

MUNICIPALITY OF CLYDE RIVER

**Operation & Maintenance Plan for
Municipal Water Licence: Sewage
Disposal Facilities**

November 2024

Municipality of Clyde River

Operation & Maintenance Plan for Municipal Water Licence: Sewage Disposal Facilities

November 2024

Document Control

Date	Document Title	Author	Details
July 2012	Clyde River Waste Water Facility Clyde River, Nunavut Operations and Maintenance Manual Volumes 1 and 2	exp Services Inc.	Previous manual
November 2024	Clyde River Operation & Maintenance Plan for Municipal Water Licence: Sewage Disposal Facilities	GN-CGS and Dillon Consulting Limited	Consolidation of previous manuals into standardized template

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1.0 Site Description

Date this plan was prepared: 2024-Nov-13

1.1 Location of the Sewage Disposal Facility (SDF)

Municipality: Clyde River
Latitude: 70°28'59 N
Longitude: 68°36'48 W
Proximity to Town: 1.2 km West



Figure 1: Clyde River Sewage Disposal Facility from Clyde River Waste Water Facility Clyde River, Nunavut Operations and Maintenance Manual Volumes 1 and 2, exp Services Inc

1.2 SWDF Site Summary

Year of commissioning the SDF: 2012

Design life of the SDF: 2028

1.2.1 Site History

The sewage treatment facility is located approximately 1.2 km west of the community. The facility was commissioned in 2012 and is comprised of a discharge area, two sewage detention cells, and a wetland area. Effluent flows 720 metres through the wetlands from the sewage detention cells to the marine environment of Patricia Bay. The site location was based on the scope of work presented in the “Clyde River Sewage Management – Planning Study (2003)” – completed by Dillon Consulting Limited. The report indicated that the previous site was suited for sewage treatment and the feedback from community officials and regulators approved the location. The site complied with the separation requirements of the Public Health Act (450m buffer), Transport Canada (3000m airport buffer), and the community water supply (400m buffer). The road servicing the lagoon is cleared and maintained year-round to access the community solid waste site, metal dump as well as the current lagoon system.

1.2.2 Ground Conditions

Permafrost is present in the soil; it recedes to approximately 1m below the surface in the summertime.

1.2.3 Treatment System

The wastewater treatment system utilizes sewage detention cells, which receive trucked wastewater, as the main method of treatment. The filter strip wetland provides additional treatment prior to the release to the environment. The treated sewage effluent is pumped from the sewage disposal facility to the wetland area beginning mid-August and continuing until mid to late September. The end of the Vegetated Filter Strip Wetland Area is located approximately 720 metres from the discharge point of the sewage disposal facility, at Patricia Bay.

2.0 Staff

2.1 Chief Administrative Officer

Name: Rajesh Kumar
Phone: 867-924-6220
Email: cao@clyderiver.ca

Responsibilities:

The CAO manages the municipal staff to ensure that:

- Proper operation of the SDF is carried out
- Sampling and inspections are completed
- Information under the water licence monitoring program is provided to the Government of Nunavut Department of Community and Government Services (GN-CGS) for Annual Report preparation
- Submission of the Annual Report for the Nunavut Water Board (NWB)

2.2 Foreman

Name: Ian Tigullaraq
Phone: 867-924-6301
Email: pworks@clyderiver.ca

Responsibilities:

- Daily operations and maintenance of the SDF.
- The sampling program at the monitoring stations
- Maintaining signage at the SDF and monitoring stations
- Annual decanting of the lagoon effluent into the adjacent wetland treatment area

2.3 Solid Waste Truck Drivers

Name: Various
Phone: N/A
Email: N/A

Responsibilities: The sewage vacuum truck drivers collect sewage from holding tanks within the municipality. Sewage is transported to the lagoon where it is deposited.

3.0 Health and Safety

All personnel working within the SDF must follow the Nunavut Safety Act and be made aware of potential health hazards associated with working around sewage and wastewater. This is imperative so individuals make a conscious effort to perform all necessary safety procedures to protect themselves, their co-workers and family members at home. Safety precautions include:

- Ensure all equipment is kept as clean as possible;
- Assume anything touched by sewage is contaminated;
- Protective clothing such as coveralls, gloves, boots, and safety glasses are to be provided to personnel and always worn when working around sewage;
- Workers must always wear protective gloves
- Work clothing is not worn home
- Workers must wash their hands with soap and water on a regular basis, especially before delivering drinking water, eating and before going home;
- Workers are prohibited from eating or drinking in and around the sewage vacuum trunks; and
- Workers must keep their vaccinations up to date.

4.0 Security and Control

Access Control of to the facility:

- Perimeter fencing around the SDF
- Signage
- 450 m restricted land use development setback surrounding the SDF

5.0 Wastewater Conveyance

Wastewater transportation:	Vacuum Truck
Annual volume of sewage collected:	Reported in Annual Report
Number of days per week sewage is collected:	5

5.1 Operations

- Sewage is collected Monday through Friday from holding tanks in residences and other buildings in the community. Sewage is collected using sewage vacuum trucks.
- The vacuum trucks pump out sewage from the building holding tanks and transport it to the detention cell.
- Sewage is deposited into the lagoon from the vacuum trucks using one of three offload chutes and concrete splash pads, located on the east side of the offload truck pad. The sewage truck backs up to one of the offload chutes and the release valve of the truck is opened. Bollards with railings have been placed in front of each offload chute for safety precautions. Sewage should be disposed in the south cell first until filled, then the smaller north cell.
- The volume of sewage discharged into the lagoon is estimated from the municipal water delivery records

5.2 Influent Volume

Table 1 Wastewater Generation Estimates

Year	Estimated Wastewater Volume (m³)	Difference (%)
2015	35,806	0
2016	35,576	-1.2%
2017	37,383	5.3%
2018	37,843	1.4%
2019	39,289	3.2%
2020	41,194	5.4%
2021	42,147	2.3%
2022	42,245	0.2%
2023	41,982	-1.7%

6.0 SDF Design

Lagoon Capacity:	58,500 m ³
Lagoon Dimensions:	Unknown
Wetland Treatment Area:	Unknown
Wetland Hydraulic Retention Time:	Unknown
Effluent Path Length:	720 m
Discharge Method:	Decant
Final Receiving Body:	Patricia Bay
Type of Receiving Environment:	Marine

An overview of the wastewater treatment process:

Sewage is discharged into the detention cell year-round. The detention cell provides primary treatment of sewage as effluent is held in the impervious cell for a period of time. In August, the filter strip wetlands are ice-free and considered active. The lagoon is decanted during this stage to provide a continuous release of effluent over the wetland during the optimal period for treatment. Sewage trucks will continue discharging to the lagoon throughout the decanting process. The outlet infrastructure is complete with a distribution trough along the toe of the berm used to disperse the pumped effluent across the head of the wetland. The natural wetland provides the post-lagoon final treatment prior to the release into Patricia Bay.



Table 2 Seasonal Effluent Flow Through the Wetland Treatment Area

Description of the Final Receiving Environment:

Patricia Bay is part of the larger Clyde Inlet, which opens into Davis Strait. Patricia Bay is home to diverse wildlife, including whales, seals, polar bears, and caribou. The bay provides access to the Ninginganiq National Wildlife Area, also known as the Igaliqtuuq National Wildlife Area, which is a protected bowhead whale sanctuary located in nearby Isabella Bay

7.0 Effluent Discharge

Discharge Method:	Decant
Time of Decant:	August - September
Duration of Decant:	1 month
Average Discharge Flowrate:	Unknown m3/d

Description of Effluent Sampling Procedures:

Per water licence 3BM-CLY1924, the Municipality is required to measure and record in cubic metres the daily, monthly, and annual quantities of effluent pumped or discharged from Monitoring Program Stations CLY-4 and CLY-5. Sampling at Monitoring Program Stations CLY-4, CLY-5, CLY-6a and CLY-6b is required a minimum of three (3) times annually, to include once upon commencement, once approximately mid-way through discharge, and once prior to discharge ending. If the discharge at Station CLY-4 or CLY-5 has been suspended and subsequently restarted with more than a 48-hour lapse, the sampling should be repeated.

Description of Operations:

Daily operations involve the collection of municipal wastewaters from holding tanks and delivery to the sewage lagoon system, minimizing spills, and immediately clean up when they occur, repairing equipment when breakdowns occur, maintaining roads, discharge point, and truck turning pads as required free of snow, and recording O&M information as required. Weekly operational duties involve removing non-sewage materials from the lagoon (floating materials such as plastic bags should be removed and solid items disposed at the solid waste site adjacent to the lagoon), assessing truck discharge location and containment berms for erosion, and recording O&M information as required. Monthly duties include preventative measures and maintenance on sewage trucks, assessing inventory of parts for truck maintenance, grading and maintaining the access road, berms, and offloading chutes as required, conducting the monitoring program as required, and recording O&M information as required. Yearly duties include carrying out the decanting process, decanting pump maintenance, conducting the annual monitoring program, and reviewing the operation and maintenance records to evaluate the effectiveness of the sewage treatment system and plan for the upcoming year.

8.0 Maintenance

Overview of Maintenance Activities:

- Annual inspections will be undertaken by Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) accompanied by a licensee from the Municipality of Clyde River and/or a licensee representative from GN-CGS. The inspection report and recommendations will be reviewed by a GN-CGS municipal engineer and submitted in the Annual Report submitted to the Nunavut Water Board (NWB).
- Regular visual inspections by municipal staff of the:
 - Offload chutes
 - Lagoon berms
 - Signage

Any issues identified by municipal staff must be reported to the regional municipal engineer. Follow-up actions will be undertaken by the municipality with support from the GN-CGS.

Sludge Management:

It is anticipated that the sewage lagoon will not require desludging during its 20-year design life, the available storage for sludge is greater than the quantity estimated to be generated. Effluent quality will guide when a sludge management program is implemented. Monitoring of the effluent from the lagoon will indicate when the performance of the lagoon starts to degrade. Degradation of the performance of a lagoon is normally caused by sludge accumulation and will be the indicator to desludge the lagoon. Prior to disposal, the sludge must be tested to ensure the disposal method chosen is safe and environmentally responsible.

Evaluating the analytical results obtained by sludge sampling, the Government of Nunavut defaults to criteria established by the Canadian Council of Ministers of the Environment (CCME). For soil, the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (updated September 2007) is used to compare the metals and VOC analytical results. The CCME has also established the Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (April 2001), which is the federal remedial standard for petroleum impacted soils. The CCME and CWS criteria are based on four land use categories: i) agricultural; ii) residential/parkland; iii) commercial; and iv) industrial. As the sludge is to be disposed of at the landfill site, the industrial land use category is utilized for assessing the sludge management.

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Surface Water Management:

Runoff from the Sewage Disposal Facility is monitored on an annual basis so that grading directs surface water away from the lagoon berms.

At some point, for a variety of reasons, impacted surface water may accumulate SDF. The water may or may not be impacted contaminants from sewage. In the event this occurs, the following procedures will be followed:

1. Collect samples from the water licence monitoring program at stations as outlined in the Environmental Monitoring Program and QA/QC Plan. It is recognized that it may take some time for results to be received from the accredited laboratory.
2. Analyze samples for parameters of concern and compare the results to the relevant Canadian Water Quality Guidelines.
3. Water should be inspected for odours, stain, or signs of visible impact (sheens, floating scum).
4. Consult with the GN-CGS municipal engineer and CIRNAC on discharge options.

9.0 Monitoring

Regulatory Inspection: The annual CIRNAC inspection will take place accompanied by the licensee from the Municipality and/or with a licensee representative from GN-CGS. The inspection report will be reviewed by a GN-CGS municipal engineer and submitted with the annual report.

Table 2 License Requirements Related to O&M of the SDF

Requirements	Reported
Monthly and annual quantities of wastewater disposal	Annual report submitted to NWB
Notice of commencement of monitoring program and observed flow	Notice given to the CIRNAC inspector
A summary of modifications and/or major maintenance work carried out on the SDF	Proposal submitted to NWB 60 days prior
A list of spills and unauthorized discharges.	Annual report submitted to NWB
A summary of any studies requested for the SDF and future planned studies planned	Annual report submitted to NWB
Monitoring Program Station CLY-4 and CLY-5 shall not exceed the effluent quality limits: 100 mg/L BOD ₅ 120 mg/L TSS 1x10 ⁶ CFU/dl Fecal Coliform No visible sheen of Oil and grease 6-9 pH	Annual report submitted to NWB
A freeboard of 1.0 m in the lagoon must be maintained	Annual report submitted to NWB

Municipality of Clyde River

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Table 3 Monitoring Program Station Location and Description

Station	Description	Latitude	Longitude
CLY-4	Effluent Discharge from Existing Sewage Disposal Facility	70°28'4.70"N	68°38'5.39"W
CLY-5	Effluent discharge from Enhanced Sewage Disposal Facility (Lagoon decanting point)	70°28'6.79"N	68°37'49.57"W
CLY-6a (inactive)	Sampling well at the end of Vegetated Filter Strip Wetlands	70°27'48.06"N	68°37'25.40"W
CLY-6b	Surface water at the end of the Vegetated Filter Strip Wetland in vicinity of CLY-6a	70°27'46.20"N	68°37'31.49"W
CLY-8	Sewage Sludge	70°28'12.15"N	68°37'51.59"W

10.0 Modifications and Upgrades

Planned modifications or upgrades:

N/A

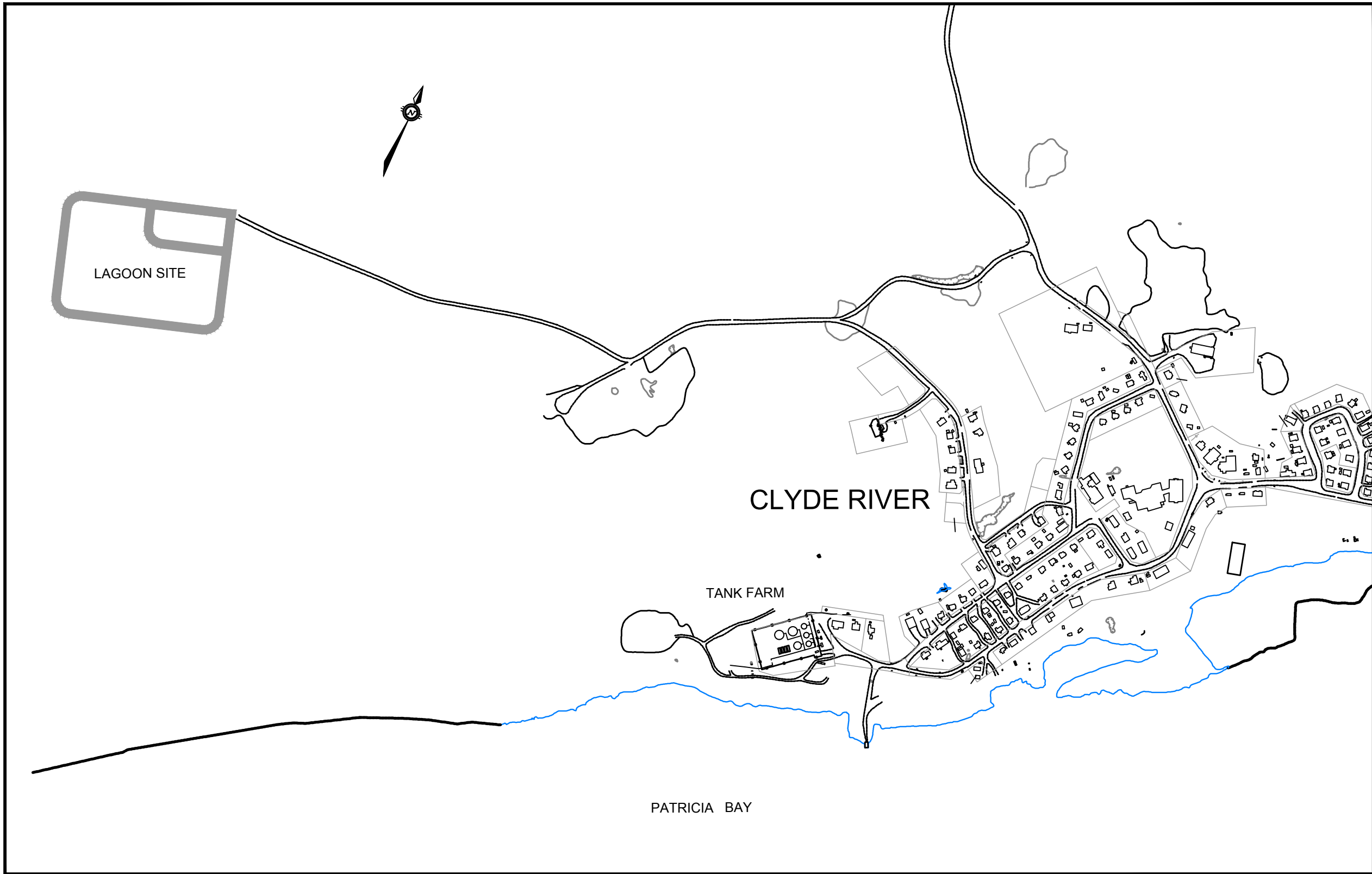
11.0 Previous Reports

- Clyde River Waste Water Facility Clyde River, Nunavut Operations and Maintenance Manual Volumes 1 and 2, exp Services Inc, 2012

Appendix A

As-Built Drawings

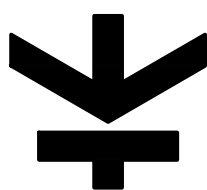
GOVERNMENT OF NUNAVUT



INDEX OF INCLUDED DRAWINGS

DRAWING NO.	REVISION	DESCRIPTION
		COVER
OTCD00019055A-SP1	REV 6	OVERALL SITE PLAN
OTCD00019055A-SP2	REV 6	SITE PLAN
OTCD00019055A-TD1	REV 7	TRUCK DISCHARGE SITE PLANS
OTCD00019055A-DE1	REV 6	DETAILS
OTCD00019055A-DE2	REV 6	DETAILS
OTCD00019055A-T1	REV 3	MUNICIPAL LOCATION PLAN

CLYDE RIVER WASTEWATER LAGOON (NEW SEWAGE LAGOON AND REHABILITATE EXISTING LAGOON)



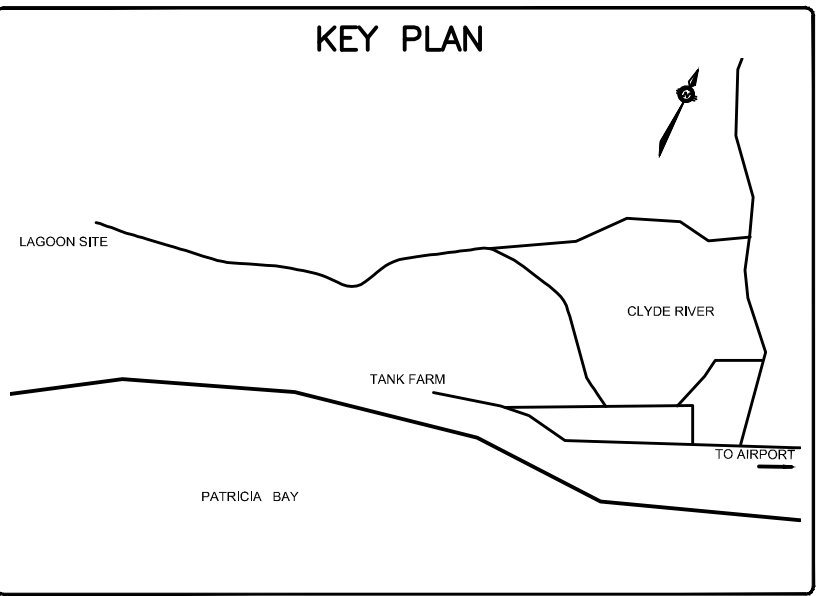
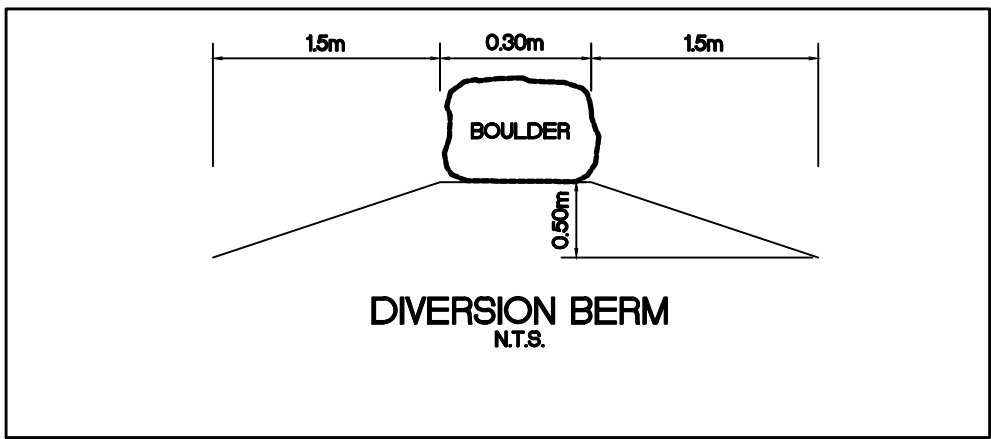
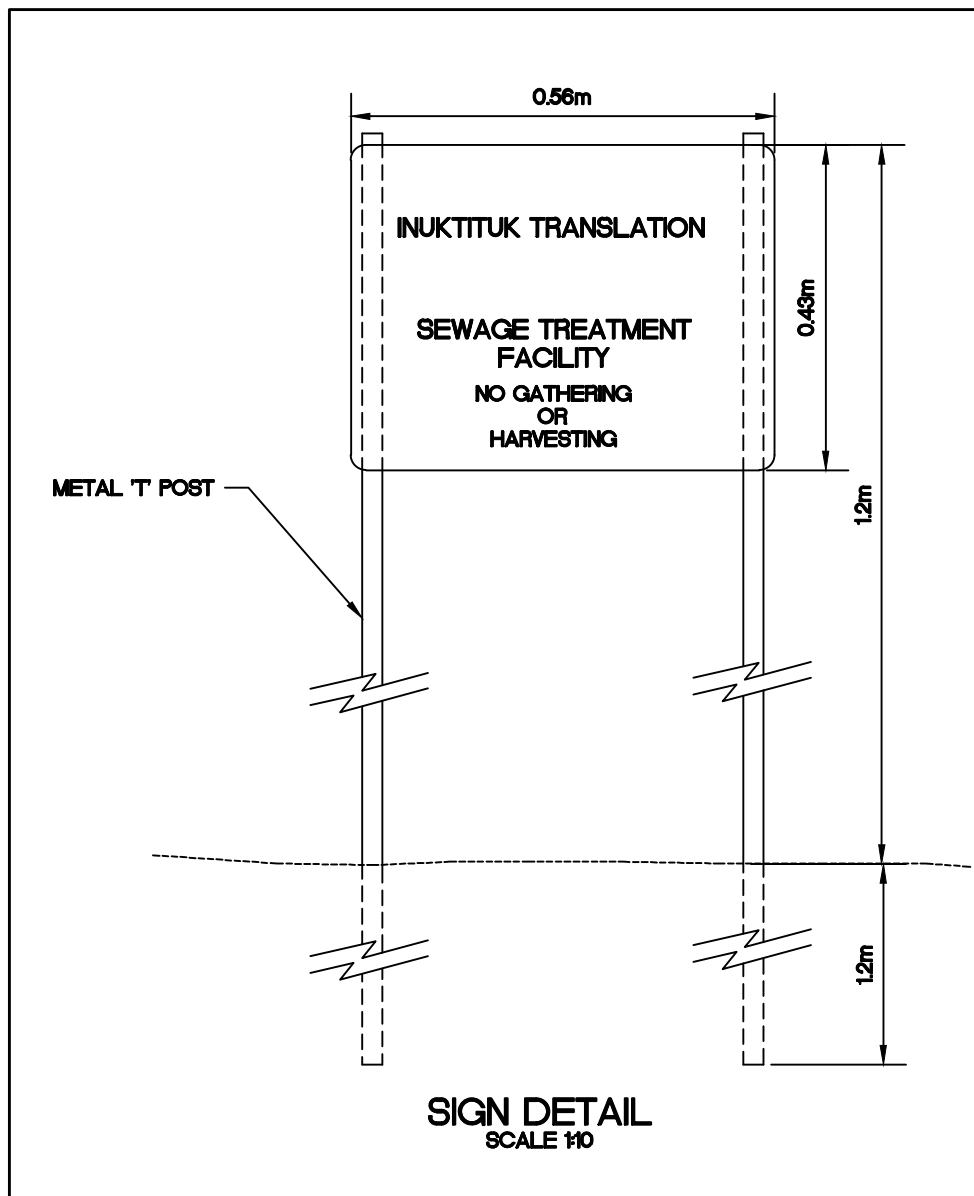
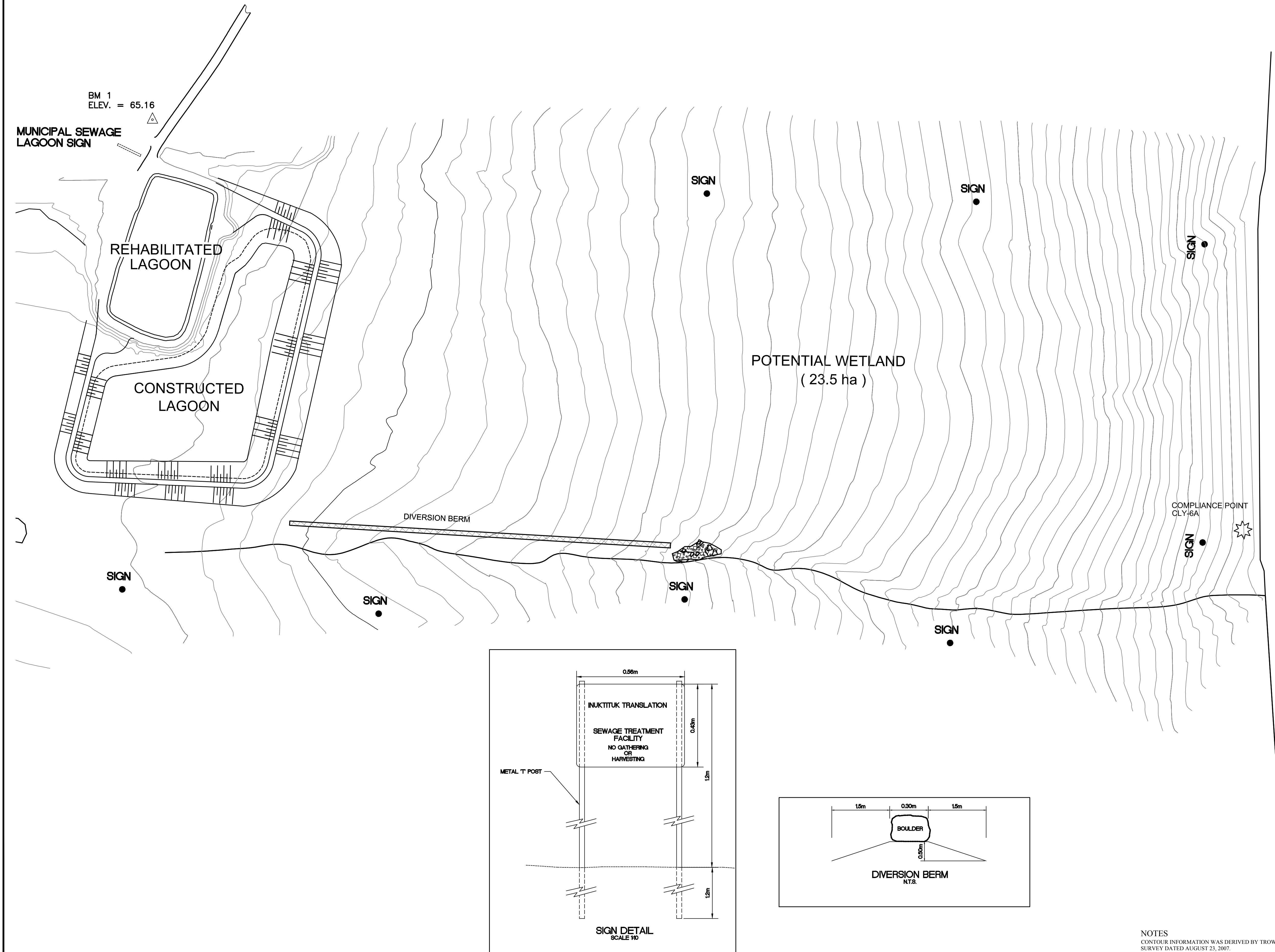
Trow Associates Inc.

100-2650 Queensview Drive PHONE: (613) 688-1899
Ottawa, Ont. K2B 8H6 FAX: (613) 225-7337

AS-BUILT

DATE: DECEMBER 31st, 2011

AS-BUILT INFORMATION PROVIDED BY KUDLIK CONSTRUCTION LTD. OCTOBER 25 2011



AS-BUILT
DATE: DECEMBER 31st, 2011

BENCH MARK
BM 1 ELEV. = 65.16
RE-BAR SET NEAR THE INTERSECTION OF THE LAGOON ACCESS ROAD AND METAL DUMP ACCESS ROAD, NORTH-EAST OF THE LAGOON SITE.

No.	DESCRIPTION	DATE	BY	APP'D
6	AS-BUILT	31/12/11	MEB	SLB
5	AS-CONSTRUCTED 2011	18/11/11	MEB	SLB
4	AS-CONSTRUCTED	02/12/10	MEB	SLB
3	ISSUED FOR CONSTRUCTION	15/06/09	MMR	SLB
2	REVISED FOR TENDER	28/05/08	MMR	SLB
1	ISSUED FOR TENDER	28/04/08	MMR	SLB

DRAWINGS ORIGINALLY SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
MAY 28TH, 2008

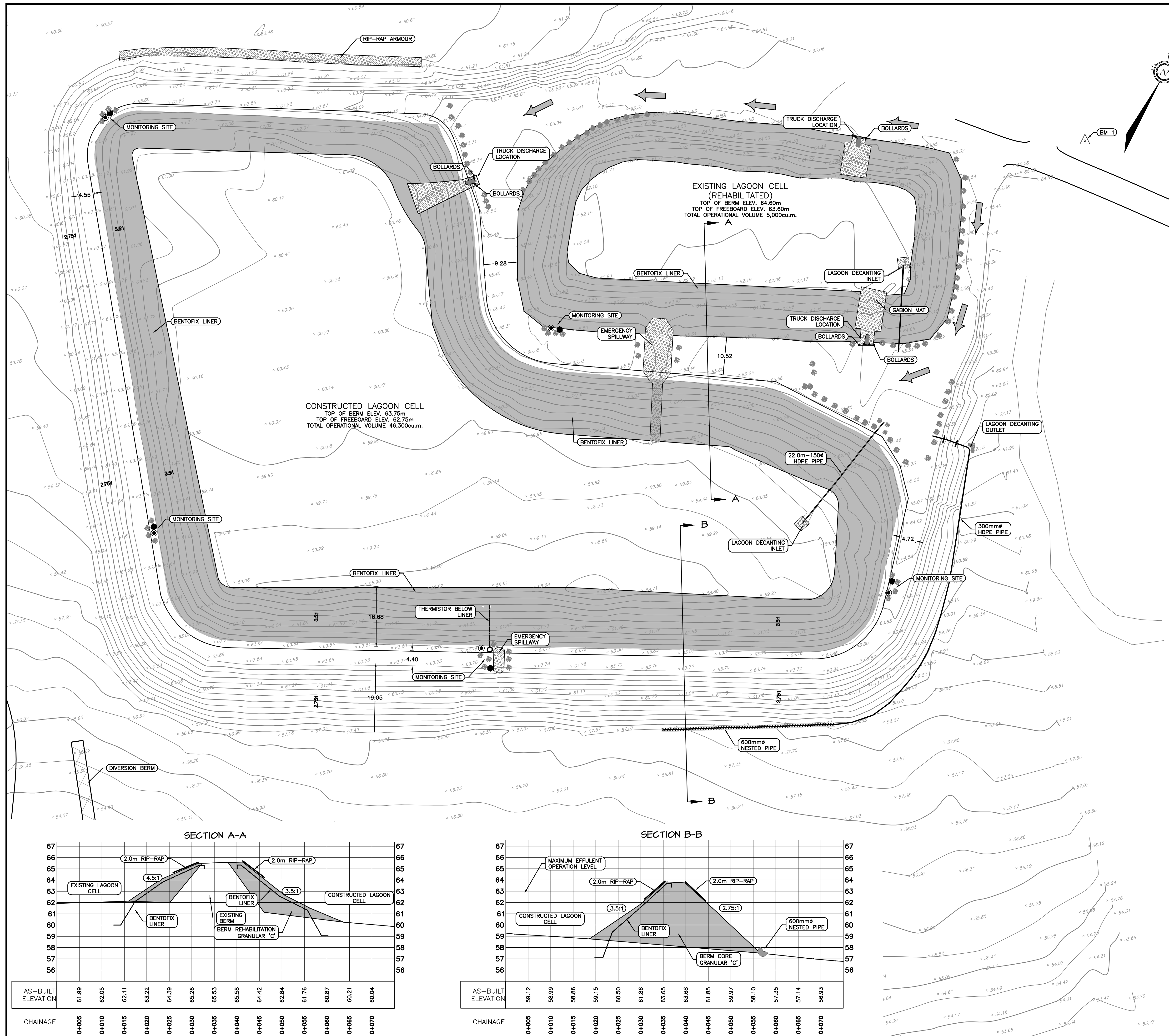
Trow Associates Inc.
154 Colonnade Road South
Ottawa, Ont. K2E 7J5
Tel: (613) 225-9940
Fax: (613) 225-7337

CLIENT
GOVERNMENT OF NUNAVUT

PROJECT		CLYDE RIVER WASTEWATER LAGOON	
TITLE			
OVERALL SITE PLAN			
design by	SAD	project no.	OTCD00019055A
drawn by	MEB	drawing no.	SP-1
checked by	SLB		
date	30/08/2007		
scale	HORIZ 1:1500		

SP-1

NOTES
CONTOUR INFORMATION WAS DERIVED BY TROW ASSOCIATES INC.
SURVEY DATED AUGUST 23, 2007.
CONTOUR INTERVALS ARE SET AT 1.00m



LEGEND

●

MONITORING WELL (SAMPLING POINT)

●

THERMISTOR

○

THERMISTOR BELOW LINER

10

SPOT ELEVATION

AB

BOULDER

GABION MAT

BENTOFIX LINER

TRUCK ROUTE

AS-BUILT

DATE: DECEMBER 31st, 2011

BENCH MARK

BM 1

ELEV. = 65.16

RE-BAR SET NEAR THE INTERSECTION OF THE LAGOON ACCESS ROAD AND METAL DUMP ACCESS ROAD. NORTH-EAST OF THE LAGOON SITE.

REVISIONS			
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4	AS-CONSTRUCTED	02/12/10	MEB SLB
3	ISSUED FOR CONSTRUCTION	15/06/09	MMR SLB
2	REVISED FOR TENDER	28/05/08	MMR SLB
1	ISSUED FOR TENDER	28/04/08	MMR SLB

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MAY 28TH, 2008

Trow Associates Inc.

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Ottawa, Ont. K2B 8H6 FAX: (613) 225-7337

CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

CLYDE RIVER
WASTEWATER LAGOON

TITLE

SITE PLAN

design by SAD

drawn by MEB

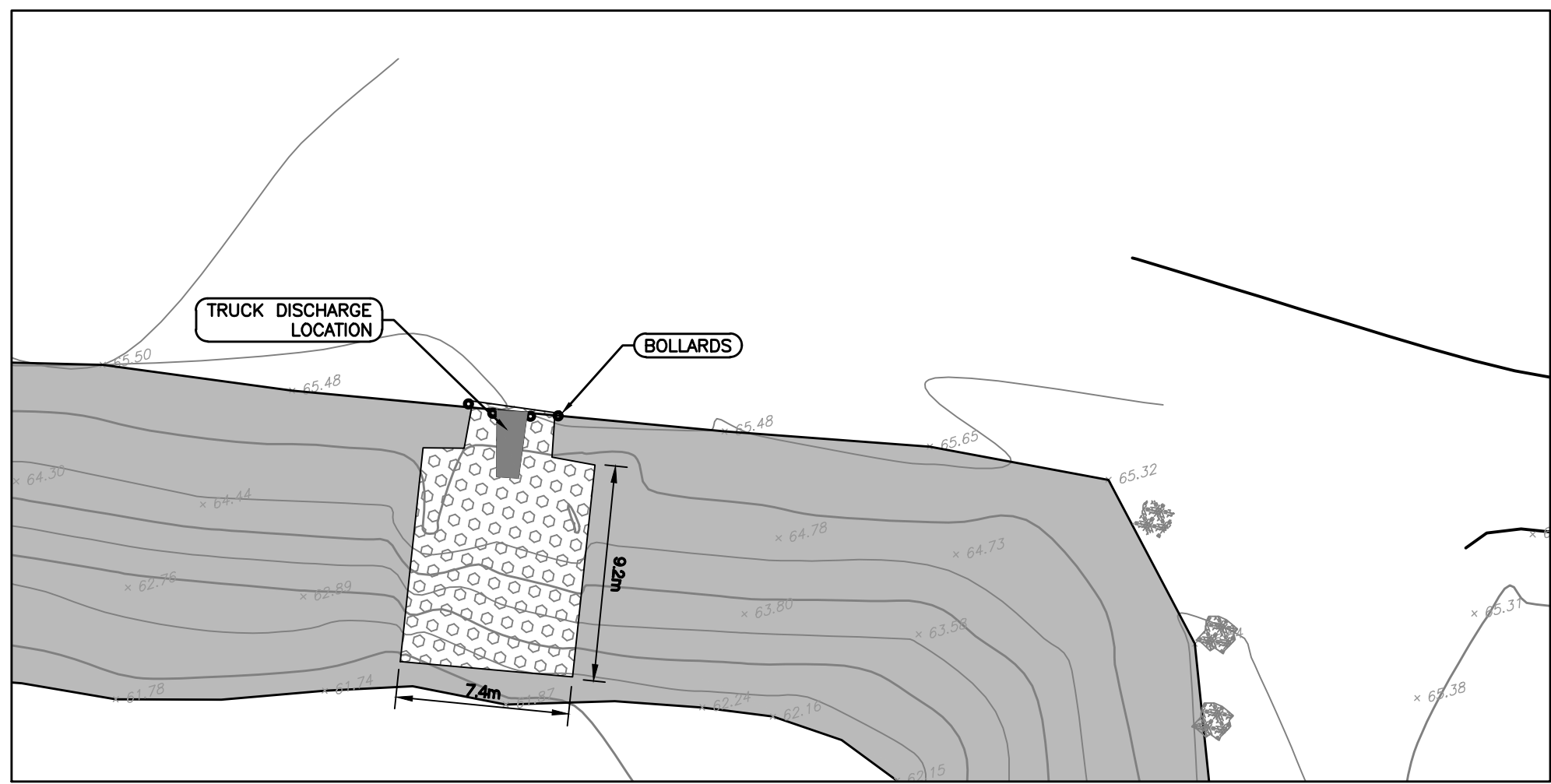
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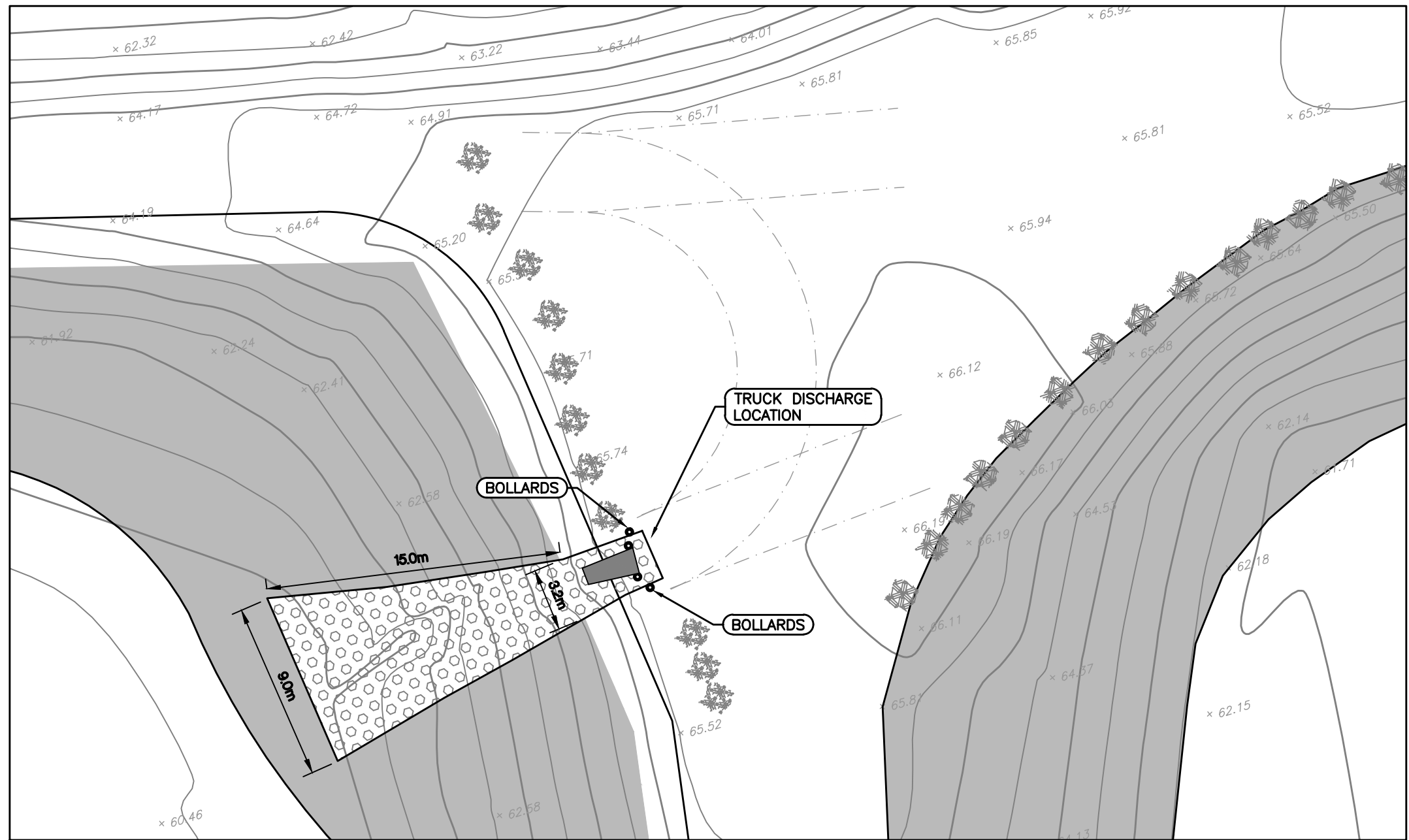
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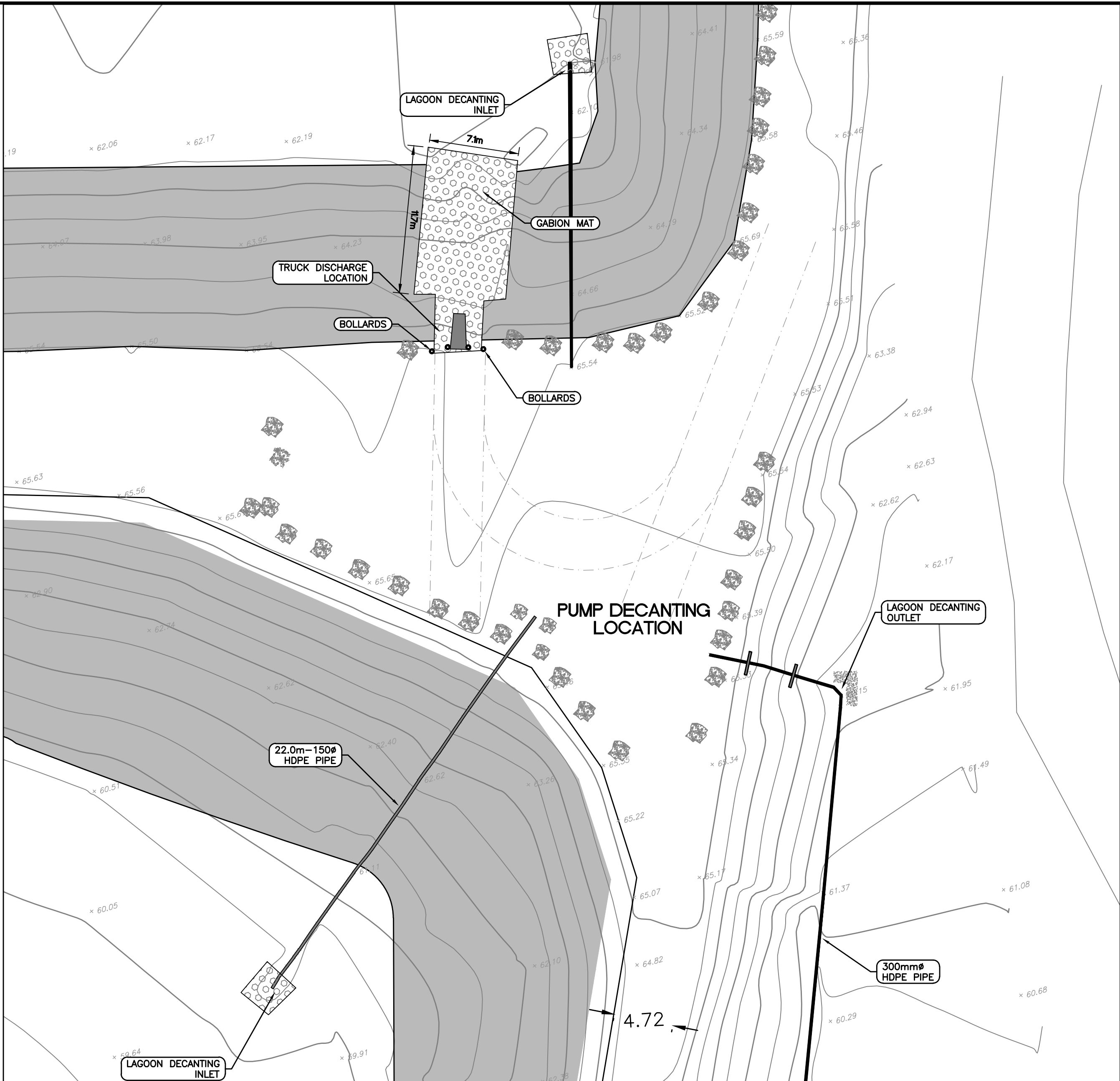
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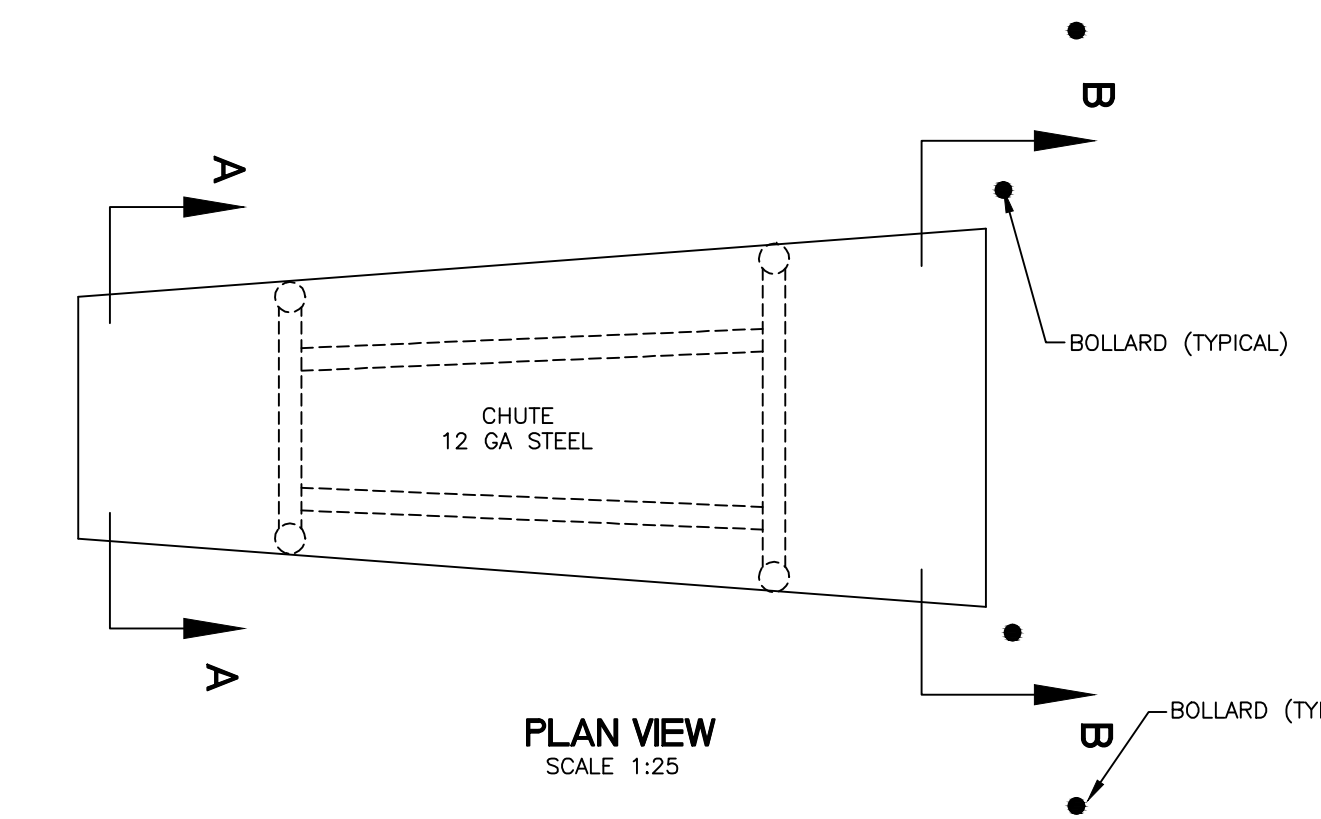
NORTH TRUCK DISCHARGE SITE PLAN



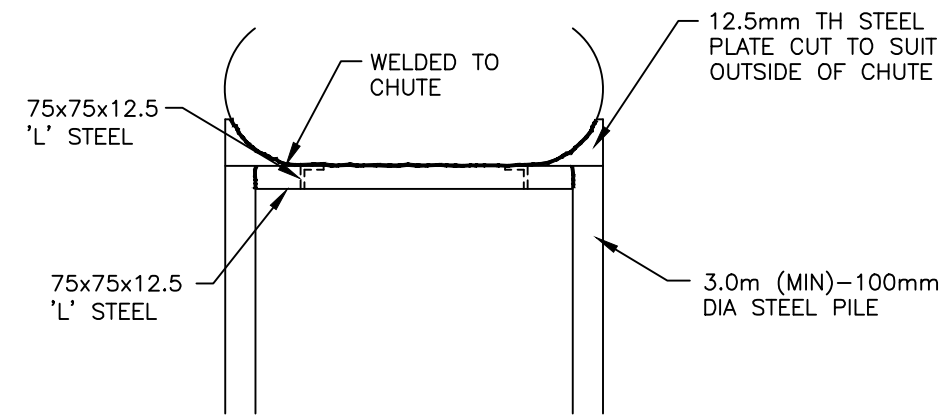
WEST TRUCK DISCHARGE SITE PLAN



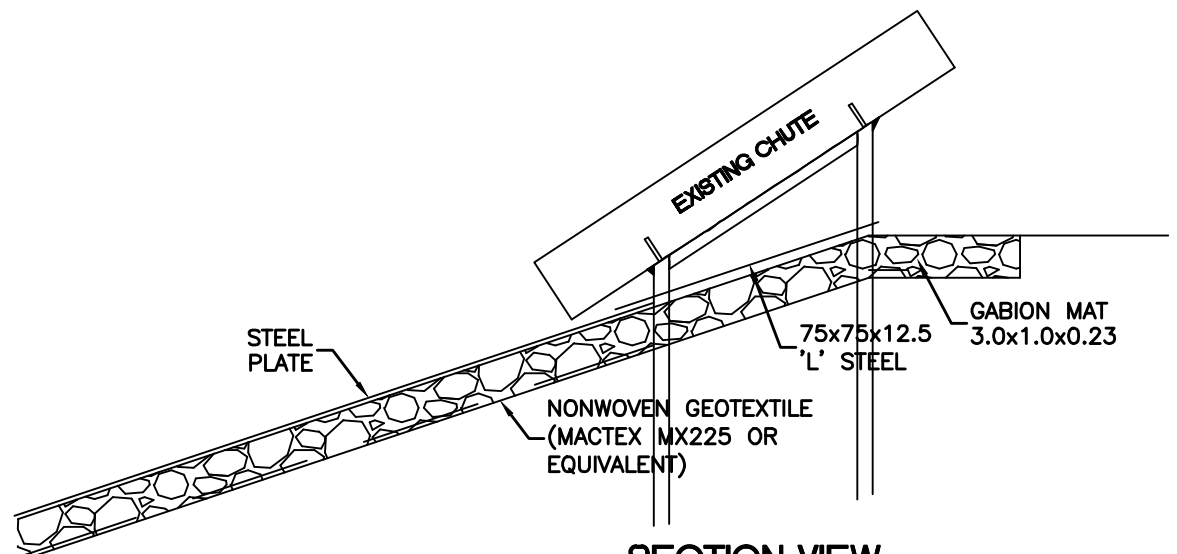
SOUTH TRUCK DISCHARGE SITE PLAN



TRUCK DISCHARGE CHUTE DETAIL

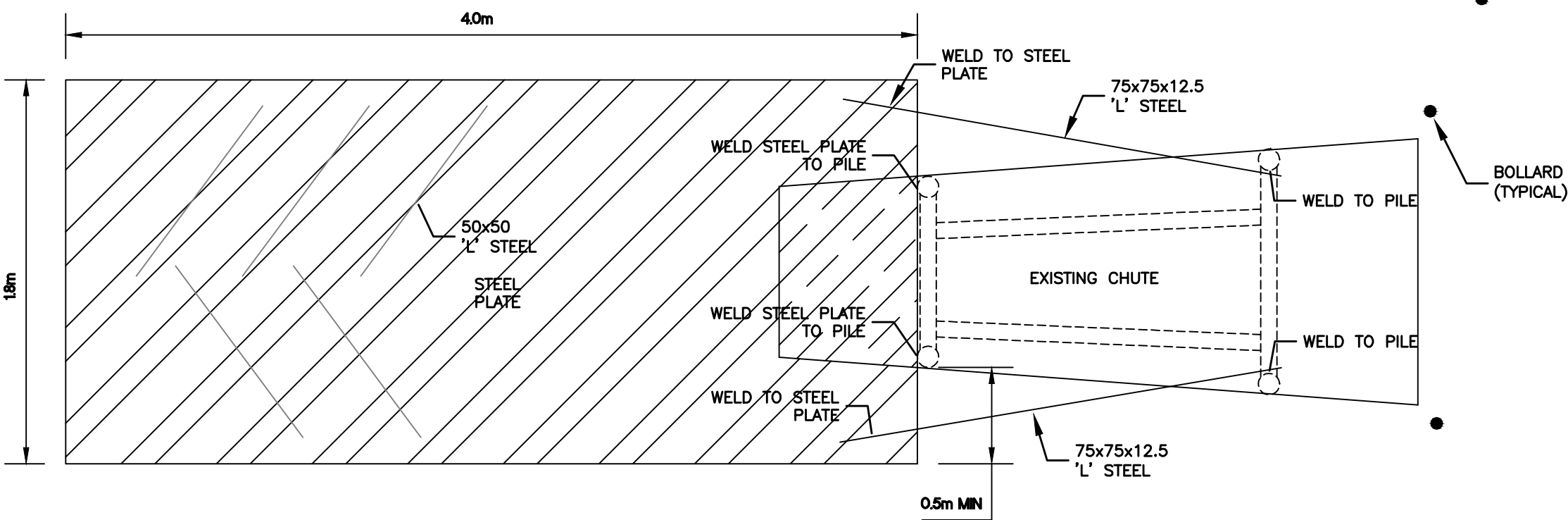


END VIEW
SCALE 1:25

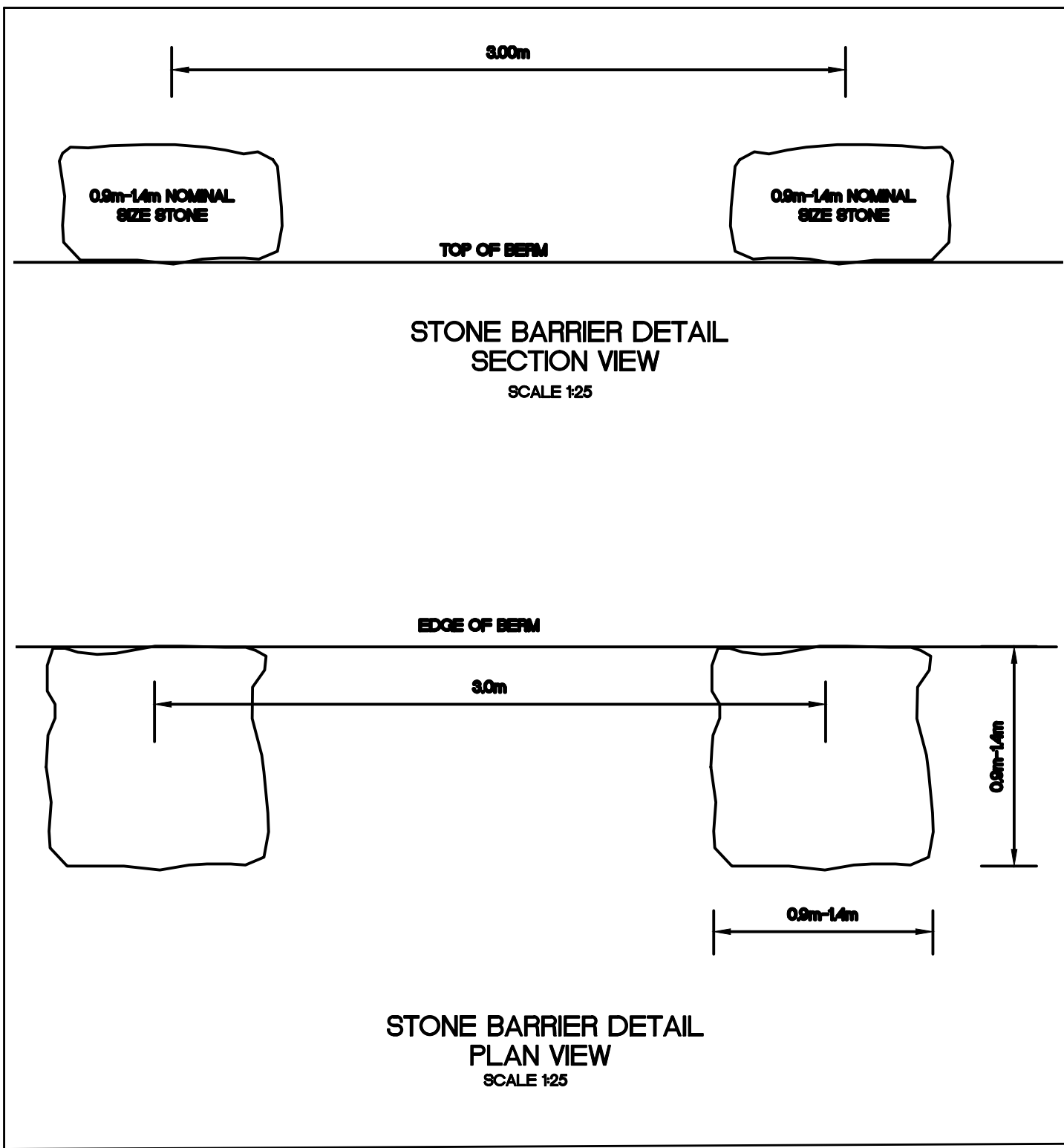


SECTION VIEW
SCALE 1:50

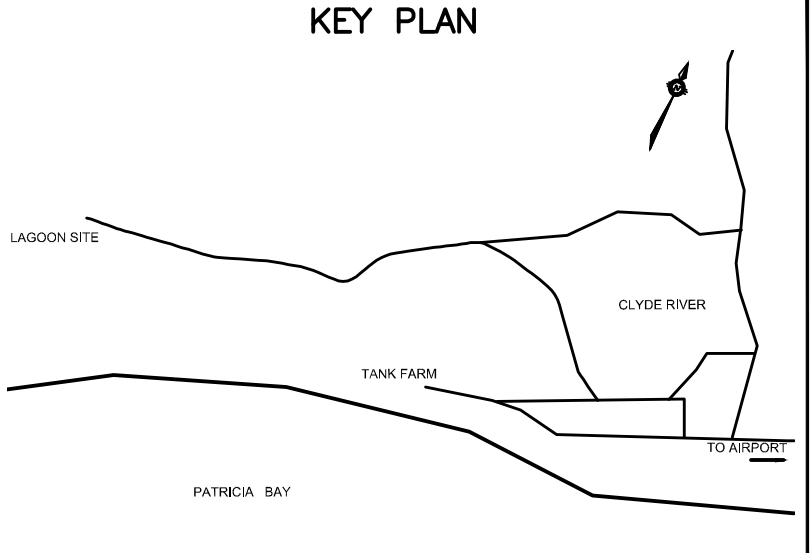
INSET



PLAN VIEW
SCALE 1:25



STONE BARRIER DETAIL
PLAN VIEW
SCALE 1:25



AS-BUILT

DATE: DECEMBER 31st, 2011

BENCH MARK
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RE-BAR SET NEAR THE INTERSECTION OF THE LAGOON ACCESS ROAD AND METAL DUMP ACCESS ROAD. NORTH-EAST OF THE LAGOON SITE.
ELEV. = 65.16

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4	REV DEWATERING INLET	10/08/09	MMR	SLB
3	ISSUED FOR CONSTRUCTION	15/06/09	MMR	SLB
2	REVISED FOR TENDER	28/05/08	MMR	SLB
1	ISSUED FOR TENDER	28/04/08	MMR	SLB

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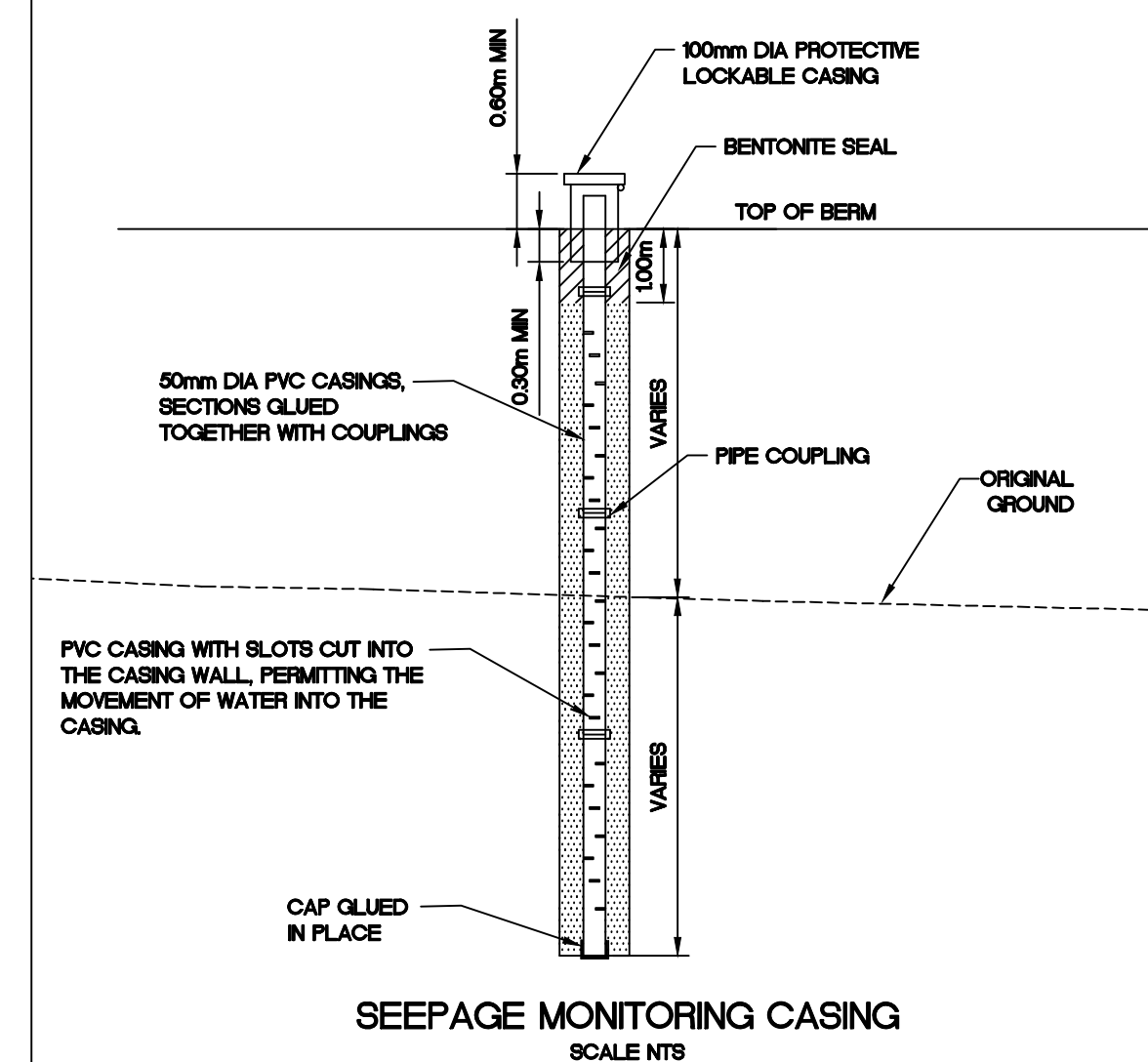
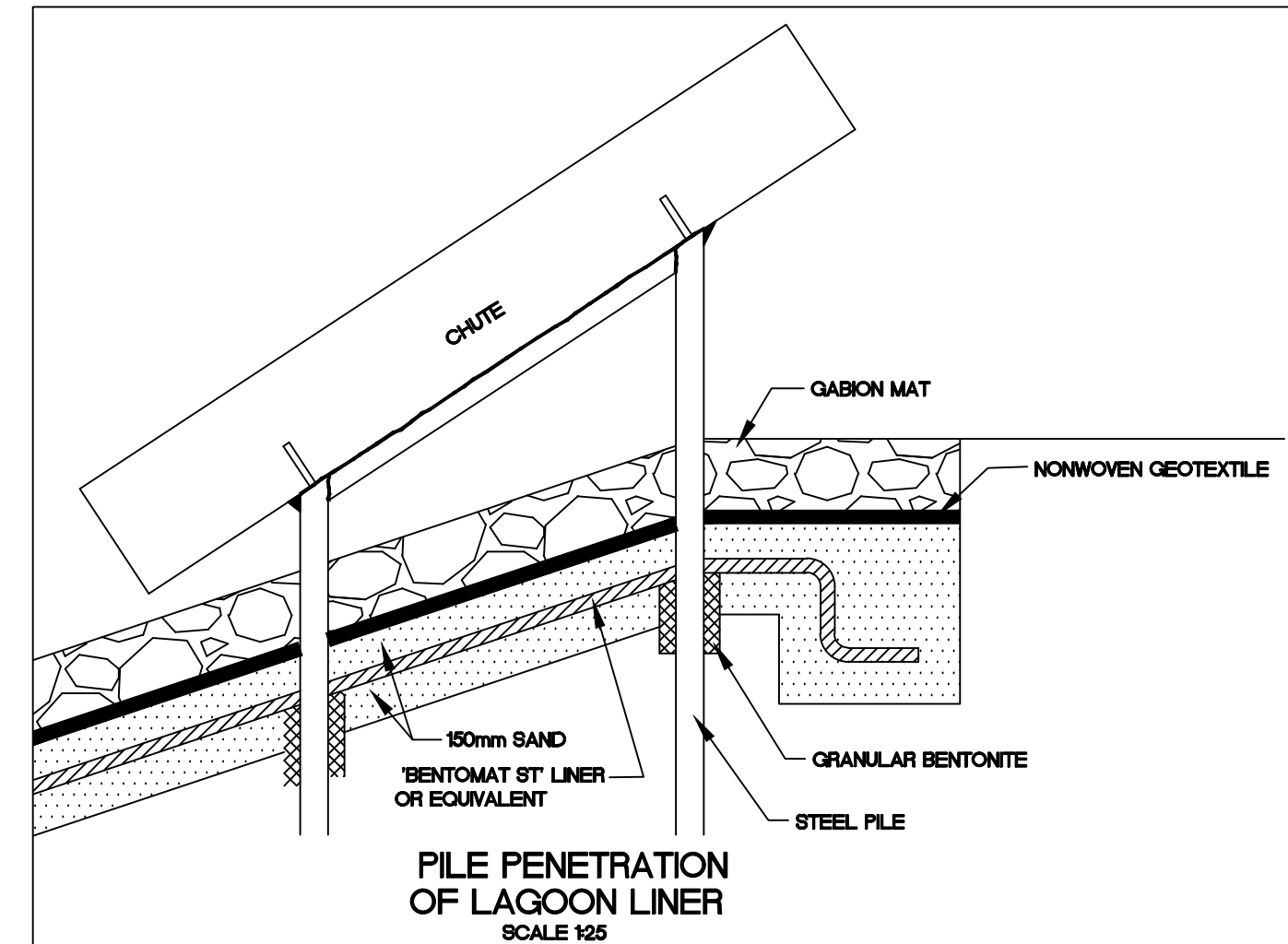
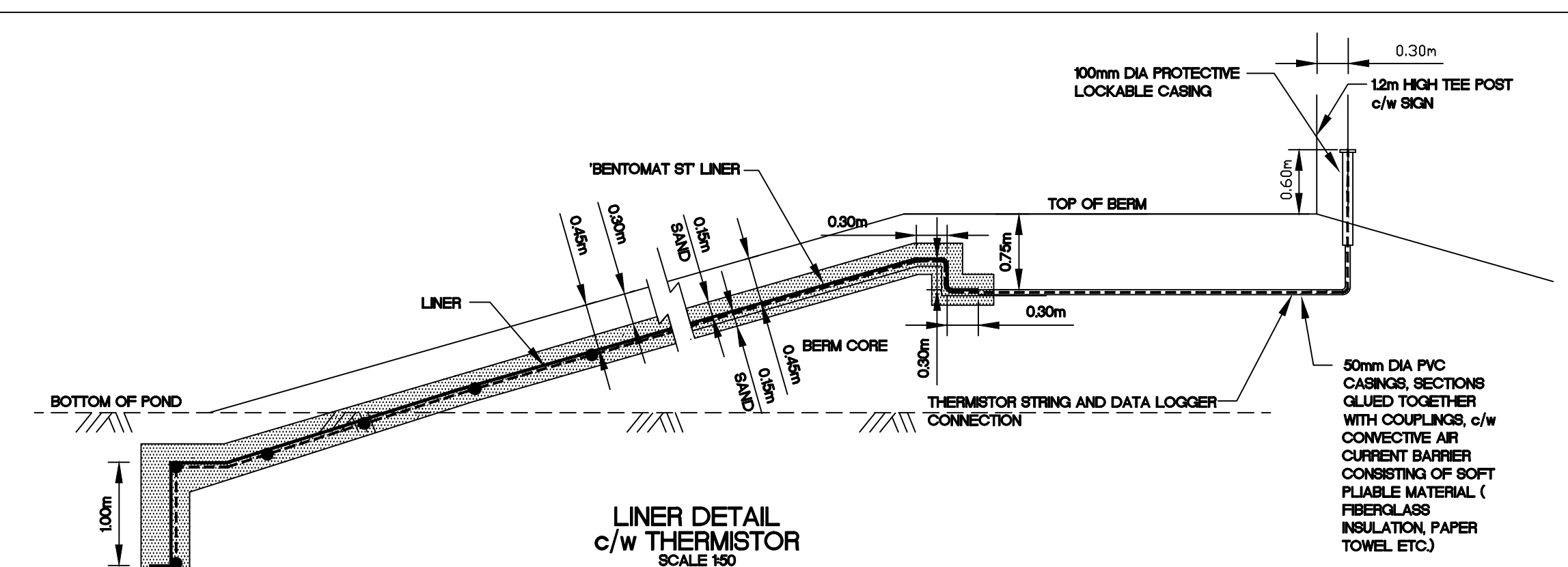
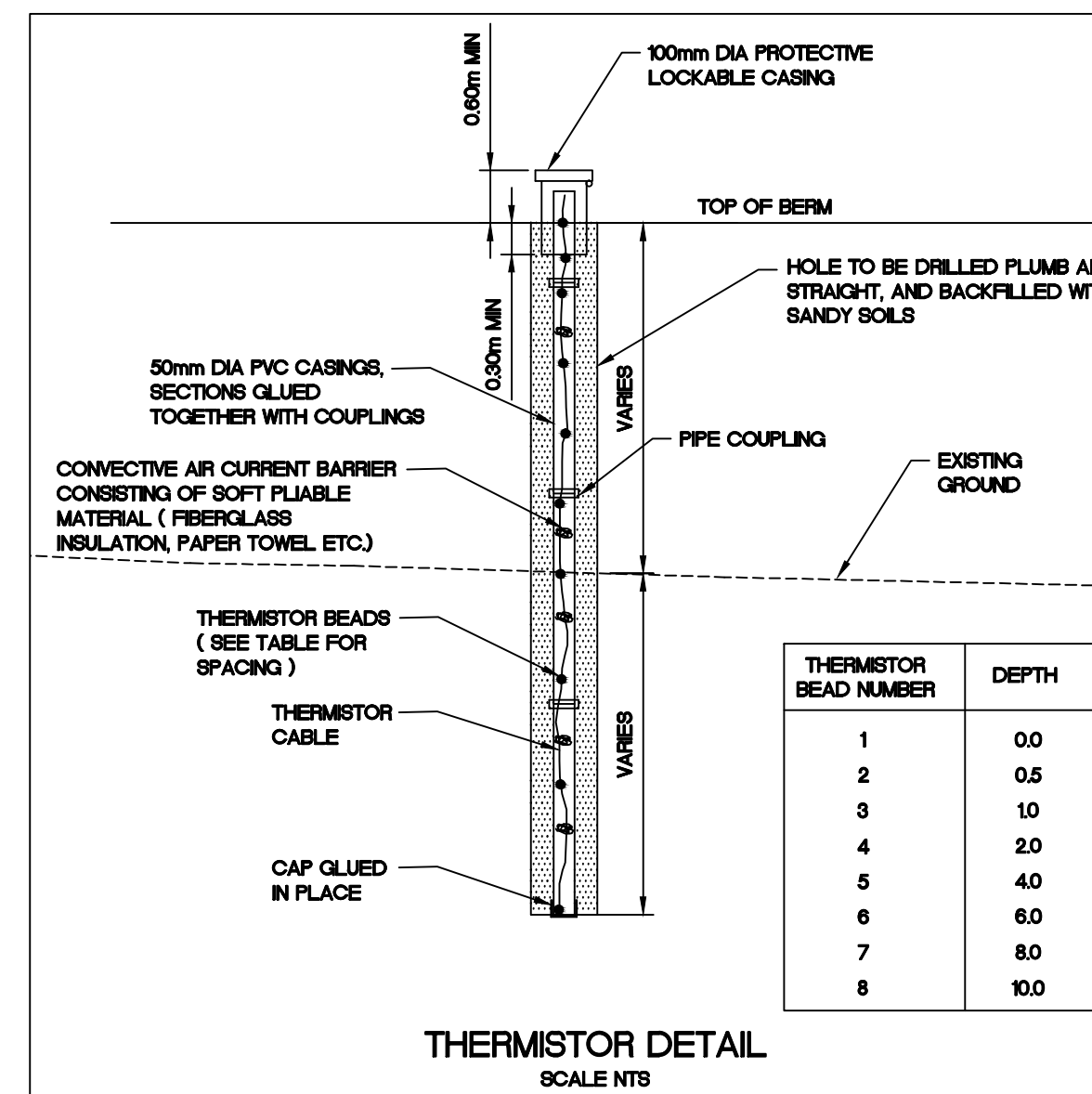
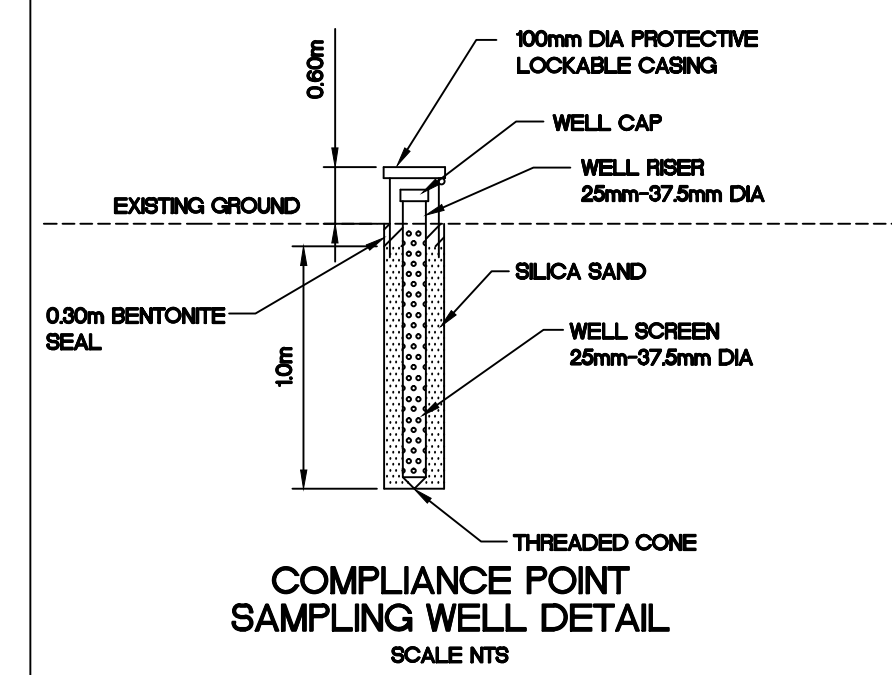
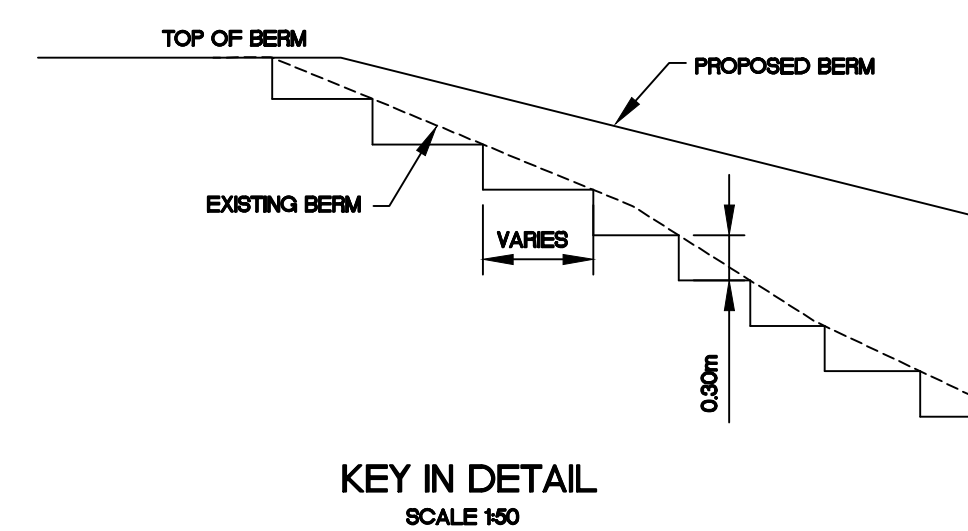
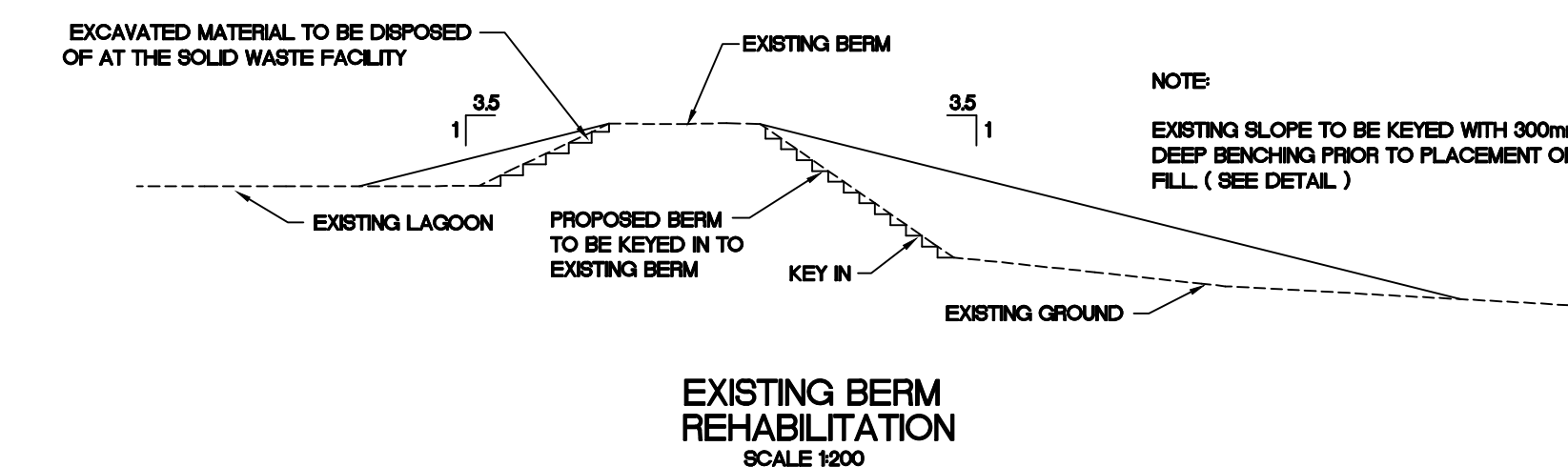
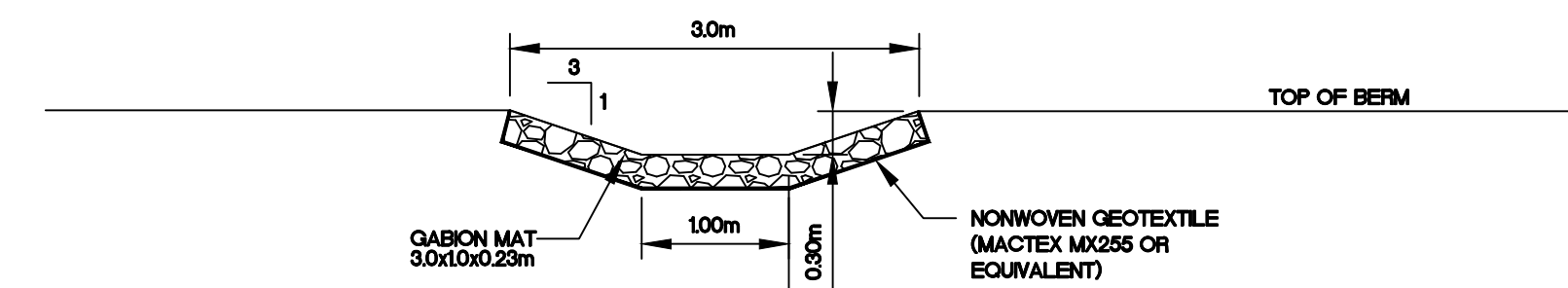
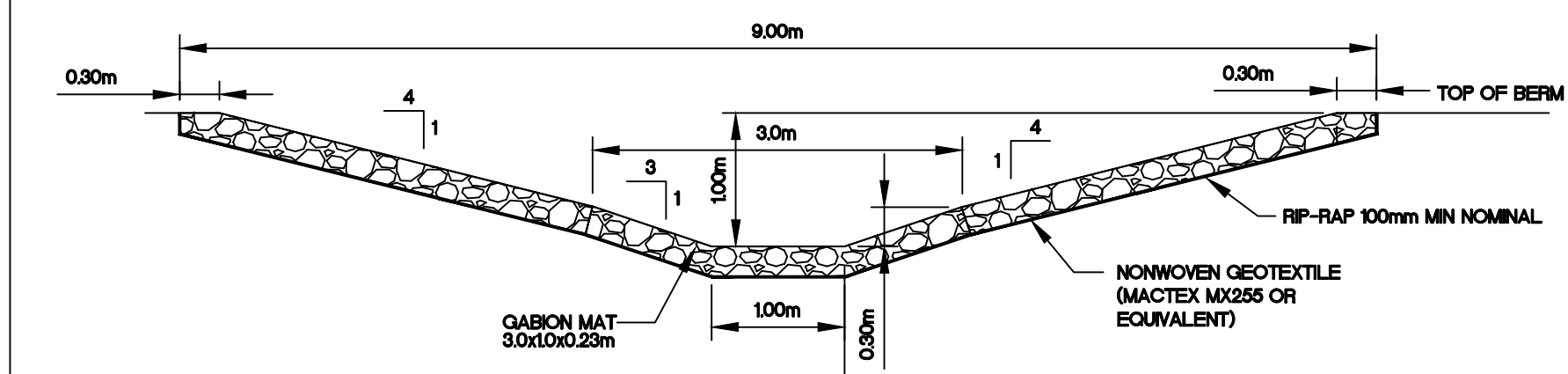
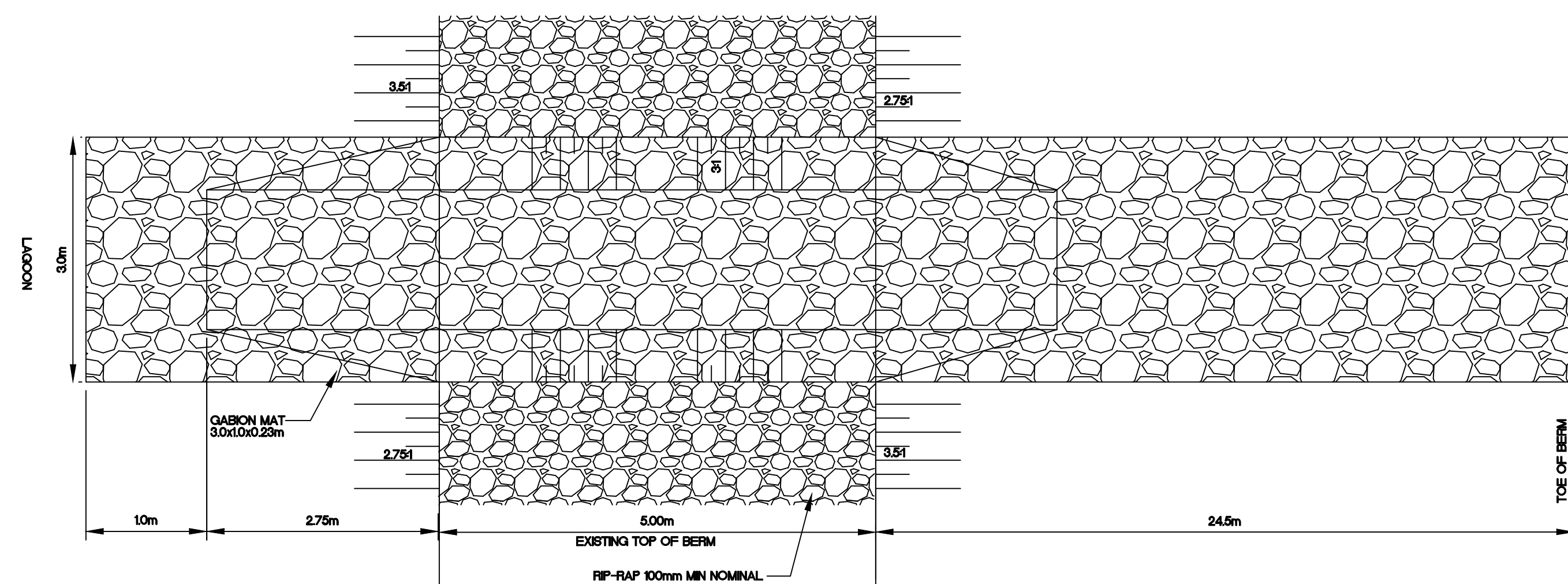
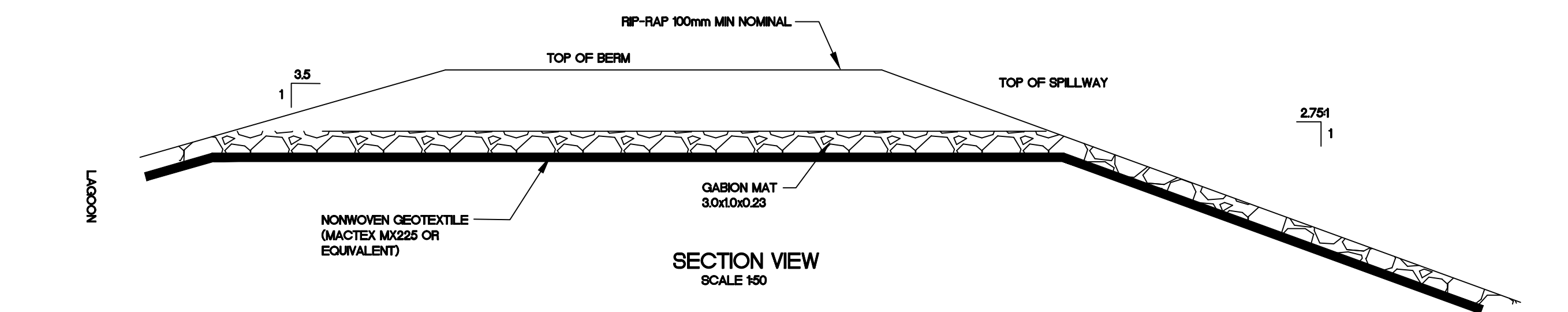
CLIENT
GOVERNMENT OF NUNAVUT

PROJECT
CLYDE RIVER
WASTEWATER LAGOON

TITLE
TRUCK DISCHARGE
SITE PLANS

design by SAD project no. OTC000190554
drawn by MEB drawing no.
checked by S.L.B.
date 30/08/2007
scale 1:250

TD1



AS-BUILT

DATE: DECEMBER 31st, 2011

6	AS-BUILT	31/12/11	MEB	SLB
5	AS-CONSTRUCTED 2011	18/11/11	MEB	SLB
4	AS-CONSTRUCTED	02/12/10	MEB	SLB
3	ISSUED FOR CONSTRUCTION	15/06/09	MMR	SLB
2	REVISED FOR TENDER	28/05/08	MMR	SLB
1	ISSUED FOR TENDER	28/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

DRAWINGS ORIGINALLY
SEALED BY
S.L.BURDEN, P.eng. OF
exp. SERVICES Inc.
MAY 28TH, 2008

 **Trow** Associates Inc.

100-2650 Queensview Drive PHONE: (613) 688-1899
Ottawa, Ont. K2B 8H6 FAX: (613) 225-7337

CLIENT

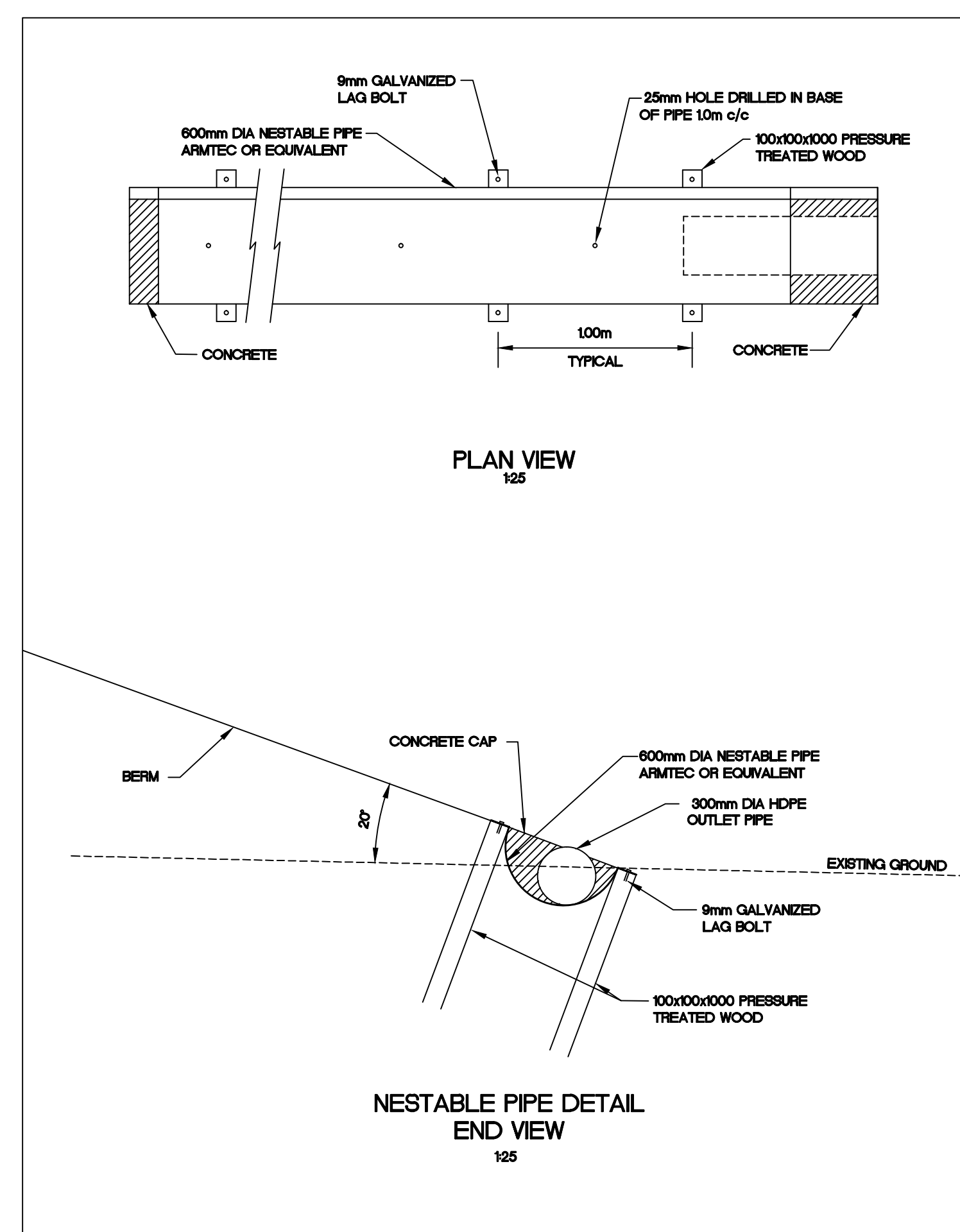
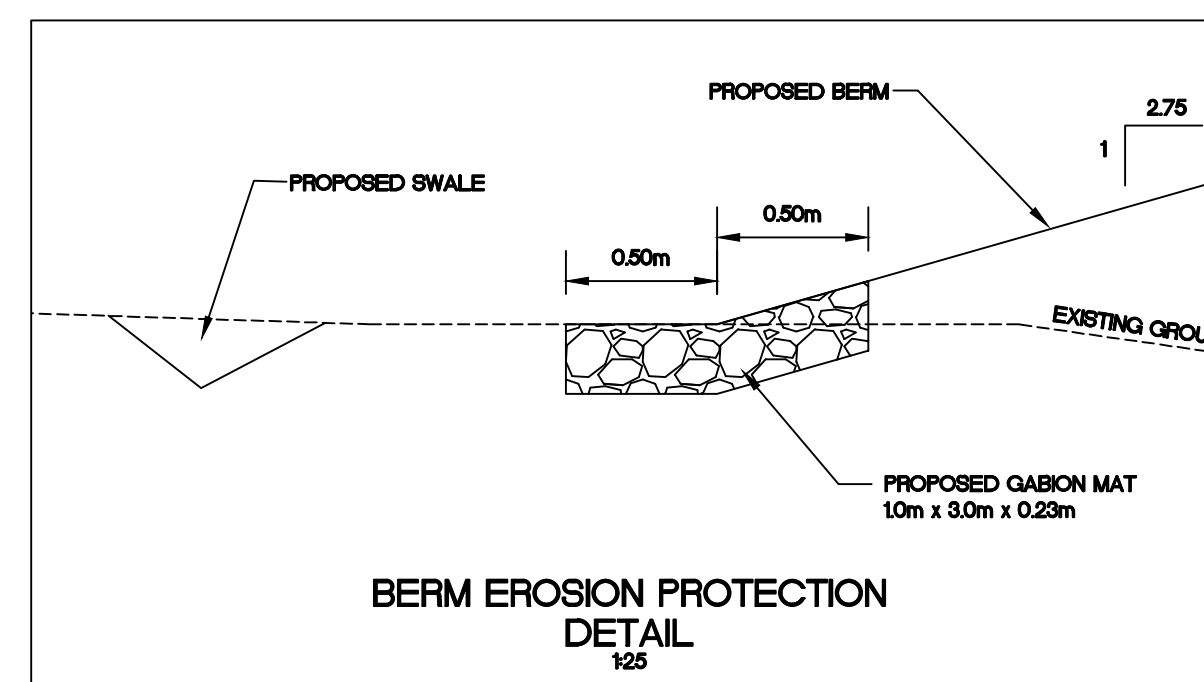
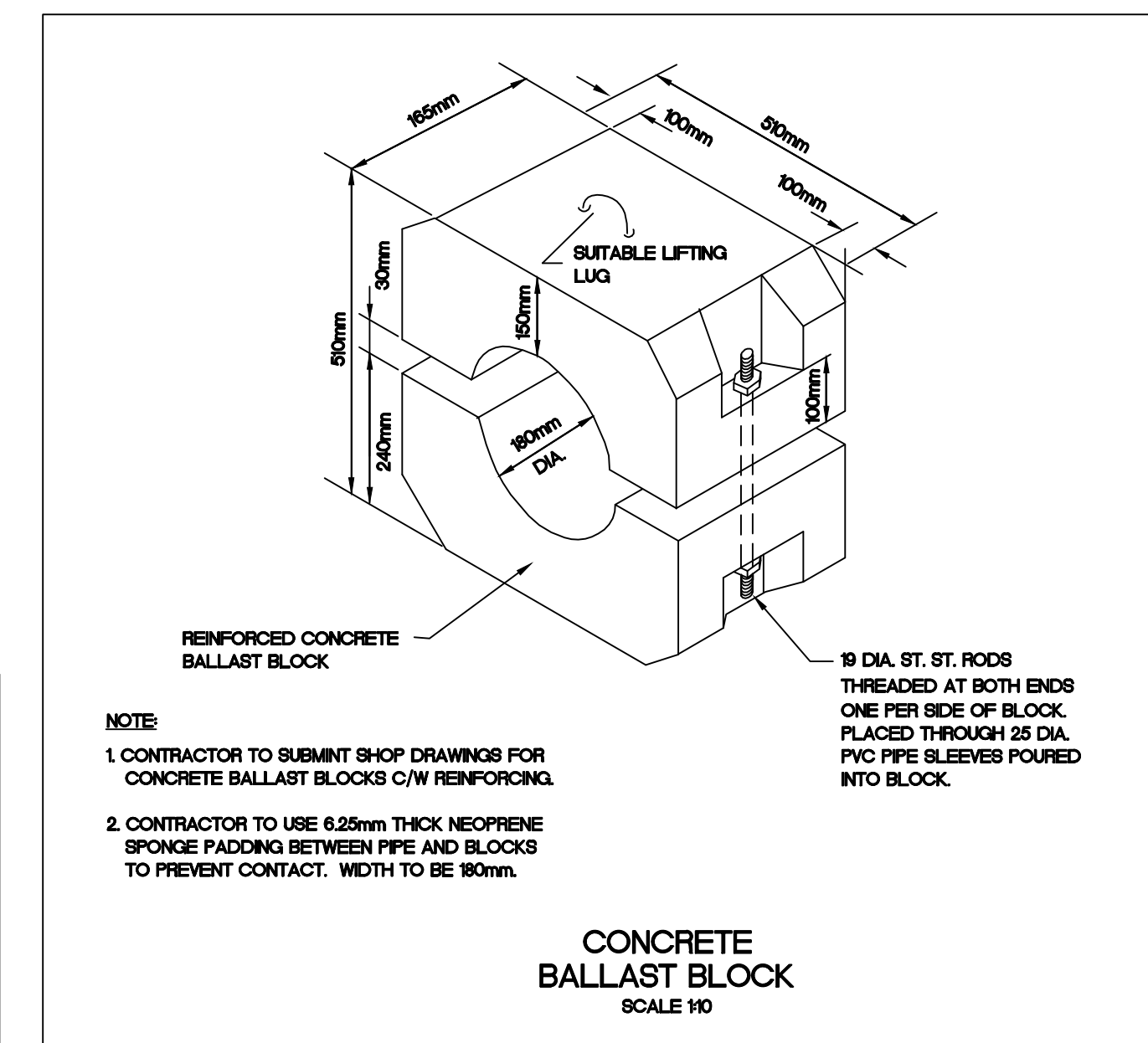
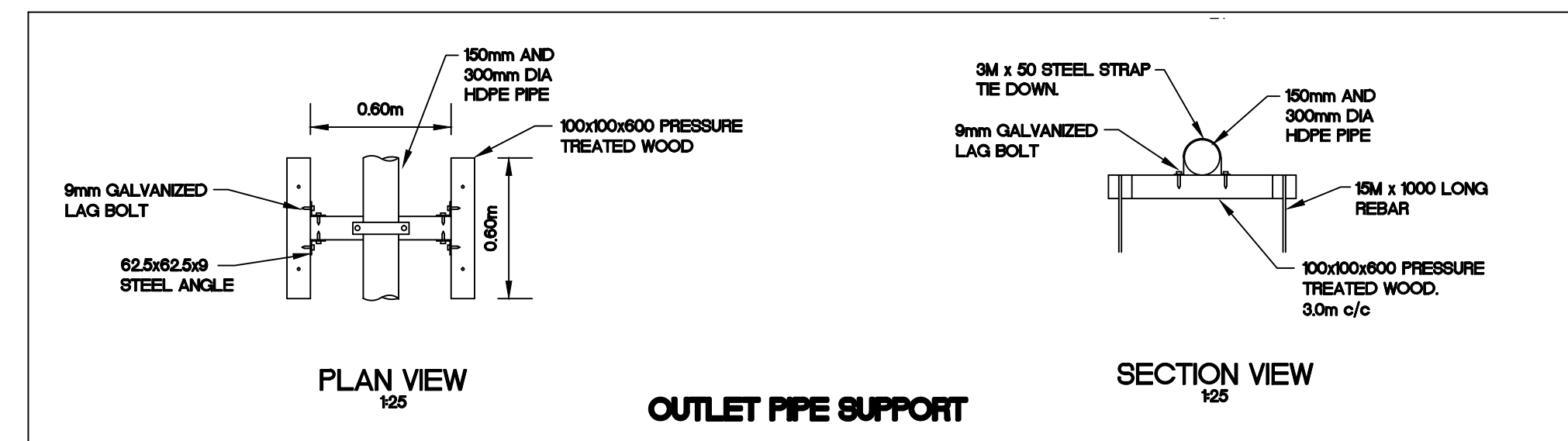
GOVERNMENT OF NUNAVUT

PROJECT

CLYDE RIVER
WASTE WATER
LAGOON

DETAILS

design by	S.A.D.	project no. OTCD19055A drawing no. DE-1
drawn by	M.M.R.	
checked by	S.L.B.	
date	14/12/07	
scale	AS SHOWN	



AS-BUILT

DATE: _____ DECEMBER 31st, 2011 _____

6	AS-BUILT	31/12/11	MEB	SLB
5	AS-CONSTRUCTED 2011	18/11/11	MEB	SLB
4	AS-CONSTRUCTED	02/12/10	MEB	SLB
3	ISSUED FOR CONSTRUCTION	15/06/09	MMR	SLB
2	REVISED FOR TENDER	28/05/08	MMR	SLB
1	ISSUED FOR TENDER	28/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

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exp. SERVICES Inc.
MAY 28TH, 2008

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Ottawa, Ont. K2B 8H6 FAX: (613) 225-7337

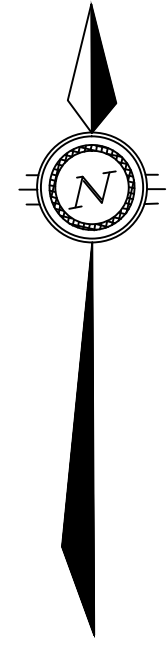
CLIENT

GOVERNMENT OF NUNAVUT

PROJECT	CLYDE RIVER WASTE WATER LAGOON
---------	--------------------------------------

DETAILS

design by	S.A.D.	project no. OTCD19055A DE-2
drawn by	M.M.R.	
checked by	S.L.B.	
date	14/12/07	
scale	AS SHOWN	



AS-BUILT

DATE: DECEMBER 31st, 2011

3	AS-BUILT	31/12/11	MEB	SLB
2	AS-CONSTRUCTED 2011	18/11/11	MEB	SLB
1	AS-CONSTRUCTED	02/12/10	MEB	SLB
No.	DESCRIPTION	DATE	BY	APP'D
R E V I S I O N S				

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exp. SERVICES Inc.
MAY 28TH, 2008



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Ottawa, Ont. K2B 8H6 FAX: (613) 225-7337

CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

CLYDE RIVER
WASTEWATER LAGOON

TITLE

CLYDE RIVER
MUNICIPAL LOCATION PLAN

design by

SAD

project no.

OTCD000190554

drawn by

MEB

drawing no.

checked by

SLB

date

11/02/2008

scale

HORIZ 1:5000

T-1