flow, erosion, and sediment transport.

### 7.3. Straw Wattle/Silt Sock

The area around the temporary and permanent fuel storage areas has minimal soil cover around the edges which would make the installation of silt fencing ineffective. For this reason, the installation of straw wattles or silt socks have been proposed to trap sediment from running off from this area during construction. The location of the straw wattles or silt socks is presented in drawing P109-51776-C1602 and P109-51776-C1609 in the attached ESCP Design Drawing package in Appendix A.

### 7.4. Culverts and Inlet/Outlet Protection

Culverts are being installed to convey runoff under site roads as outlined in drawing P109-51776-C1603 and P109-51776-C1609 in the attached ESCP Design Drawing package in Appendix A. All culverts should be protected with rock armored sumps to catch sediment on both inlets and outlets, please refer to standard details on Drawing ECSP-2 included in the attachments of *Taltson River Work Camp- Erosion & Sediment Control Plan* in Appendix B. Where temporary measures are required, the contractor will protect stormwater inlets with mesh and geotextile fabric and berm the perimeter.

## **7.5. Drainage Swales/Roadside Ditching**

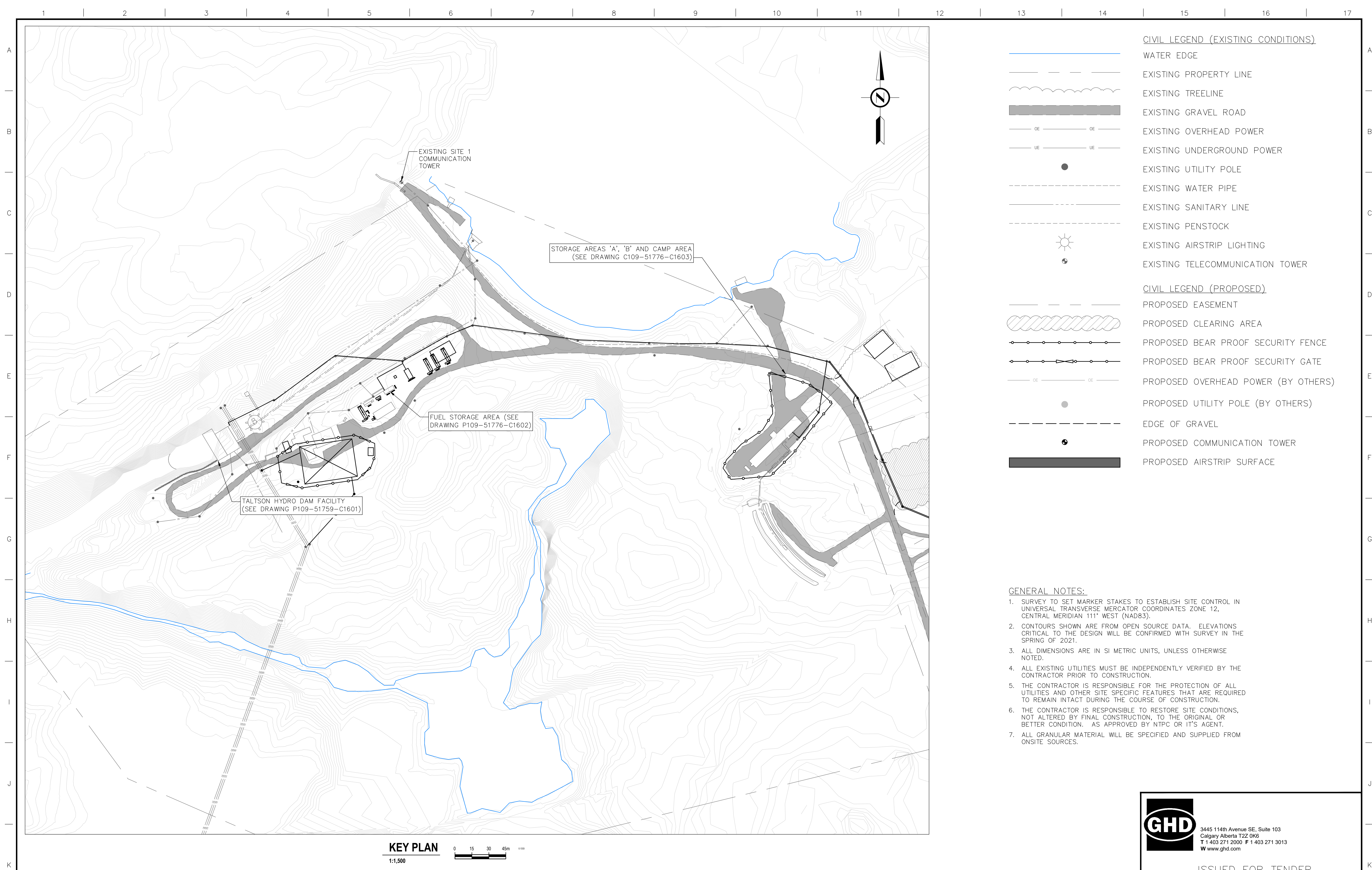
Roadside ditches are not required for the site roads for the Taltson facility. However, in a few locations close to watercourses and/or with steep gradient roadside ditching has been proposed to collect runoff from the roadway to trap sediment and avoid sheet flow over the road which may damage it. A drainage swale will also be placed along Storage Area A.


## **7.6. Rock Check Dams**

Rock check dams are used in drainage channels to reduce the velocity of flowing water and prevent scouring; they also allow mobilized sediment to settle out of turbid water. Check dams are commonly constructed out of rock, sandbags, or manufactured products such as spring berms. The rock check dams at Taltson will be constructed from clean fill from one of the borrow locations. Rock check dams have been proposed for roadside swales or ditching near water and/or with a steep gradient as outlined in the attached ESCP Design Drawing package in Appendix A. As directed by the ESC Monitor, check dams may be installed in new or existing drainage courses as required. All check dams must be monitored and maintained regularly.

## **Appendix A- Erosion and Sediment Control Design Drawings**



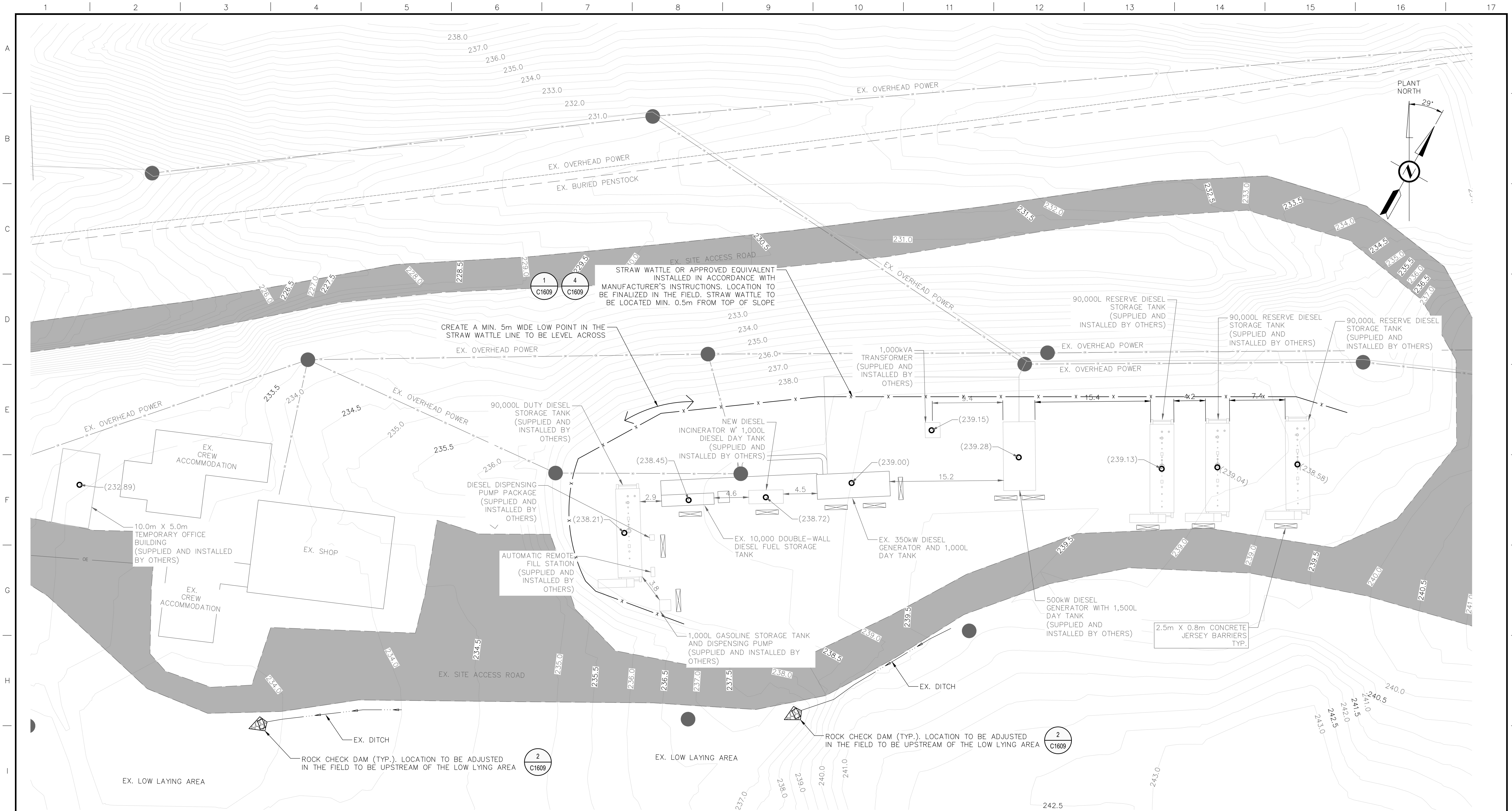


												PROFESSIONAL STAMP	PERMIT STAMP	LOCATION TALTSON, NWT			
														TITLE TALTSON REHABILITATION PROJECT 2021 CONSTRUCTION – TBD3 EROSION AND SEDIMENT CONTROL PLAN WATER BODIES			
														SCALE 1:7500	SHEET 1 OF 1		DRAWING NO. P109-51776-C1600
01	-	-	A	ISSUED FOR REFERENCE	-	DJW	21JAN21	DC / DP	DC	TENDER	21JAN21						
ID	DRAWING NO.	TITLE	0	ORIGINAL - ISSUED FOR TENDER REVIEW	-	DJW	11JAN21	DC / DP	DC	DRAFT	11JAN21						
REFERENCE DRAWINGS			REVISION LETTER	REVISION			WORK ORDER	NAME	DATE	CHECKED BY	DESIGNED BY			STATUS OF DRAWING		DATE	









CIVIL SITE NOTES:

1. REFER TO GENERAL NOTES ON DRAWING P109-51776-C1000(C).
2. ALL ELEVATIONS AND CONTOURS SHOWN ARE EXISTING GROUND CONDITIONS.
3. FUEL TANKS TO BE PLACED ON EXISTING GRADE TO SUIT. LOCATION AND ORIENTATION OF TANKS TO BE VERIFIED ON SITE BY NTPC REPRESENTATIVE AT THE TIME OF INSTALLATION.
4. TEMPORARY OFFICE TO BE PLACED IN THE GENERAL LOCATION SHOWN HERE. MINOR GRADING MAY BE REQUIRED TO LEVEL THE AREA. LOCATION AND ORIENTATION TO BE VERIFIED ON SITE BY NTPC REPRESENTATIVE AT THE TIME OF INSTALLATION.
7. ALL GRANULAR MATERIAL WILL BE SPECIFIED AND SUPPLIED FROM ONSITE SOURCES.
8. ALL FUEL TANKS, TEMPORARY OFFICE AND OTHER INFRASTRUCTURE WILL SUPPLIED AND INSTALLED BY OTHERS.

FUEL STORAGE AREA & TEMPORARY OFFICE - SITE PLAN



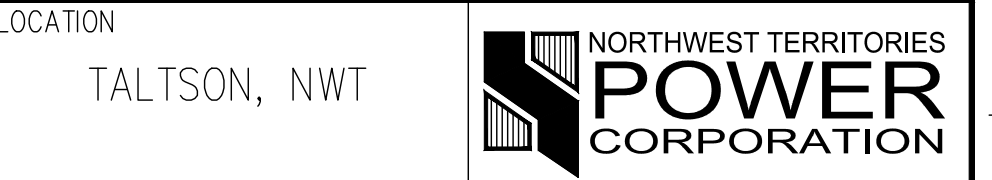
CIVIL GRADING LEGEND

- EXISTING ELEVATION
- EXISTING GROUND CONTOUR



3445 114th Avenue SE, Suite 103  
Calgary Alberta T2Z 0K6  
T 1 403 271 2000 F 1 403 271 3013  
W www.ghd.com

ISSUED FOR TENDER



TALTSON REHABILITATION PROJECT  
2021 CONSTRUCTION - TBD3  
FUEL STORAGE AREA  
EROSION ANDS SEDIMENT CONTROL PLAN

SCALE 1:250 SHEET 1 OF 1 DRAWING NO. P109-51776-C1602 REV. A

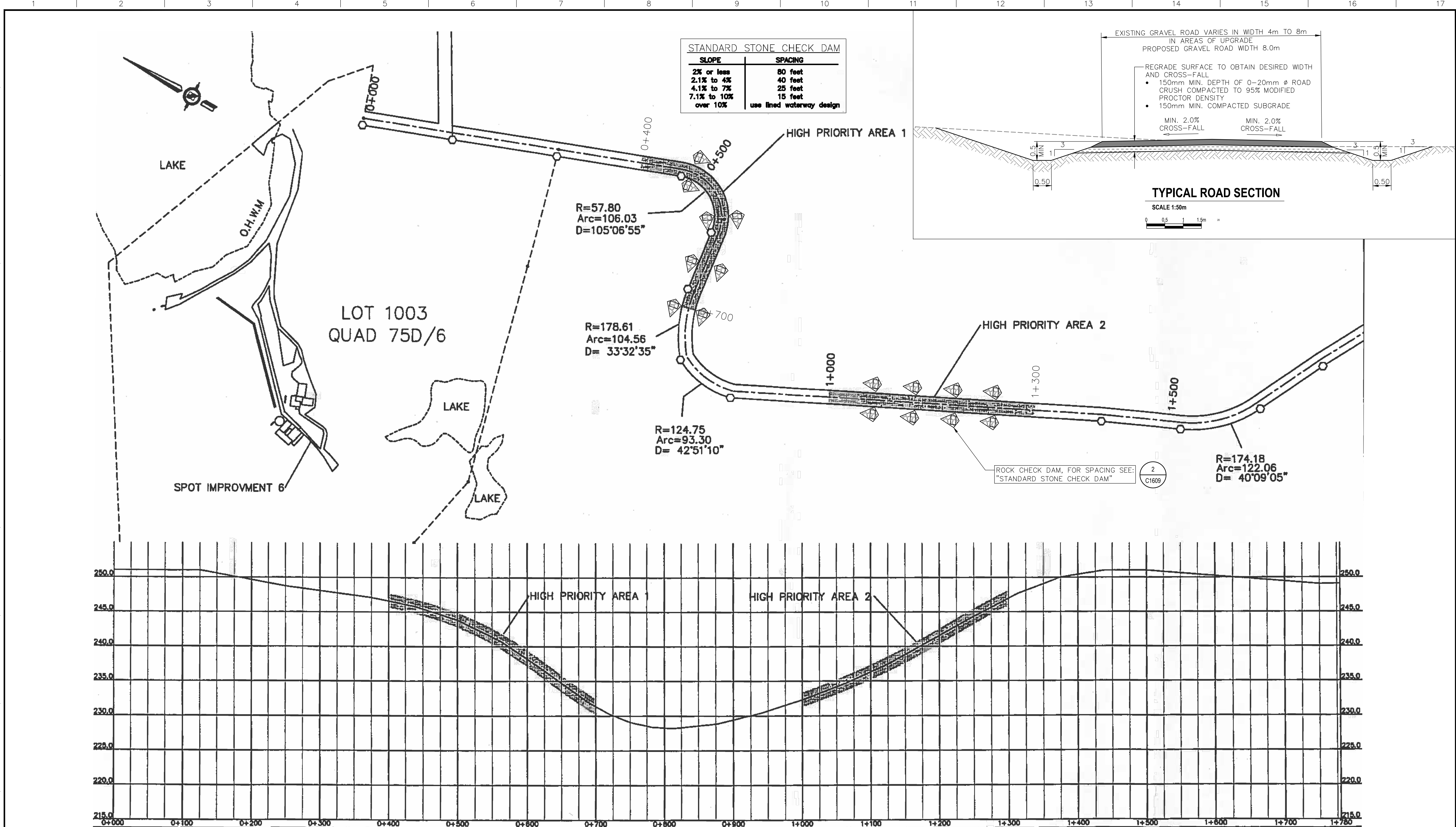
01	DRAWING NO.	TITLE	REVISION LETTER	REVISION	WORK ORDER	NAME	DATE	CHECKED BY	DESIGNED BY	STATUS OF DRAWING	DATE
01	-	-	A	ISSUED FOR TENDER	-	DJW	21JAN21	DC / DP	DC	TENDER	21JAN21
ID	DRAWING NO.	TITLE	0	ORIGINAL - ISSUED FOR TENDER REVIEW	-	DJW	11JAN21	DC / DP	DC	DRAFT	11JAN21











CIVIL SITE NOTES:

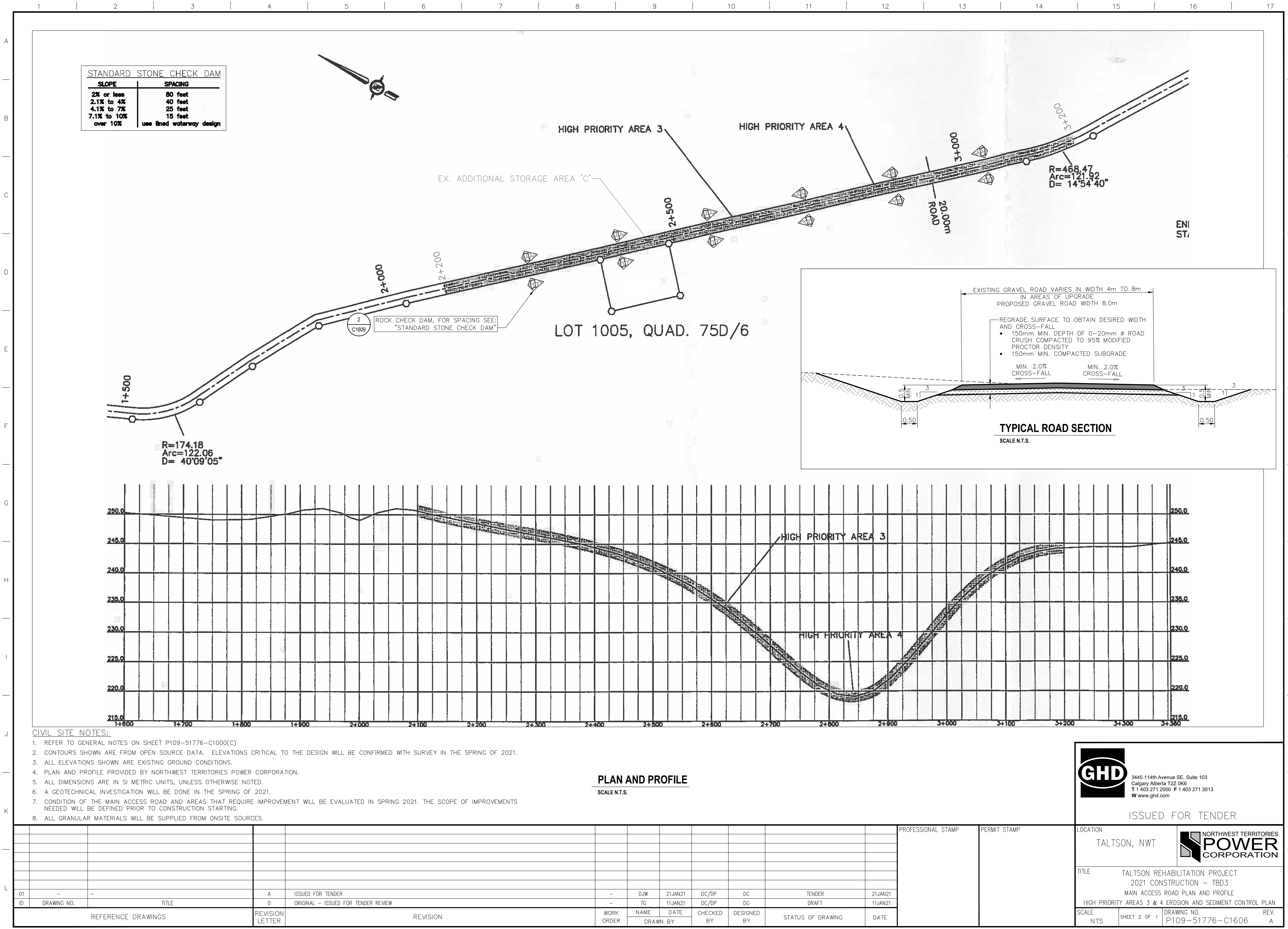
1. REFER TO GENERAL NOTES ON SHEET P109-51776-C1000(C)
2. CONTOURS SHOWN ARE FROM OPEN SOURCE DATA. ELEVATIONS CRITICAL TO THE DESIGN WILL BE CONFIRMED WITH SURVEY IN THE SPRING OF 2021.
3. ALL ELEVATIONS SHOWN ARE EXISTING GROUND CONDITIONS.
4. PLAN AND PROFILE PROVIDED BY NORTHWEST TERRITORIES POWER CORPORATION.
5. ALL DIMENSIONS ARE IN SI METRIC UNITS, UNLESS OTHERWISE NOTED.
6. A GEOTECHNICAL INVESTIGATION WILL BE DONE IN THE SPRING OF 2021.
7. CONDITION OF THE MAIN ACCESS ROAD AND AREAS THAT REQUIRE IMPROVEMENT WILL BE EVALUATED IN SPRING 2021. THE SCOPE OF IMPROVEMENTS NEEDED WILL BE DEFINED PRIOR TO CONSTRUCTION STARTING.
8. ALL GRANULAR MATERIALS WILL BE SUPPLIED FROM ONSITE SOURCES.

PLAN AND PROFILE  
SCALE N.T.S.

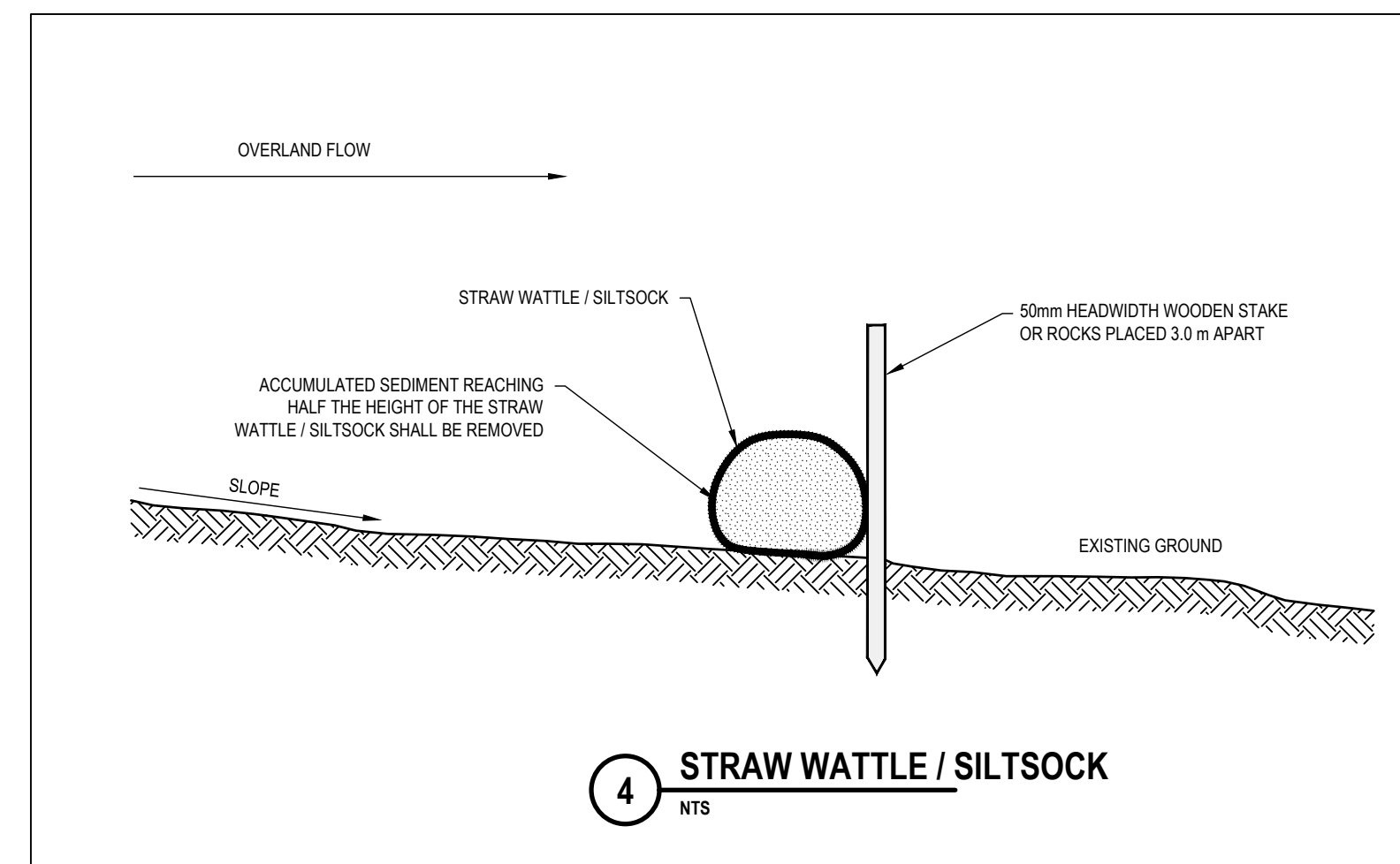
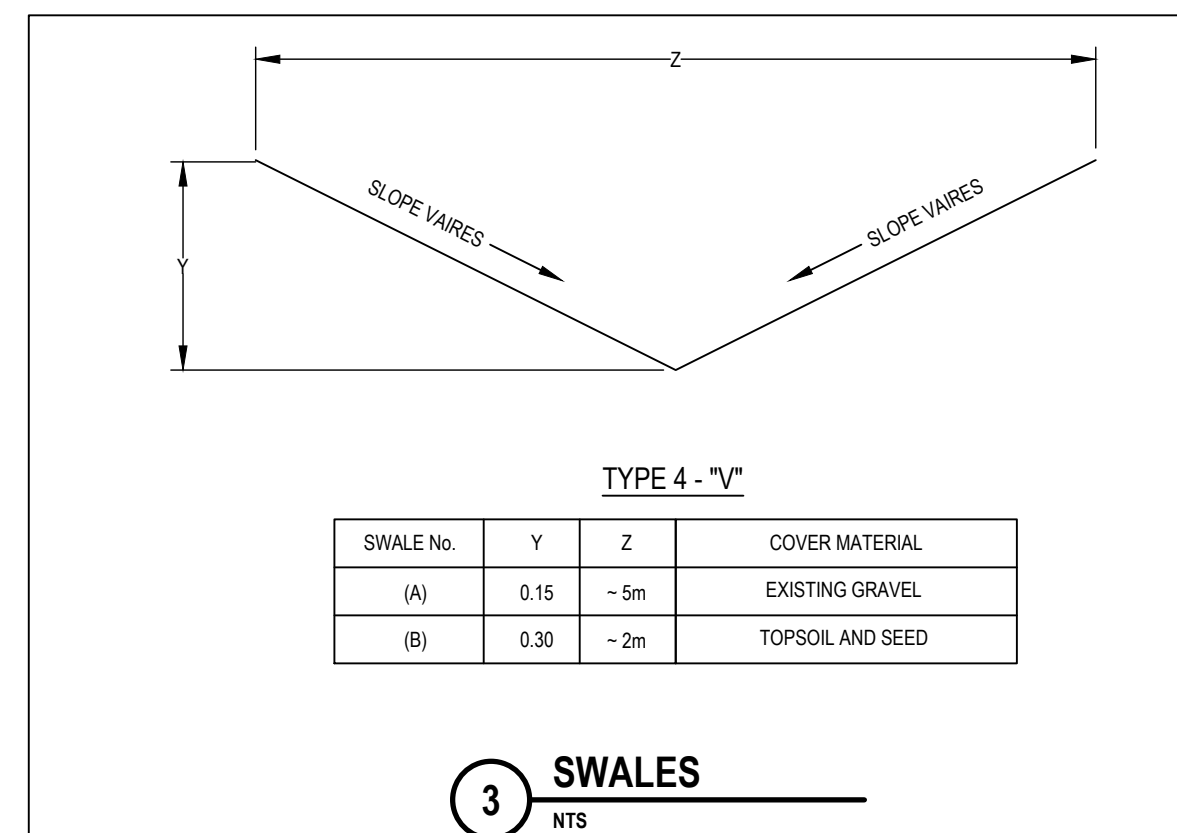


ISSUED FOR TENDER

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--







## **Appendix B- NTPC Taltson River Work Camp - Erosion & Sediment Control Plan**



1210 Fourth Avenue  
Prince George, B.C. V2L 3J4  
Tel. (250) 562-1977  
Fax (250) 562-1967

**July 7<sup>th</sup>, 2020**

**NTPC TALTSON RIVER WORK CAMP**

**NORTHWEST TERRITORIES**

# **EROSION & SEDIMENT CONTROL PLAN**

**Client:** Northwest Territories Power Corporation

**L&M Project No.:** 1702-01

## **L&M ENGINEERING LIMITED**

1210 Fourth Avenue, Prince George, BC V2L 3J4

Phone: (250) 562-1977

## TABLE OF CONTENTS

## Page No.

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
	1.1 Objective.....	1
	1.2 Project Location.....	1
	1.3 Existing Site Conditions.....	2
	1.4 Proposed Construction Activities.....	2
	1.5 Proposed Material Borrow Activities.....	3
<b>2.0</b>	<b>EROSION AND SEDIMENT CONTROL MEASURES.....</b>	<b>3</b>
	2.1 Erosion & Sediment Control Guidelines.....	3
	2.2 Construction Sequencing.....	3
	2.3 Contractor Responsibilities.....	4
	2.4 Erosion & Sediment Control Maintenance.....	4
	2.5 Erosion & Sediment Control Inspection.....	4
	2.6 Emergency Response.....	5
	2.7 Materials Onsite.....	6
<b>3.0</b>	<b>EROSION AND SEDIMENT CONTROL RECOMMENDATIONS.....</b>	<b>6</b>
	3.1 Storm Drain Inlet/Outlet Protection.....	6
	3.2 Material Borrow and Import.....	6
	3.3 Soil & Construction Debris Stockpiles.....	7
	3.4 Access Road Entrances & Exits.....	7
	3.5 Wind Erosion & Dust Control.....	7
	3.6 Check Dams.....	8
	3.7 Silt Fencing.....	8
	3.8 Truck & Equipment Washing.....	8
	3.9 Equipment Fueling & Maintenance Area .....	9
	3.10 Summary of Erosion Control Recommendations.....	9
<b>4.0</b>	<b>REFERENCES.....</b>	<b>9</b>
<b>5.0</b>	<b>CLOSURE.....</b>	<b>10</b>

**APPENDIX A – Overall Site Development Plans**

**APPENDIX B – ESC Standard Details (ESCP-1 - ESCP-3)**

**APPENDIX C – ESC Standard Inspection Report**

## **1.0 INTRODUCTION**

### **1.1 Objective**

This Erosion and Sediment Control Plan (ESCP) was prepared by L&M Engineering Ltd. for Northwest Territories Power Corporation. The purpose of this ESCP is to reduce the potential for negative impacts on air and water quality and to control, respond to, and dispose of sediment and turbid water during the construction of the new staff accommodation facilities and operation of borrow locations across the site utilizing current industry standards and implementing best management practices (BMP's). This work is regulated under the Mackenzie Valley Land and Water Board (MVLWB) land use permit MV2020X0004 and Government of Northwest Territories Lands Department Quarry Permit 2020QP0019.

This document applies to all areas related to the camp rebuild and borrow locations including work areas, equipment, and material storage areas, staging areas, and material borrow sites and stockpiles. As site conditions change, continued evaluation and adaptive mitigation measures may be necessary to suit the changing conditions. This report does not address any potential or existing geotechnical concerns that may be present.

This plan applies to the construction of the new staff accommodation facilities and operation of borrow locations across the site only. A full Erosion and Sediment Control Plan that contains all phases of the Taltson overhaul project regulated under land use permit MV2020X0004 will be provided to the MVLWB later in 2020.

### **1.2 Project Location**

The Taltson hydroelectric facility is located within the Taltson River watershed 56 km northeast of Fort Smith in the Northwest Territories. The development area includes the location of the new staff accommodation and borrow locations. The site is considered remote with access to the development area being primarily by plane to the Taltson Airport. The airport is approximately 4km from the proposed development area, but proposed material borrow sites are located near the airport and along the access between the airport and the development area. See Appendix A for an overview of the development and borrow pit areas.



### 1.3 Existing Site Conditions

The main access road between the airport and the proposed development site resembles a forest service road consisting of a graveled surface and cut/fill slopes extending to native vegetated surroundings. The road has some culvert crossings varying in size to accommodate natural drainage courses. The soil conditions are inconsistent along the 4km of road, varying from exposed rock, gravels, and saturated organic silty clay and mineral soils. In the development area, the soil's conditions consist of primarily exposed bedrock and bedrock overlain with varying depths of silty clay and peat. No significant drainage conveyance has been implemented in the development area.

Fine-textured soils (Clay and silt) bind well together and are resistant to erosion however sandy soils bind poorly together and are susceptible to mobilization when exposed to surface flows: sand particles settle out of solution freely, however, suspended silt particles are difficult to remove from water and take significant time to settle out of suspension. Exposed soils are also susceptible to wind erosion, producing dust throughout dry weather periods, compounded by heavy vehicle traffic.

The proposed development area currently appears stable, but it is anticipated that with construction activity, it poses a significant risk of sediment mobilization offsite through surface water. Borrow sites are generally sand and gravel with low risk for negative erosion and sediment impacts with the exception of the two clay pits which pose a significant risk of sediment mobilization. As all surface water runoff ultimately leads to Taltson River it is imperative to eliminate erosion and ultimately prevent sedimentation.

### 1.4 Proposed Construction Activities

This project entails the construction of site surface grading, onsite sewerage system, access road building, water conveyance, and surface stabilization.

The proposed project includes the following activities:

- Clearing, grubbing and stripping site of organics;
- Installing water conveyance ditches;
- Borrow and import of soils for site development;
- Site grading and slope stabilization;
- Placement of imported aggregates for road structure and camp grading;
- Culvert installation;

- Sanitary sewer system installation;
- Installation of erosion and sediment control measures.

### **1.5 Proposed Material Borrow Activities**

This project entails the borrow and import of soils from the following pit locations to the development area as indicated on the drawings in Appendix A.

- Lake Pit
- Middle Pit;
- ABC Pit (3 pits);
- D Pit;
- Y Pit;
- Gertrude Pit
- Z Pit
- V Pit
- W Pit
- South Clay Pit
- North Clay Pit

## **2.0 EROSION AND SEDIMENT CONTROL MEASURES**

### **2.1 Erosion & Sediment Control Guidelines**

All erosion and sediment control measures should be conducted and installed as per the standard specifications found in the:

- National Guide to Erosion and Sediment Control of Roadway Projects (TAC, 2005);
- DFO Land Development Guidelines for the Protection of Aquatic Habitat (chillibeck, 1993); and
- MVLWB Land Use Permit MV2020X0004 including approved management plans.

### **2.2 Construction Sequencing**

The implementation of the recommended permanent erosion and sediment control (ESC) measures should be completed in sequencing that mitigates any increased sediment transportation from the development area due to the construction. Only once the Erosion and Sediment Control measures are in place should major construction work begin. The recommended sequencing for the implementation of the measures are as follows:

- Install perimeter silt fencing as per standard details indicated on the attached ESCP drawings (Appendix B).

- Install stabilized site entrances as per standard details indicated on the attached ESCP drawings.
- Install inlet and outlet protection at all road culvert crossings as per standard details indicated on the attached ESCP drawings.
- Install sediment basins as indicated in the attached ESCP drawings.
- Install sediment basins and ESC measures at material borrow sites.
- Construct drainage swales and then all other proposed construction can be completed following the completion of the above-listed items.
- Cover all exposed non-vegetated native soil surfaces with native stripping or mulched organics immediately following final grading.

### **2.3 Contractor Responsibilities**

The contractor will be responsible for ensuring compliance with all erosion and sediment control measures outlined within this document. At all times during construction, erosion control measures are to be maintained in working order, cleaned, and adjusted as required to achieve the desired objective. When the construction works are completed, and the permanent erosion and sediment control measures are functioning correctly, any temporary best management practices (BMP) measures can be removed and any collected sedimentation during construction works is to be removed.

### **2.4 Erosion and Sediment Control Maintenance**

The Erosion and Sediment Control's (ESC's) shall be maintained for the life of the facility operations. Should any new areas of the project become subject to erosion, the same best management practices and procedures outlined in this document should be used to stabilize the area and eliminate erosion and sedimentation from recurring. The sediments removed during maintenance should be placed in a designated location with silt fencing and permanently stabilized with the use of hand seeding or hydro-seeding. Once the area is established with vegetation it is considered stabilized and silt fencing can be removed.

### **2.5 Erosion & Sediment Control Inspection**

During construction, the ESC measures shall be inspected periodically at the discretion of the ESC Monitor. Deficiencies identified during inspections shall be

remediated immediately to prevent sediment mobilization, as directed by the ESC Monitor.

The inspections will:

- Observe runoff leaving the site during storms checking for turbid water.
- Inspect downslope areas surrounding the site for tracking of sediment.
- Report the results of the inspection and recommended improvements, if any, to the contractor.
- Evaluate the implementation of specified measures and ensure installation is in accordance with the drawings and manufacturers specifications.

Copies of the inspection reports (Appendix C) should be kept onsite during the life of the project and available for review upon request.

After construction is completed, inspections should be performed in the spring and fall to evaluate the performance of the permanent ESC measures and provide recommendations for maintenance and/or improvements as required.

## **2.6 Emergency Response**

In the event of a large storm event, the contractor shall immediately control and respond to turbid water discharges and sediment transport outside of the developed site area. Appropriate action includes the following:

- Hazard Assessment - assess the source, extent, and quantity of the discharge;
- Containment and Elimination of Source – contain the discharge with silt fences, pipes, sandbags, or a soil berm down-slope from the affected area;
- Cleanup – when containment is complete, turbid water and sediment will be directed to the most logical settling pond to either infiltrate or settle the suspended particles;
- Notification – all discharges of turbid water to tributaries or natural drainage courses leading to Taltson River should be reported immediately to the ESC Monitor.

After construction, the operations staff will be responsible for maintaining and implementing the emergency response actions as required.

## 2.7 Materials Onsite

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

Material
Tarping/Poly Sheeting
Drain Pipe
Spring Berms
Drain Rock
Silt Fencing

After construction is completed, the mitigation materials shall be restocked and permanently maintained onsite in an accessible location.

## 3.0 EROSION AND SEDIMENT CONTROL RECOMMENDATIONS

### 3.1 Storm Drain Inlet/Outlet Protection

All culverts inside the project limits and within the surrounding area should be protected with rock armored sumps to catch sediment on both inlets and outlets, see standard details in appendix A, as part of this document. Where temporary measures are required, the contractor will protect stormwater inlets with mesh and geotextile fabric and berm the perimeter.

### 3.2 Material Borrow Locations and Import

As indicated in Section 1.4 and Appendix A the project requires the borrow and import of materials within close proximity to the development area to complete the proposed works. These borrow sites should implement erosion and sediment control measures outlined in Section 2 of this report. As most of the identified pits are considered clean sand and gravel sources, it is not expected that they will be a significant risk for erosion and sediment transport. The exception to this is the North and South Clay Pit which have positive drainage towards natural water conveyance to the Taltson River and are highly susceptible to negative erosion and sediment conditions.

At these borrow locations, implement spring berms every 10m in any natural or constructed conveyance swales/ditches in the active borrow area. Implement a sediment discharge pond at the limit of the borrow area at the natural or constructed point of surface water discharge in accordance with the details in Appendix A. Limit cut slopes to less than 3H:1V and limit slope length whenever possible by providing benching in active borrow areas. All stockpiles in the active borrow area or at the import site should be silt fenced and stabilized.

### **3.3 Soil & Construction Debris Stockpiles**

Throughout facility operations, soils and construction debris should be stockpiled within the worksite or removed off-site. Materials to be stockpiled on site shall be contained within a bermed area or surrounded by a silt fence. Any stockpiles that are to remain inactive for longer than 7 days should be covered with tarps or poly to prevent erosion. This same practice should be maintained after construction is complete as part of the facility operations procedures.

### **3.4 Access Road Entrances & Exits**

Before leaving the project site, all trucks and equipment should be inspected for mud and debris. The following measures should be implemented for this cause:

- The entrance should be constructed with 75mm clean granular soils (Pit V or W) to reduce tire exposure to mud and dirt.
- Trucks should always be instructed to remain on designated haul roads.
- An employee should be assigned to inspect and clean trucks periodically in designated areas.

Any mud or debris tracked from the site should be cleaned immediately by sweeping and shoveling and transported to a designated storage area.

### **3.5 Wind Erosion & Dust Control**

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

- Covering stockpiles with wind impervious fabrics or materials.
- Erecting a windscreen.
- Change the stockpile orientation and shape.
- Spray water to compact and weight the soil particles.
- Reduce equipment and vehicle speed over exposed soils to reduce dust generation.
- Establish designated travel routes on temporary gravel surfaces whilst watering regularly during construction. Restrict vehicle traffic entering and leaving the site to reduce sediment transport and mobilization to roadways.

### **3.6 Check Dams**

Check dams are used in drainage channels to reduce the velocity of flowing water and prevent scouring; they also allow mobilized sediment to settle out of turbid water. Check dams are commonly constructed out of rock, sandbags, or manufactured products such as spring berms. As directed by the ESC Monitor, check dams may be installed in new or existing drainage courses as required. All check dams must be monitored and maintained regularly.

### **3.7 Silt Fencing**

Silt fencing allows surface water to pond so sediment particles can settle. They are to be installed where sheet flow run-off is expected or is occurring and are not to be used within drainage channels or ditches. Silt fences should be utilized as a sediment control measure around all temporary stockpiles. At the discretion of the ESC Monitor, silt fences should be installed at the base of new fill/cut slopes, along temporary access construction, and at any location where sedimentation is of concern, especially areas directly adjacent to streams, drainage courses or riparian areas. Silt fencing is to be maintained regularly until a solution can be implemented to manage the source of sheet flow, erosion, and sediment transport.

### **3.8 Truck & Equipment Washing**

To prevent contamination of soil, water trucks and equipment should be washed out at designated areas with no direct connectivity to natural or constructed stormwater conveyance infrastructure. Designated wash areas should be equipped with a containment pad prior to discharging to any drainage course.

### 3.9 Equipment Fueling & Maintenance Area

To prevent contamination of soil or water, equipment maintenance should be restricted to a designated location. All fuel should be stored in one central fuel facility with a containment pad or vehicle complete with a spill kit.

### 3.10 Summary of Erosion Control Recommendations

The following erosion controls should be applied as follows:

- Culvert crossings: Install inlet and outlet protection at all road culvert crossings complete with sumps, rock armoring, filter fabric, and check dams at the discretion of the ESC monitor as per standard details indicated in Appendix B.
- Slope stabilization: Install permanent rock armoring in ditch-lines and adjacent slopes when slopes are greater than 3 horizontal to 1 vertical. Slopes less than 3 horizontal to 1 vertical should be re-graded to a consistent slope and textured by track packing perpendicular to the slope, have rolled erosion control product installed, or use stockpiled organic stripping to cover the slopes, and finally hand seed as per standard details found in Appendix B.
- Ditches and water conveyance channels: Drainage ditches with slopes greater than 4% should be provided with rock armoring or rolled erosion matting. All exposed surfaces should be covered with native stripping soil and hand seeded.

## 4.0 REFERENCES

- (DFO) Fisheries and Oceans Canada. 1992. Land Development Guidelines for the Protection of Aquatic Habitat.
- (TAC) Transportation Association of Canada. 2005. National Guide to Erosion and Sediment Control on Roadway Projects. Ottawa, Ont.
- Chillibeck, Barry. 1993 Land development guidelines for the protection of aquatic habitat. Department of Fisheries and Oceans and the Ministry of Environment, Lands and Parks, Victoria, BC. 129pp.



## 5.0 CLOSURE

This erosion and sediment control plan has been prepared for the exclusive use of Northwest Territories Power Corporation. The intended purpose of this plan and associated drawings is to provide mitigation of erosion and sediment transport for the currently active road. Any use which a third party makes of this report or any reliance on or decisions to be made based on it is the responsibility of such third parties. L&M Engineering Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. The information and data contained within this document represent L&M Engineering Limited's professional judgment in accordance with the knowledge and information available to L&M Engineering Limited at the time of the report preparation. No other warranty, expressed or implied, is made. Should you have any questions regarding the contents of this report please contact the undersigned.

Sincerely,  
L&M Engineering Limited

***Prepared by:***

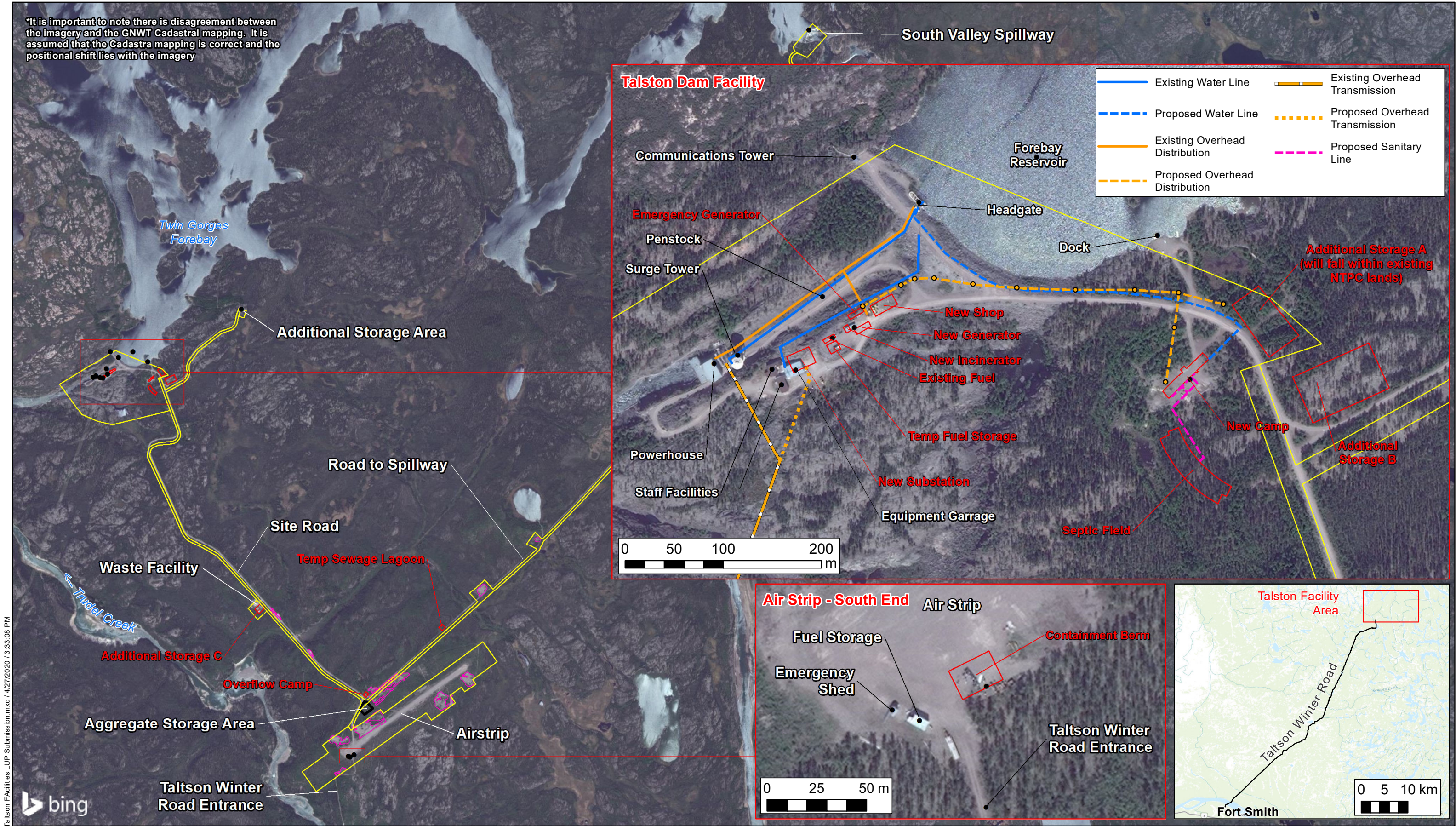


**Dustin Alexander, ASCT, CPESC**

# Appendix A



\*It is important to note there is disagreement between the imagery and the GNWT Cadastral mapping. It is assumed that the Cadastra mapping is correct and the positional shift lies with the imagery











Taltson Gravel Pit.mxd / 3/25/2020 / 2:39:06 PM



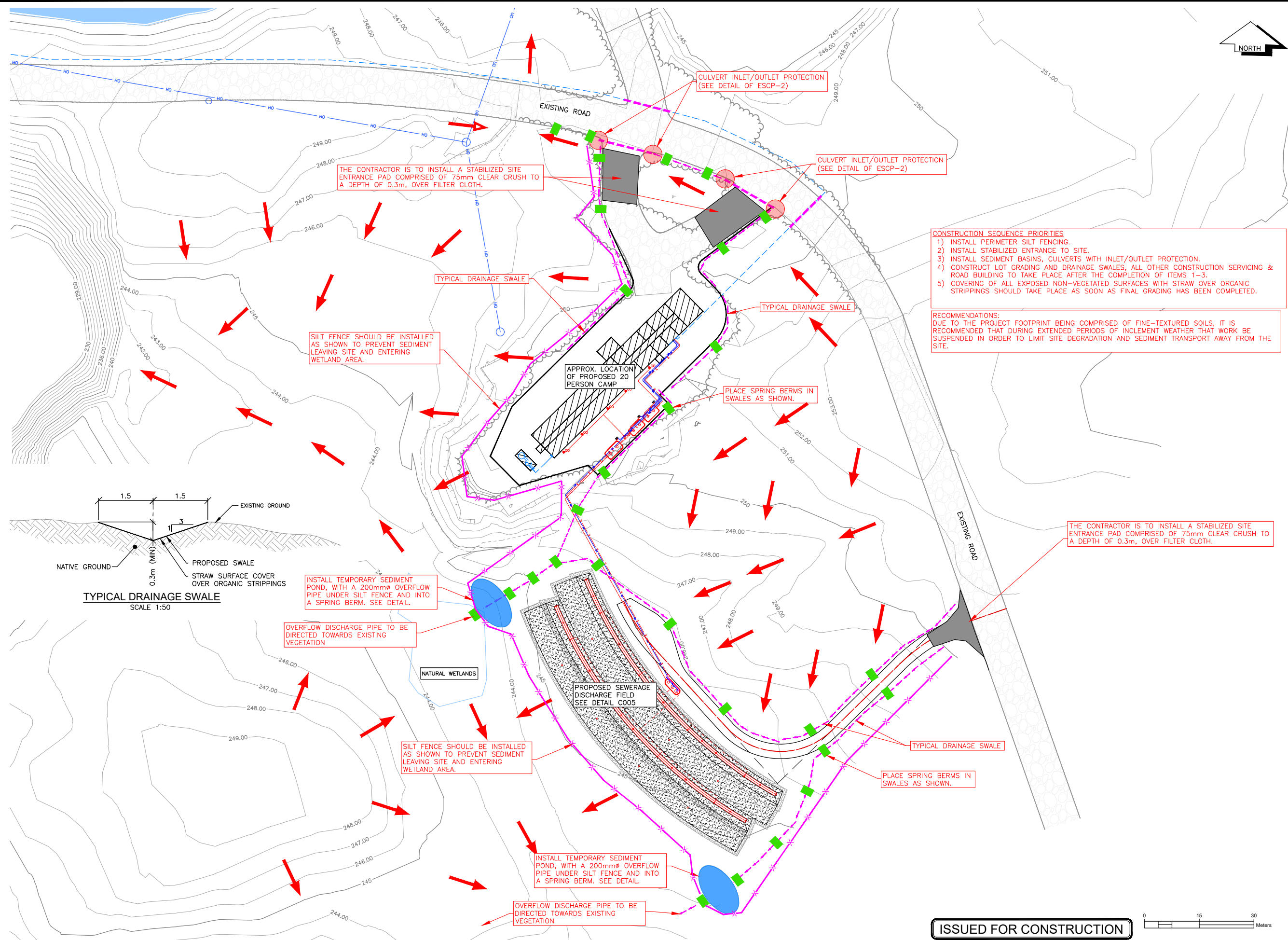
- |   |   |
|---|---|
|  Gravel Pit              |  Gravel Pit Extent       |
|  Pit Outline (EBA 2001)* |  Parcel Boundary (GNWT)* |

\*Inconsistency between data sources results in the appearance of error, however, pit locations and sizes are correct relative to the imagery

PROJECT NO.: DATE: DRAWN BY:	2019-6044.100.203 March 2020 DA	<b>GRAVEL PIT ACCESS</b>
		NTPC
		Taltson Gravel Pit Operations Plan




## **Appendix B**



**LEGEND**

- INLET/OUTLET PROTECTION
- SWALES
- SPRING BERM
- OVERLAND FLOW DIRECTION
- SILT FENCE
- SETTLING PONDS
- SEED MIX**
  - MOUNTAIN BROMEGRASS 15%
  - NODDING BROMEGRASS 15%
  - SHEEP FESCUE 20%
  - GREEN NEEDLE GRASS 15%
  - JUNEGRASS 15%
  - SLENDER WHEATGRASS 10%
  - ANNUAL RYEGRASS 10%

1	05/06/20	ISSUE FOR CONSTRUCTION	DDA
NO.	DATE	REVISION	DR.



**L & M**  
ENGINEERING LIMITED

1210 FOURTH AVENUE  
PRINCE GEORGE, B.C.  
V2L 3J4  
TEL. (250) 562-1977  
FAX (250) 562-1967

DRAWN:	DDA
CHECKED:	JSS
ENGINEER:	JSS
SURVEY FILE:	
DRAWING FILE:	C3D20 1702-01 NWTPC-ES
CORRESPONDENCE:	
GRID:	
DATE:	JUNE 2020
SCALES:	FULL: 1:500    HALF 1:1000

NWT POWER CORPORATION  
20 PERSON WORK CAMP

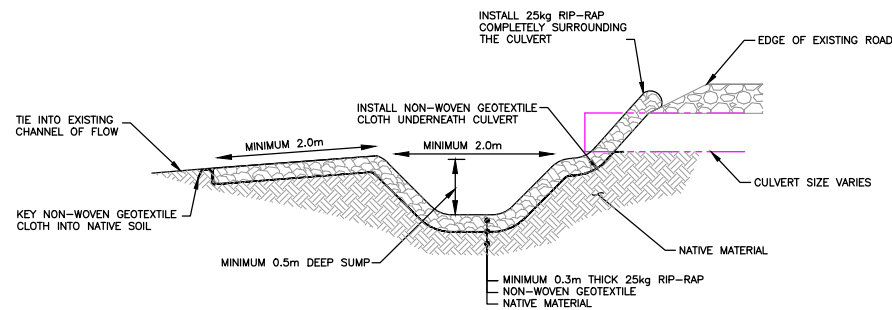
EROSION & SEDIMENT  
CONTROL PLAN

CONSULTANTS PROJECT No.  
1702-01  
DRAWING No.  
ESCP-1

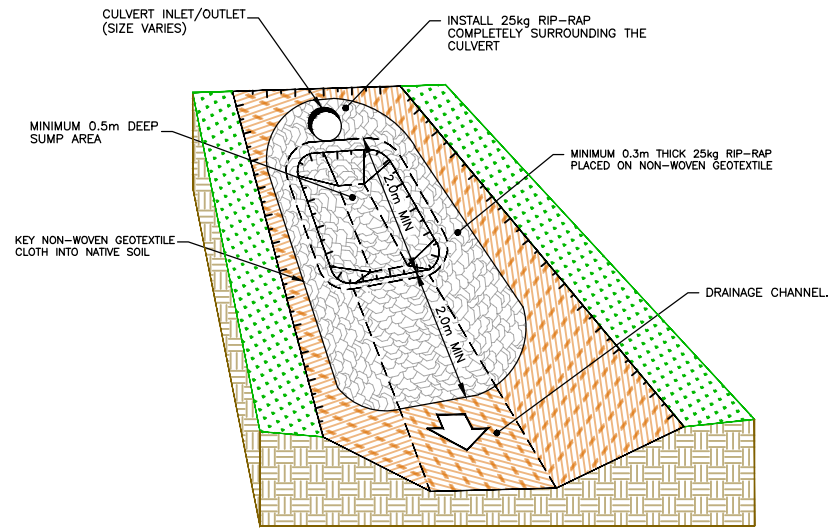
SHEET No.	REV. No.
1 OF 3	1

ISSUED FOR CONSTRUCTION

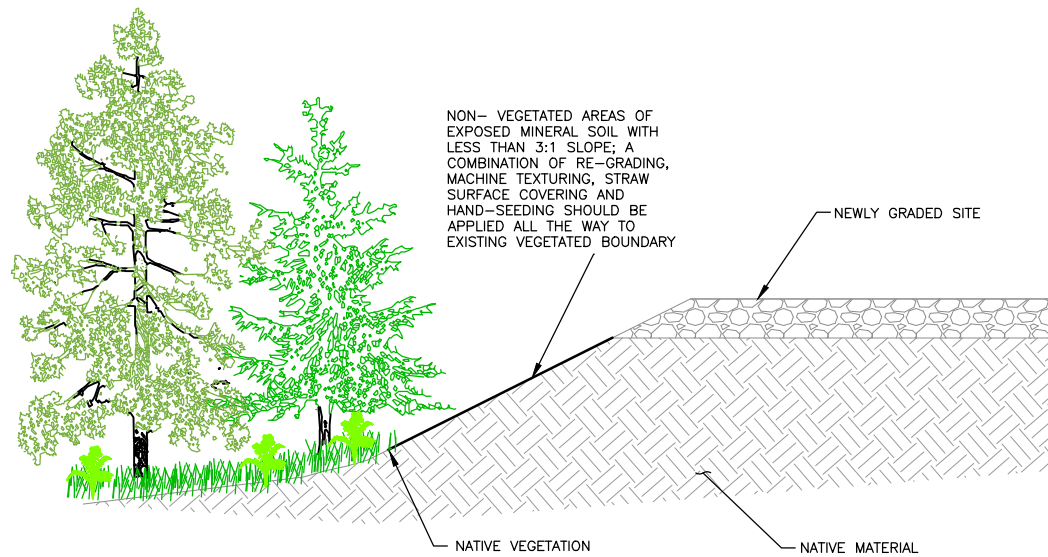
Q:\Jobs Files\1702\1702 - NWT Power Corp\01 - Tullion Work Camp\ESCP\1702-01 NWTPC-ESCP.dwg



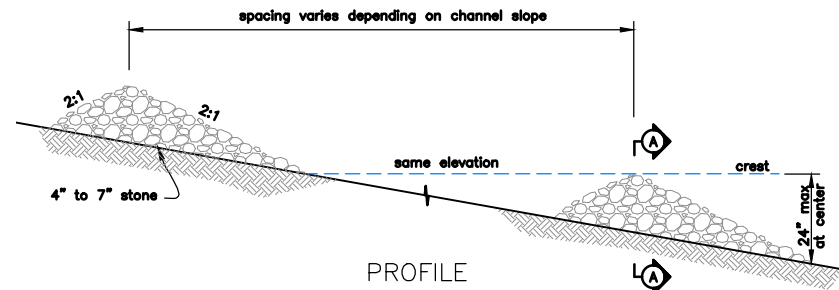
CULVERT INLET/ OUTLET PROTECTION SECTION DETAIL



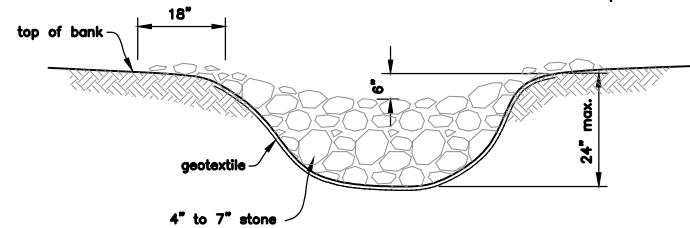
CULVERT INLET/OUTLET PROTECTION DETAIL



TYPICAL SLOPES STABILIZATION DETAIL



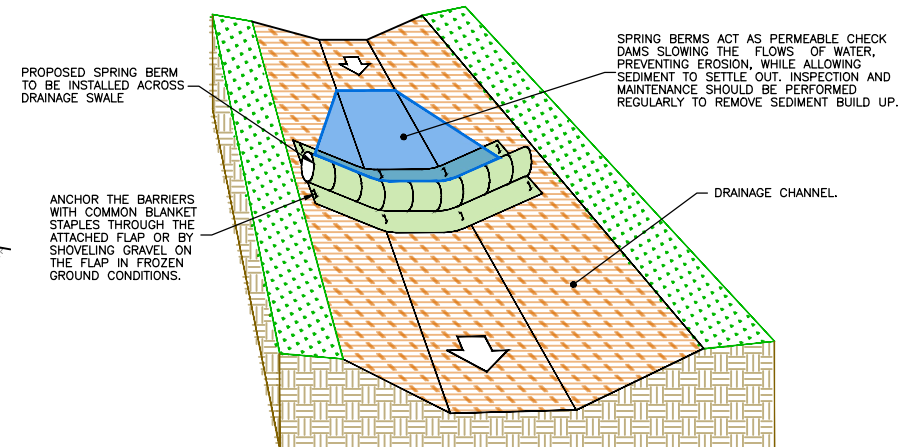
NOTE:  
Key stone into channel banks and extend it beyond the abutments a minimum of 18" to prevent flow around dam.



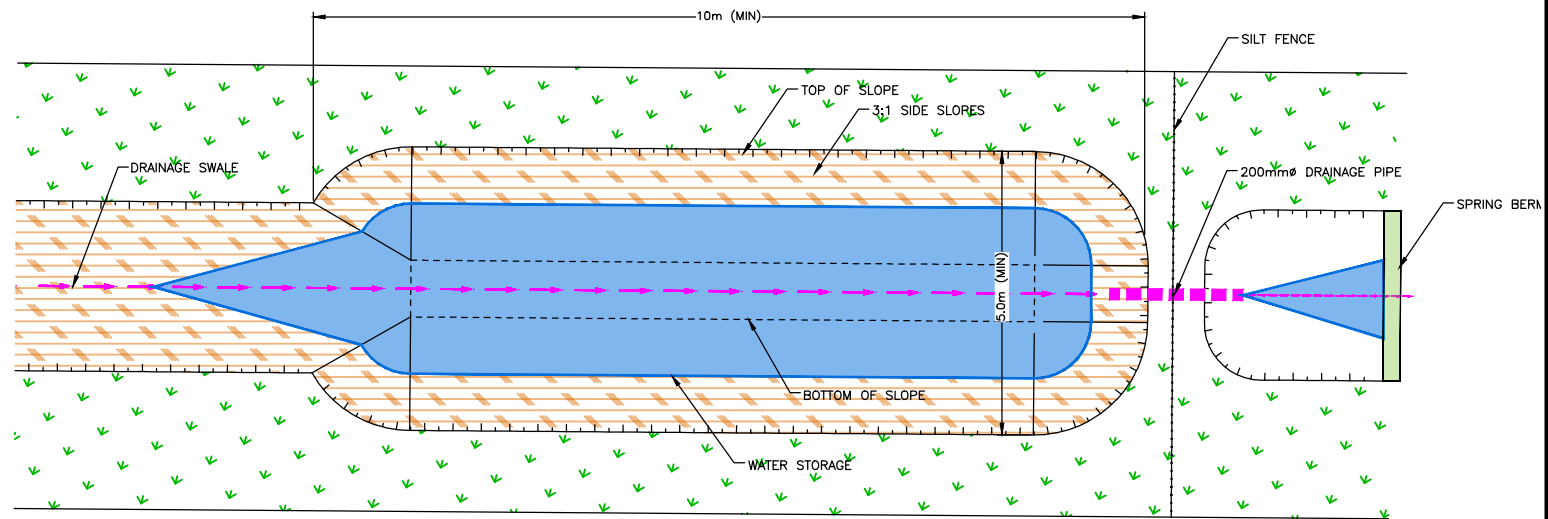
ROCK CHECK DAM DETAIL

STANDARD STONE CHECK DAM

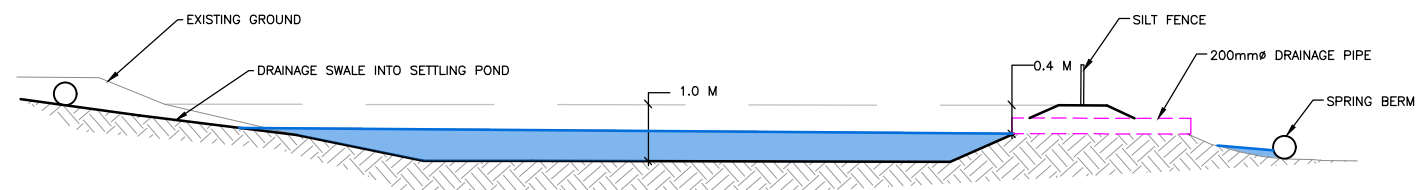
SLOPE	SPACING
2% or less	80 feet
2.1% to 4%	40 feet
4.1% to 7%	25 feet
7.1% to 10%	15 feet
over 10%	use lined waterway design



SPRING BERM CHECK DAM INSTALLATION DETAIL



TYPICAL SEDIMENT BASIN DETAILS



ISSUED FOR CONSTRUCTION

LEGEND

1	05/06/20	ISSUE FOR CONSTRUCTION	DDA
NO.	DATE	REVISION	DR.

**L&M**  
ENGINEERING LIMITED

1210 FOURTH AVENUE  
PRINCE GEORGE, B.C.  
V2L 3J4  
TEL. (250) 562-1977  
FAX (250) 562-1967

DRAWN:	DDA
CHECKED:	JSS
ENGINEER:	JSS
SURVEY FILE:	
DRAWING FILE:	C3D20 1702-01 NWTPC-ESCP.dwg
CORRESPONDENCE:	
GRID:	
DATE:	JUNE 2020
SCALE:	FULL: N/A

NWT POWER CORPORATION  
20 PERSON WORK CAMP  
  
EROSION & SEDIMENT  
CONTROL TYPICAL DETAILS

CONSULTANTS PROJECT No.  
**1702-01**  
DRAWING No.  
**ESCP-2**

SHEET No. 2 OF 3	REV. No. 1
---------------------	---------------



1.0 SITE PREPARATION AND PLANNING

DISTURBED AREAS WHERE VEGETATION HAS BEEN REMOVED CAN BE SUSCEPTIBLE TO EROSION DURING SUBSEQUENT RAIN EVENTS WHICH CAN MOBILIZE LOOSENEED SOIL PARTICLES. IN ADDITION, POOR SOIL STOCKPILING PRACTICES CAN FURTHER CONTRIBUTE TO SEDIMENT MOBILIZATION AND THE UNNECESSARY REMOVAL OF VEGETATED FILTER STRIPS CAN REDUCE THE EFFECTIVENESS OF POTENTIAL ONSITE SEDIMENT CONTROL MEASURES. THEREFORE,

- REMOVAL OF VEGETATION WILL BE MINIMIZED WHEREVER POSSIBLE.
- A PRE-CONSTRUCTION MEETING WILL BE HELD PRIOR TO ANY ACTIVITIES TO DELINEATE THE EXTENT OF ANY PROPOSED WORK AREA(S);
- CONTRACTORS WILL BE ADVISED NOT TO CONDUCT ANY WORKS OUTSIDE A DELINEATED WORK AREA WITHOUT PRIOR CONSULTATION AND APPROVAL FROM THE EROSION AND SEDIMENTATION CONTROL MONITOR (ESCM);
- THE DURATION AND QUANTITY OF ONSITE SOILS STOCKPILES WILL BE MINIMIZED TO THE GREATEST EXTENT POSSIBLE;
- SOILS AND CONSTRUCTION DEBRIS WILL BE STOCKPILED WITHIN THE WORK SITE OR OFF SITE. MATERIALS TO BE STOCKPILED ON PAVEMENT WILL BE PLACED ON PLASTIC AND CONTAINED WITHIN A BERMED AREA OR SURROUNDED BY SILT FENCE. ANY STOCKPILES THAT ARE TO REMAIN INACTIVE FOR LONGER THAN 7 DAYS WILL BE COVERED WITH TARPS OR POLY TO PREVENT EROSION.
- ONCE LAND CLEARING IS COMPLETE, DISTURBED AREAS NOT REQUIRED FOR OTHER CONSTRUCTION ACTIVITIES WILL BE SEEDED WITH AN APPROPRIATE MIX OF GRASSES TO STABILIZE DISTURBED SOILS OR PLANTED AS PART OF THE SITE DECOMMISSIONING OR LANDSCAPING PLAN.
- IN CONSULTATION WITH THE ESCM THE CONTRACTOR WILL DEVELOP A SCHEDULE OF WORKS OUTLINING THE STAGING OF CONSTRUCTION ACTIVITIES (E.G. LAND CLEARING, SITE SERVICING, AND ERECTION OF BUILDINGS).
- THE CONTRACTORS CONSTRUCTION SCHEDULE WILL CONSIDER THE FOLLOWING:
  - a) INTERCEPTOR DITCHES WILL BE CONSTRUCTED AS SOON AS POSSIBLE TO CAPTURE RUN-OFF FROM DISTURBED AREAS AND DIRECT WATER TO ONSITE TREATMENT FACILITIES;
- BASED ON THE SCHEDULE PROPOSED BY THE CONTRACTOR THE ESCM MAY RECOMMEND MODIFICATIONS TO THE ESCP TO ADDRESS SITE AND TIMING SPECIFIC CONCERNS ABOUT EROSION AND SEDIMENT CONTROL.

2.0 PROPERTY ACCESS

ACCESS OF VEHICLES AND HEAVY EQUIPMENT TO AND FROM CONSTRUCTION AREAS CAN BE A SIGNIFICANT SOURCE OF SEDIMENT TRANSPORT AND MOBILIZATION. ONCE SEDIMENT IS TRANSFERRED FROM CONSTRUCTION AREAS TO OFFSITE IMPERVIOUS AREAS (I.E. LOCAL PAVED ROADS) IT BYPASSES ONSITE SEDIMENT CONTROL MEASURES SUCH AS VEGETATED FILTER STRIPS, SEDIMENT TRAPS AND INTERCEPTOR DITCHES. SEDIMENT MOBILIZED OFF SITE FROM VEHICLE ACCESS CAN THEREFORE BE MAJOR CONTRIBUTOR TO POOR WATER QUALITY IN LOCAL DRAINAGE'S.

- THE CONTRACTOR WILL DELINEATE AND MAINTAIN DESIGNATED ACCESS AND PARKING AREAS TO MINIMIZE VEHICLE ACCESS TO AND FROM AREAS DISTURBED FOR CONSTRUCTION.
- VEHICLE TRAFFIC WILL BE RESTRICTED TO DESIGNATED ACCESS ROADS AND LANDINGS.
- THESE ROADS AND LANDINGS MUST BE CONSTRUCTED SO THAT MUD AND SEDIMENT ARE NOT GENERATED BETWEEN THE INTERFACE OF THE PAVED ROAD AND ONSITE, UNPAVED AREAS.
- ALL ROCK & WASH PADS SHALL BE CLEARLY MARKED. (IE: SIGNAGE)
- SEDIMENT TRACKED ONTO PAVED ROADS WILL BE REMOVED BY SHOVELING SWEEPING OR OTHER SIMILAR METHODS;
- WASHING OR DISPOSAL OF SEDIMENT INTO LOCAL DRAINAGE'S, DITCHES, CATCH BASINS, OR STORM SEWERS WILL NOT BE PERMITTED.

2.1 ROCK PAD

CONSTRUCTION TRAFFIC TRAVELING OVER SOIL AREAS SHALL ONLY EXIT OVER THE DESIGNATED ANGULAR ROCK PAD. THESE VEHICLES SHALL NOT ENTER OR EXIT THE SITE UNTIL THE ROCK IS INSTALLED. THE ROCK ENTRANCE PAD SHALL BE COMPRISED OF A 300mm LAYER OF CLEAN 100mmØ ANGULAR ROCK (SEE DETAIL - TYPICAL PROPERTY ASSESS - DRIVEWAYS). THE PAD SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF SEDIMENT ONTO THE PAVED ENTRANCE/EXIT ROAD. THIS MAY REQUIRE PERIODIC TOP DRESSING AND/OR REMOVAL AND REPLACEMENT OF THE ANGULAR ROCK PAD AS CONDITIONS DEMAND.

2.2 WHEEL WASH STATION

THE WHEEL WASH AREA SHALL BE USED IF IT IS FOUND THAT THE VEHICLES LEAVING THE SITE ARE TRACKING SEDIMENT ONTO PAVED ROADS AFTER TRAVELING OVER THE ROCK ENTRANCE PAD. THE WASH PAD SHALL BE SLOPED SUCH THAT ALL RUNOFF FROM THE WHEEL WASHING ACTIVITIES FLOWS TO THE ADJACENT SEDIMENT TRAP (SEE DETAIL WASH PAD-SEDIMENT TRAP SECTION). A 19mmØ PE CL160 WATER SERVICE PROVIDED TO THE WHEEL WASH LOCATION, C/W DOUBLE BACKFLOW PREVENTOR. 19mmØ GALVANIZED IRON OR BRASS PIPING SHALL BE USED FOR THE STAND PIPE ABOVE GROUND AND TERMINATED WITH TWO BRASS HOSE BIBS. THE STAND PIPE SHALL BE ADEQUATELY SUPPORTED c/w TWO HOSE RACKS. INSTALLATION OF THE SERVICE SHALL BE TO THE MMCD STANDARDS. TWO 20m LENGTHS OF 16mmØ HEAVY DUTY GARDEN HOSE AND NOZZLES SHALL BE SUPPLIED.

3.0 TRENCHING AND EXCAVATIONS

ACTIVITIES SUCH AS SITE SERVICING AND CONSTRUCTION OF BUILDING FOUNDATIONS REQUIRES EXCAVATION BELOW GROUND LEVEL, AND EXCAVATED TRENCHES CAN ACCUMULATE POOLED SURFACE WATER WHICH MAY NEED TO BE REMOVED BY PUMPING TO FACILITATE CONSTRUCTION.

- WATER FROM ONSITE EXCAVATIONS WILL BE REMOVED BY PUMPING FROM DESIGNATED DEWATERING SUMPS (SHORT SECTIONS OF PVC BURIED IN CLEAN GRAVEL) SEE DETAIL BELOW.
- THE CONTRACTOR WILL POSITION HOSES SUCH THAT THEY DISCHARGE ONTO ANCHORED GEOTEXTILE, POLY, PLYWOOD OR OTHER NON-ERODIBLE MATERIAL TO PREVENT SOIL EROSION AT THE POINT OF DISCHARGE.
- WATER WILL BE DISCHARGED TO THE PROPOSED SEDIMENT BASINS WITHIN THE WORK SITE.
- WHERE DISCHARGE TO VEGETATED AREA IS NOT FEASIBLE THE CONTRACTOR WILL DISCHARGE TO ONSITE INTERCEPTOR DITCHES AND/OR DIRECT WATER TO RECHARGE CHAMBERS FOR INFILTRATION TO GROUND;
- THE CONTRACTOR WILL PREVENT THE DISCHARGE OF SEDIMENT OR SEDIMENT LADEN WATER TO ROADSIDE DITCHES OR STORM SEWERS NOT CONNECTED TO ONSITE RECHARGE CHAMBERS;
- THE CONTRACTOR WILL MONITOR THE DISCHARGE AREA TO ENSURE EROSION IS NOT OCCURRING AT THE POINT OF DISCHARGE AND WATER IS NOT DRAINING TOWARD EXISTING BUILDINGS, WATERCOURSES, DITCHES OR OTHER STORM SEWER CONNECTIONS;
- ACCUMULATED SEDIMENT IN SUMPS, INTERCEPTOR DITCHES, RECHARGE CHAMBERS OR ON ROAD SURFACES AND OTHER AREAS WILL BE MANAGED SUCH THAT THEY ARE NOT MOBILIZED INTO LOCAL DRAINAGE'S OR STORM SEWER SYSTEM.
- THE CONTRACTOR SHALL STORE ADDITIONAL SILT FENCING, HAY BALES AND POLY TARPS ONSITE TO SUFFICIENTLY CONTAIN ALL EROSION FROM THE EXCAVATIONS.

4.0 CONTROL AND TREATMENT OF SURFACE WATER FROM DISTURBED AREAS

THE CONTRACTOR WILL ENSURE WORKS UNDERTAKEN FOR THE PROJECT WILL BE COMPLETED IN A MANNER PREVENTING THE DISCHARGE OF SEDIMENT TO ANY WATERCOURSE ABOVE ALLOWABLE TOTAL SUSPENDED SOLIDS (TSS) LEVELS OUTLINED IN THE 1993 LAND DEVELOPMENT GUIDELINES (LDG, CHILBECK, 1993). THE LDG SPECIFIES DISCHARGE TSS SHOULD NOT EXCEED 25MG/L ABOVE BACKGROUND LEVELS DURING DRY WEATHER CONDITIONS OR 75MG/L ABOVE BACKGROUND LEVELS DURING WET WEATHER CONDITIONS.

THE CONTRACTOR WILL SUPPLY AND INSTALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES FOR THE SITE AS SHOWN IN RELEVANT ESCP DRAWINGS OR ALTERNATIVE MEASURES AS DEEMED SUITABLE IN CONSULTATION WITH THE ESCM.

- RUN-OFF FROM AREAS DISTURBED FOR CONSTRUCTION WILL BE DIRECTED TO VEGETATION FILTER STRIPS FOR INFILTRATION OR TO THE PERIMETER INTERCEPTOR DITCH WHICH WILL CONVEY WATER TO ONSITE SEDIMENT BASINS.
- INTERCEPTOR DITCHES (IF REQUIRED) WILL BE CONSTRUCTED TO REDUCE WATER VELOCITIES AND ENCOURAGE INFILTRATION TO GROUND AND SETTLING OF SUSPENDED SOLIDS
- INTERCEPTOR DITCHES USED TO CONVEY DISCHARGE WATER AND SURFACE RUN-OFF MAY NEED TO BE LINED WITH NON-WOVEN GEOTEXTILE, BIODEGRADABLE LINERS OR OTHER NON ERODIBLE MATERIAL IN ADDITION TO GRAVEL CHECK DAMS.
- ONSITE AND ROADSIDE CATCH BASINS WILL BE PROTECTED. SUITABLE PROTECTION MAY INCLUDE NON-WOVEN GEOTEXTILE OR PRODUCTS SPECIFICALLY DESIGNED FOR CATCH BASIN PROTECTION SUCH AS CATCHBASIN DAMS, DONUTS AND CURB INLET FILTER SOCKS OR THE SILTSACK ® SYSTEM.
- ANY STOCKPILES THAT ARE TO REMAIN INACTIVE FOR LONGER THAN 7 DAYS WILL BE COVERED WITH TARPS OR POLY TO PREVENT EROSION.
- SILT FENCES WILL BE REQUIRED AROUND THE PROPERTY BOUNDARY OR STOCKPILE PERIMETERS, AND SHALL BE INSTALLED ACCORDING TO THE DETAILS SHOWN.

5.0 SITE DECOMMISSIONING AND REHABILITATION

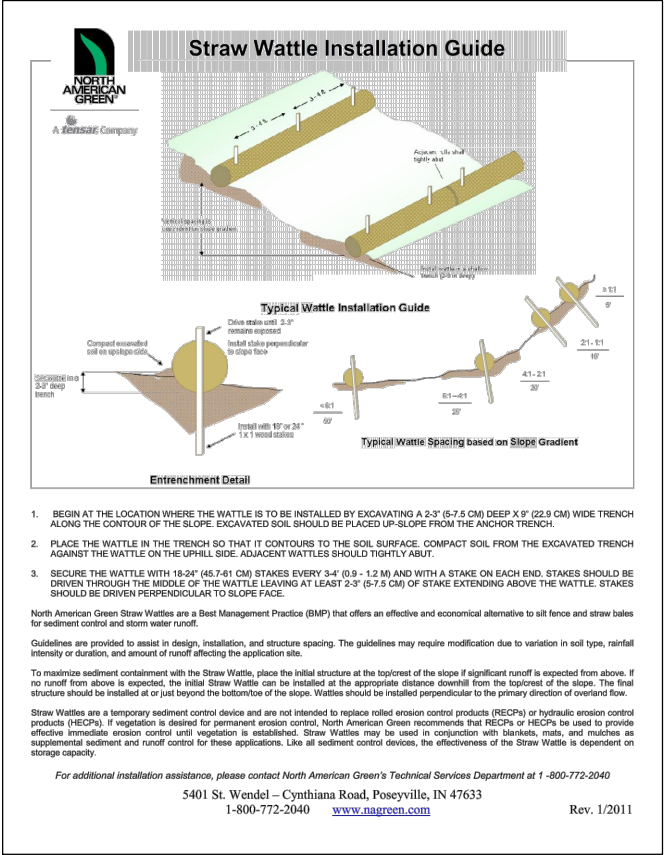
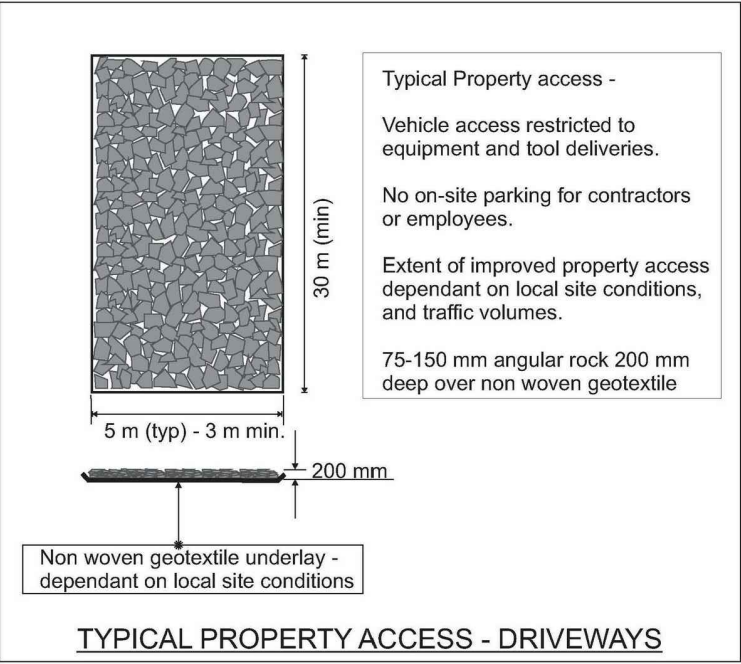
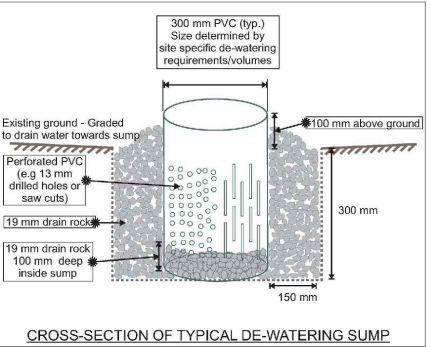
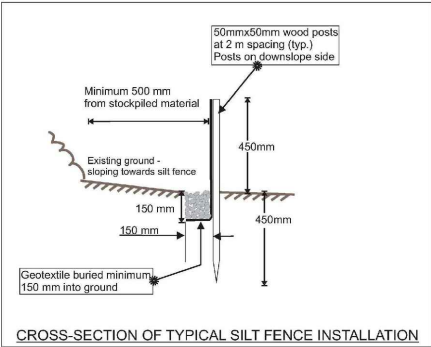
AS CONSTRUCTION ACTIVITIES PROGRESS SOME EROSION AND SEDIMENT CONTROL MEASURES BECOME REDUNDANT OR ARE NO LONGER EFFECTIVE AND IMPLEMENTATION OF PERMANENT SITE STABILIZATION MEASURES IS REQUIRED. EROSION AND SEDIMENT CONTROL MEASURES WILL BE MAINTAINED ONSITE IN GOOD CONDITION UNTIL THE ESCM CONFIRMS THEY ARE NO LONGER NEEDED AND MAY BE REMOVED;

- THE CONTRACTOR WILL BE RESPONSIBLE FOR REMOVING EROSION AND SEDIMENT CONTROL MEASURES ONCE THE ENVIRONMENTAL MONITOR CONFIRMS THEY ARE NO LONGER NEEDED;
- THESE MATERIALS WILL BE DISPOSED OF IN AN APPROPRIATE MANNER AT AN OFFSITE LOCATION;
- EXPOSED SOILS THAT WILL NOT BE LANDSCAPED BEFORE THE CONTRACTOR VACATES THE SITE SHOULD BE STABILIZED.
- EXAMPLES OF SOIL STABILIZATION INCLUDE BUT ARE NOT NECESSARILY LIMITED TO: HAND SPREADING GRASS SEED, APPLYING LOOSE STRAW, HYDRO-SEEDING, AND APPLICATION OF SPRAY ON COMPOST GROUT;
- THE EM WILL ASSIST THE CONTRACTOR IN DETERMINING APPROPRIATE SOIL STABILIZATION METHODS.

6.0 MONITORING AND REPORTING

REQUIREMENTS FOR EROSION AND SEDIMENT CONTROL VARY WITH LOCAL SITE CONDITIONS AND WEATHER PATTERNS. THEREFORE IT IS NECESSARY TO CONDUCT ROUTINE INSPECTIONS AND MODIFY OR ADAPT MITIGATION MEASURES TO CHANGING CONDITIONS. THEREFORE MONITORING, MAINTENANCE AND REPORTING ARE IMPORTANT COMPONENTS OF ANY ESCP.

- ONSITE PERSONNEL WILL CONDUCT ROUTINE INSPECTIONS (WEEKLY DURING DRY WEATHER AND DAILY DURING WET WEATHER) OF ALL EROSION AND SEDIMENT CONTROL MEASURES INSTALLED ONSITE
- EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED INCLUDE, BUT MAY NOT BE LIMITED TO; INSPECTION AND MAINTENANCE OF RECHARGE CHAMBERS, DEWATERING SUMPS, CATCH BASIN PROTECTION, SILT FENCES, INTERCEPTOR DITCHES, VEHICLE ACCESS ROUTES, SOIL STOCK PILES AND STAGING AREAS;
- THE CONTRACTOR WILL MAINTAIN AND MODIFY ALL SEDIMENT AND EROSION CONTROL MEASURES AS NECESSARY BEFORE, DURING, AND AFTER RAIN EVENTS TO ENSURE THEY ARE FUNCTIONING AS INTENDED.
- AN ESCM WILL VISIT THE SITE BI-WEEKLY, WITH ADDITIONAL VISITS CONDUCTED AS REQUESTED BY THE CONTRACTOR OR DURING HEAVY RAIN EVENTS (E.G. ≥ 10MM OVER 24 HOURS).
- DURING EACH VISIT THE ESCM WILL ASSESS THE CONDITION AND FUNCTION OF EROSION AND SEDIMENT CONTROL MEASURES, AND WILL DISCUSS ANY MAINTENANCE REQUIREMENTS OR SUGGESTIONS WITH THE SITE SUPERINTENDENT
- THE ESCM WILL PROVIDE A BRIEF WRITTEN SUMMARY OF ANY OBSERVATIONS AND RECOMMENDED MODIFICATIONS TO ESC MITIGATION MEASURES.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR IMPLEMENTING ANY CORRECTIVE MEASURES IDENTIFIED IN DISCUSSION WITH THE ENVIRONMENTAL MONITOR.



LEGEND

1	05/06/20	ISSUE FOR CONSTRUCTION	DDA
NO.	DATE	REVISION	DR.

**L&M**  
ENGINEERING LIMITED

1210 FOURTH AVENUE  
PRINCE GEORGE, B.C.  
V2L 3J4  
TEL. (250) 562-1977  
FAX (250) 562-1967

DRAWN:	DDA
CHECKED:	JSS
ENGINEER:	JSS
SURVEY FILE:	
DRAWING FILE:	C3D20 1702-01 NWTCP-ESCP.dwg
CORRESPONDENCE:	
GRID:	
DATE:	JUNE 2020
SCALES:	FULL: N/A

NWT POWER CORPORATION  
20 PERSON WORK CAMP

EROSION & SEDIMENT  
CONTROL NOTES & DETAILS

CONSULTANTS PROJECT No.	1702-01
DRAWING No.	ESCP-3

SHEET No.	REV. No.
3 OF 3	1

ISSUED FOR CONSTRUCTION



## **Appendix C**



1210 Fourth Avenue  
Prince George, B.C. V2L 3J4  
Tel. (250) 562-1977  
Fax (250) 562-1967

PROJECT NUMBER: 1702-01

CLIENT NAME: Northwest Territories Power Corp

DATE (dd/mm/yyyy):

### EROSION AND SEDIMENT CONTROL CHECKLIST

CONTRACT TITLE:	Taltson River Work Camp	LOCATION:	Taltson River NWT
CONTRACTOR'S NAME:		SITE STAFF:	
TIME ON SITE:		INSPECTED BY:	

CURRENT WEATHER CONDITIONS:

FORECAST:

PREVIOUS 24hr WEATHER CONDITIONS:

TOTAL RAINFALL (mm) - PREVIOUS 24hr: LAST 7 DAYS: STATION: PG Airport (WMO ID: 71302)

REPORT OF ONSITE CONSTRUCTION ACTIVITIES:

SITE SUPERVISOR(S) MET WITH DURING SITE VISIT:

SITE ACCESS/OFFSITE SEDIMENT TRANSPORT	YES	NO	N/A	COMMENT
Are the designated construction site access points in use and stable?				
Are the designated parking areas established, in use, and stable?				
Are measures in place to reduce offsite transport of sediment?				
Are the access roads free of sediment and being maintained?				
Are additional ESC measures required to contain the offsite transport of sediment to public roads?				
Have the previously recommended ESC recommendations been implemented since previous inspection?				
Has the contractor modified the existing ESC measures since the previous inspection?				
Are the ESC modifications installed and functioning as intended?				

Additional ESC measures required at site access points (street sweeping, wheel wash etc.):

EROSION CONTROL	YES	NO	N/A	COMMENT
Are inactive soil stockpiles covered or otherwise protected from erosion?				
Are erosion control measures functioning as intended?				
Are additional erosion control measures required for the soil stockpiles?				
Are swales or other water conveyance measures in place to direct stormwater runoff?				
Are swales or other water conveyance measures constructed as per ESCP specifications?				
Are swales or other water conveyance measures functioning as intended?				
Are additional water conveyance measures required?				
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:



## **Appendix C- TSS Monitoring Plan Taltson Camp Water Supply**



# 1 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) has prepared this appendix to *the Taltson Hydroelectric Facility Erosion and Sediment Control Plan* (ESCP) to provide a total suspended solids (TSS) monitoring plan (the Plan) to be implemented during the installation of the permanent water intake at the Twin Gorges Forebay Reservoir. This Plan provides specific guidance for monitoring the effects of in-water construction on suspended sediment and is based on the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life for total particulate matter.

The key objectives of this Plan are to:

- Prevent the release of sediment into the receiving environment during construction activities;
- Provide design guidance for establishing sampling locations;
- Monitor turbidity (nephelometric turbidity units [NTU]) as a field surrogate for total suspended solids (TSS);
- Compare turbidity levels and TSS concentrations during in-water work to the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life for total particulate matter; and,
- Provide a response framework relative to TSS measurements such that mitigation measures can be initiated as necessary to reduce TSS levels.

# 2 PROJECT DESCRIPTION

NTPC intends to construct a pumphouse facility and water intake to supply water to the camp facility. The proposed pumphouse and water intake will be constructed along the shoreline of the Twin Gorges Forebay Reservoir (Figure 2 of the Taltson ESCP). No clearing or grubbing of riparian vegetation is anticipated. Approximately 85 cubic metres (m<sup>3</sup>) of material will be excavated at the shoreline with approximately 63 m<sup>3</sup> of the excavation transpiring below the highwater mark.

The inlet will be excavated to a depth of approximately 4 m, and lined with a non-woven geotextile filter fabric, overlapped at the joints to a minimum of 1.5 m. A layer of clean pit-run gravel shall be placed over the filter fabric along the invert of the inlet prior to installation of the well and perforated drainpipes. The well, or HDPE perforated manhole, shall be lifted into place on the bedding gravel and leveled. The trench will be backfilled with clean pit-run gravel. The work, (excavation, installation of well and piping then backfilling), is planned to take place over a one-week period between July 16, 2022 and August 1, 2022, and the in-water work is estimated to take approximately 3 days.

The working area for the Project will be temporarily impounded during construction with turbidity curtain to minimize the potential for entrained sediments escaping beyond the excavation area. The turbidity curtain will be installed around the perimeter of the working area prior to commencement of construction. To avoid adverse effects to fish, a fish salvage will be conducted prior to starting excavation. During construction activities, a monitoring crew will be onsite to ensure turbidity levels remain within background expectations. Regular inspections of the

turbidity curtain and other ESC measures will occur during the construction, and damaged or ineffective measures will be immediately repaired or replaced with effective controls. The turbidity curtain will be removed upon completion of construction and start-up of the pumphouse.

### 3 CONSTRUCTION MONITORING

Turbidity monitoring is required for any in-water construction and where there is potential for entrainment of sediments during construction. This includes locations where construction may occur below the high-water mark.

#### 3.1 SAMPLE SITE SELECTION

The monitoring crew is expected to establish sampling (cross-sectional) transects relative to the work area as per the following design:

- Background reference representing baseline conditions shall be collected at minimum 50 m from the work area into the pelagic zone
- Turbidity readings shall be collected at 10 m increments to up to a distance of 30 m from the turbidity curtain.
- Transects shall be established at 10 m (Transect #1), 20 m (Transect #2) and 30 m (Transect #3) from turbidity curtain.
- Samples shall be collected at 5-10 m intervals for each transect around the circumference of the turbidity curtain.

Site selection should be considered flexible, as environmental conditions at the time of monitoring, such as wind strength and direction and morphology of the Forebay basin, will affect the behaviour of silt pluming within the waterbody. Methods should be adapted by the Environmental Monitor, based on professional knowledge and experience, to undertake turbidity monitoring that will appropriately capture data that will inform of radiating turbidity and a departure from baseline conditions.

Once established, all transect locations will be marked with a GPS. The crew will then collect samples for background turbidity and TSS measurements at each site. The creation of samples that represent a range of TSS concentrations will be sent to an accredited laboratory for RUSH analysis to ensure that results are available prior to construction.

##### 3.1.1 TSS-Turbidity Relationship

Measurements of TSS (mg/L) requires specialized equipment and considerable time, making the required analytical procedure impractical for use in field settings. For this reason, measurements of turbidity (Nephelometric Turbidity Units [NTU]) have been proposed for the Project as a surrogate measurement for TSS. A turbidity-TSS relationship will be developed which will allow for the calculation of TSS concentrations in the field during construction.

Prior to construction, representative sediment samples will be collected from the water body in the area of proposed disturbance. The sediment and water samples will be combined to produce approximately 20 surrogate suspended sediment samples, creating a range of turbidity values that might be encountered during construction.

The samples will be measured for turbidity and then submitted to the predetermined accredited laboratory to determine the TSS concentration of each sample. Upon receipt of laboratory results, TSS-turbidity relationship will be developed specific to the Project location to allow for the estimation of TSS concentrations based on the turbidity measurements collected during in-water construction activities.

### 3.1.2 Turbidity Measurements

The transects and background reference will be sampled twice daily, but more frequent monitoring may be triggered based on monitoring results (e.g., elevation of TSS or exceedances of CCME guidelines). In addition, there shall be at least two measurements following the removal of the turbidity curtain and start of the pumphouse. If samples collected from Transect #2 show no compliance exceedances, continued sample collection from Transect #3 will be at the discretion of the monitoring crew.

A depth integrated water sample will be collected for each sample location, with the crew lowering and raising a bottle attached to a pole through the water column at a constant rate to collect the sample. For sites where depths are shallower than 0.5 m, samples can be collected by hand at the mid-column depth. Any samples where the bottle or pole contact the substrate will be discarded and resampled after any disturbed sediment has settled out (e.g., 30 seconds).

Turbidity will be measured using a portable turbidity meter. The meter will be calibrated daily using a blank (0 NTU) and a standard appropriate for the range of expected turbidity levels (i.e., 10, 40, 100, or 400 NTU) following manufacturer' instructions. Prior to measuring turbidity, each sample collection container will be gently agitated to re-suspend solids. The outside of the 20 mL test vial will also be cleaned and dried with ultra-low lint tissue prior to testing. The inside of the test vial will then be rinsed three times with a portion of the sample being tested, and then a sub-sample will be immediately withdrawn and analyzed in the test vial. This process will be repeated for each sample. Samples will be disposed on-site or archived for TSS analysis, if needed.

Turbidity measurements will be used to predict TSS. The results for each of the baseline sample points will be averaged to determine a background TSS concentration (mg/L) for each sampling event. The average TSS concentration (mg/L) will then be calculated for each of the transects (cross sections) and compared to the background TSS concentration (mg/L).

The monitoring crew will also be responsible for maintaining a construction activity log, photo log, and calibration log, and will be responsible for reporting any plumes or elevated levels of TSS to the Project Supervisor.

Quality Assurance/Quality Control (QA/QC) of sample collection procedures will involve the collection of replicate samples in rapid succession from one site for 5 to 10% of the grab samples. QA/QC of the preparation of sub-samples will be assessed by split measurements from a single

sample to verify the consistency of sample agitation procedures (i.e., the 20 mL vial will be filled three separate times from one water sample with each being analyzed three times; this will be done for 5-10% of the samples). QA/QC of turbidity meter repeatability will be conducted during the entire monitoring period by measuring and recording every sub-sample (20 mL vial) three times.

### 3.1.3 Response Framework

The response framework relative to TSS measurements is provided in Table 1-2. This approach constitutes passive adaptive management, or the application of best practices, and is based on the CCME Guidelines for the Protection of Aquatic Life.

**Table 1-1: Response Framework for TSS Measurements**

Threshold <sup>(a)</sup>	Action Level	Tasks
TSS less than 15 mg/L above background at first transect, lakeward side of the turbidity curtain.	None	<ul style="list-style-type: none"> <li>Continue with construction with no further mitigation actions required</li> </ul>
TSS exceeds 15 mg/L above background but is less than 25 mg/L at the first transect lakeward side of the turbidity curtain.	Low	<ul style="list-style-type: none"> <li>Monitoring crew to determine if TSS inputs are related to construction activities or are from an external source.</li> <li>If TSS inputs are determined to be construction related, notify the Project Supervisor or designate and modify pace of in-water activity to the extent safe to do so, and begin sampling at next transect away from the turbidity curtain (20 m)</li> </ul>
TSS exceeds 20 mg/L above background at the first lakeward-side transect, but remains less than 25 mg/L.	Medium	<ul style="list-style-type: none"> <li>Notify the Project Supervisor or designate, modify pace of in-water activity to the extent safe to do so, and implement mitigation measures where feasible</li> <li>Increase frequency of monitoring and continue to sample at Transect #3.</li> </ul>
TSS exceeds 25 mg/L above background at the first transect lakeward side of the turbidity curtain.	High	<ul style="list-style-type: none"> <li>Notify Project Supervisor or designate, stop all in-water activity, implement additional mitigation measures</li> <li>Increase frequency of monitoring</li> <li>When TSS concentrations decline below 25 mg/L and there is a declining trend over two monitoring events, NTPC will resume construction.</li> </ul>

<sup>(a)</sup>TSS threshold based on an 'instantaneous measurement' averaged over samples collected at the three sampling locations on the first transect

## 3.2 REPORTING

The results of the turbidity monitoring program will be reported within the Water Licence Annual Report and will include information collected throughout turbidity monitoring, including:

- Sample site locations;
- Results of TSS – turbidity relationship calculations;
- Results of turbidity monitoring;
- Any actions taken under the Response Framework; and,
- Any changes to procedures outlined in the Plan as a response to environmental or site-specific conditions.