# Baffinland Iron Mines Corporation
# Mary River Project

## Construction Summary Report: Mine Site Water System

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 28 JAN 15
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
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|---|---|---|---|---|---|---|
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| DATE | REV. | STATUS | PREPARED BY | CHECKED BY | APPROVED BY | APPROVED BY |
| | | | HATCH | | | CLIENT |

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# 1. Facility Description

The Mine Site Water Systems include the facility's raw water system (including the raw water jetty), water treatment system, sewage treatment system, and the treated effluent discharge system.

## 1.1 Raw Water System

The Mine Site raw water system is a pumping arrangement that draws water from Camp Lake (west of the main accommodation facilities) to the water treatment system for treatment and distribution. The raw water system includes a raw water pumphouse (a heated and insulated sea container) installed on a jetty built out from the east side of Camp Lake. The pump draws water up through the wet well below the pumphouse, and pumps the water through a 100mm (4 inch) HDPE DR11 pipeline over 4km to the water treatment building (approximately 4,300m). This pipeline is pre-insulated and heat traced for year-round use.

There are three locations where the pipe crosses underneath roads or access trails. Under these roads the pipe runs inside a larger carbon steel schedule 80 pipe to prevent the raw water pipeline from being crushed by vehicle traffic.

## 1.2 Water Treatment System

The Mine Site water treatment system includes an adsorption clarifier water treatment plant designed to treat raw water for the removal of colour, turbidity and other impurities to provide a high quality effluent. The high quality effluent from the adsorption clarifier is then disinfected for potable and domestic use.

The process combines flocculation and clarification in the mono-media roughing filter. Flocs are formed and retained in the coarse mono-media. The dual media filter provides polishing of the pre-treated water to provide a high quality effluent. Disinfection involves UV and chlorination.

The treatment process is designed to run at the constant pre-set flowrate 3.4m3/h (15USgpm). The system flow is tracked by the inlet flow meter/ totalizer through the SCADA system.

Plant operation is controlled by the raw water tank level and the potable water tank level. On receipt of a high raw water tank level signal and low potable water tank level, the raw water pump downstream of the raw water tank (feeding the clarifier) is started, and the PLC controller opens the influent valve, starts selected chemical feed pumps, and initiates normal plant operation. On receipt of the stop signal, the plant is shut down. All control valves are de-energized to close, all chemical dosing is stopped.

The system is fed by the raw water system drawing from Camp Lake.

The Mine Site water treatment building is a foldaway building located south of the fuel tank farm and southwest of the sewage treatment building at northing N7 913 234 to N7 913 217 and easting E561 275 to E561 262. There is an overhead door on the southeast side of the building and a man door on the southeast and northwest.

The system includes the outdoor piping connecting the water treatment plant to the sewage treatment plant, and the piping between the water treatment plant and the accommodations facility. These pipes are HDPE DR11, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use.

The water treatment system operations and maintenance manual has been included in Appendix C.

## 1.3 Sewage Treatment System

The Mine Site sewage treatment plant is a membrane bioreactor (MBR) wastewater treatment plant designed for treatment of domestic wastewater. The STP is a packaged plant that comes with containerized inlet screen, equalization tank, post EQ screen, aeration tank, membrane tanks, UV disinfection systems and a sludge dewatering unit. The plant is housed inside six (6) 40 ft modified high-cube shipping containers that were interconnected when installed. The Mine Site sewage treatment plant was designed for an average design flow of 63m3/d (2.63m3/h). The system flow is tracked by the inflow meter and totalizer.

The Mine Site sewage treatment plant is located southeast of the fuel tank farm, north east of the water building, and south of the accommodations facility at northing N7 913 250 to N7 913 236 and easting E561 320 to E561 340.

The system includes the outdoor piping connecting the accommodations facility to the sewage treatment plant and the connection for the effluent discharge piping. These pipes are HDPE DR11, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use.

The sewage treatment system operations and maintenance manual has been included in Appendix C.

## 1.4 Treated Effluent Discharge

During normal operation, the treated effluent from the sewage treatment plant (STP) is pumped to the permitted discharge points at Mary River via the treated effluent discharge pipeline. In the event that the treated effluent does not meet discharge requirements, the off-spec effluent would be trucked from the STP to one of the three existing Polishing Waste Stabilization Ponds located southeast of the Weatherhaven camp facilities for storage and eventual treatment/discharge as required. Once the ‘problem’ in the STP is corrected, the off-spec effluent from the pond(s) will be treated insitu or transported via vacuum truck and re-processed through the STP before directly discharging to Mary River. In practice, since plant start-up there has been only minor requirements to divert off-spec effluent to the PWSP as the effluent has been well within water licence effluent criteria.

The treated effluent discharge pipeline is used for two discharge activities, each of which discharges to Mary River. The tee in the treated effluent discharge pipeline, currently blocked with a blind flange, would allow the pipeline to discharge a future stockpile settling pond, if required.

The pipeline routing exits the STP from the north wall, crosses over the STP roof, turns southeast to meet with the utility berm, and then runs parallel to the road in a southeast direction to the discharge points at Mary River. The effluent discharge has two (2) all-season pre-insulated and heat traced discharge points, and one (1) summer-only discharge point (the west-most discharge point). The treated effluent discharge pipeline is a 50mm (2 inch) diameter HDPE DR11 pipeline from the STP to the tee connection (valve box/branch) with the remainder of the pipeline (from the valve box/branch to the Mary River discharge) being 75mm (3 inch) diameter HDPE DR11. The pipeline is approximately 2km long, above ground, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use. There are three locations where the pipe crosses underneath roads. Under these roads the pipe runs inside larger carbon steel schedule 80 pipe to prevent the effluent line from being crushed by vehicle traffic.

The pumps and motors (duty/standby) start and stop as required to empty the containment tank (2731-TK-002) inside the STP.

# 2. Construction Activity Summary

Construction activities on the Mine Site water systems started in August 2013. The final system handover certificates were completed in November 2014. The most recent item closeout on the open punch lists is dated December 2014. The remaining punch list items are scheduled for completion in 2015.

The following summarizes the construction activities:

a. Crushed blast rock and fill material was quarried, crushed, screened, and hauled from the Mine Site Quarry (QMR2).

## 2.1 Raw Water System

a. Areas were cleared and graded to prepare the sub-base for construction of the raw water jetty.

b. Installed the wet well and supported in place by rocks around base and an excavator supporting the top.

c. Installed layers of granular material.

d. Installed final layer of armour rock.

e. Installed wearing surface/base and jersey barriers.

f. Installed pumphouse, aligned over wet well.

g. Installed well pumps with well piping and supporting equipment.

h. Check column heat tracing for wet well freezing prevention.

i. Complete all mechanical, electrical and HVAC fitout.

j. Installed all exterior heat tracing and insulation.

k. Backfill around sea container to prevent air ingress to top of wet well.

l. Site run pre-insulated pipe and fittings on grade between the raw water pumphouse outlet flange and the WTP inlet flange, behind the existing Weatherhaven camp.

m. Installed heat trace (two pass series constant watt system).

n. Installed heat trace RTD temperature sensors, controls and connect power supply.

o. Installed heat tracing control panels.

**QA/QC**

p. Pressure test of raw water pipe from raw water pumphouse to the water treatment building.

## 2.2 Water Treatment System

a. Prepared sub base and granular cap.

b. Installed berm between water building and camp.

c. Placed pre cast concrete foundation blocks.

d. Erected fold away building.

e. Installed raw water and treated water tanks.

f. Installed water treatment equipment.

g. Site run pre-insulated pipe and fittings on grade between the WTP outlet flange and the accommodation facilities.

h. Installed heat trace (two pass series self regulating system).

i. Installed heat trace RTD temperature sensors, controls and connect power supply.

j. Installed heat tracing control panels.

k. Installed water distribution system inside the accommodation facilities.

l. Connected electrical power to the building and install power distribution to the water treatment equipment.

m. Site run pre-insulated pipe and fittings on grade between the WTP outlet flange and the sewage treatment plant.

n. Installed heat trace (two pass series self regulating system).

o. Installed heat trace RTD temperature sensors, controls and connect power supply.

p. Installed heat tracing control panels.

q. Commissioned the water treatment facility.

r. Test treated water for regulatory compliance.

**QA/QC**

s. Pressure test of treated water pipe from water building to accommodation facilities.

t. In-service leak test of treated water pipe from water building to sewage treatment plant.

u. Off-site testing of water samples.

## 2.3 Sewage Treatment System

a. Prepared sub base and granular cap.

b. Placed sea containers, lining up pre-marked container connections.

c. Connected all pre-run piping connections.

d. Site run pre-insulated pipe and fittings on grade between the accommodation facilities and the sewage treatment plant.

e. Installed waste water collection system inside the accommodation facilities.

f. Installed heat trace (two pass series self regulating system).

g. Installed heat trace RTD temperature sensors, controls and connect power supply.

h. Installed heat tracing control panels.

i. Connected all pre-wired electrical connections.

j. Connected electrical power to the building and install power distribution to the treatment equipment.

k. Commissioned the sewage treatment facility.

l. Test treated water for regulatory compliance.

**QA/QC**

m. Pressure test of waste water pipe from accommodation facilities to sewage treatment building.

n. Off-site testing of water samples.

## 2.4 Treated Effluent Discharge

a. Connected pipe to STP treated effluent nozzle.

b. Site run pipe between the STP and utility berm.

c. Installed pipe on grade following the road towards the stockpile settling pond and downwards to the approved Mary River discharge points.

d. Installed tee and manual valve station on berm at stockpile settling pond for use when pumping from the stockpile settling pond.

e. Installed the three (3) discharge points at Mary River.

f. Installed heat trace (two pass series constant watt system).

g. Installed heat trace RTD temperature sensors, controls and connect power supply.

h. Installed rock anchors on pipe to suit utility berm width.

i. Installed heat tracing control panels inside the Sewage Truck Building.

**QA/QC**

j. Pressure test of treated effluent pipe from sewage treatment building to the Mary River discharge point.

# 3. Photographic Records

## 3.1 Raw Water System

### *3.1.1 Raw Water Jetty*

**Figure 1: Pre-construction location for the raw water jetty (existing pumphouse shown with red roof) [west view]**

**Figure 2: Raw water jetty earthworks in-progress [northeast view]**

**Figure 3: Installing armour stone at raw water jetty [east view]**

**Figure 4: Raw water jetty earthworks complete [west view]**


**Figure 5: Installation of the raw water pumphouse [west view]**

**Figure 6: Inside the completed raw water pumphouse [west view]**

**Figure 7: Completed raw water jetty and pumphouse [east view]**

### *3.1.2 Raw Water Pipeline*

**Figure 8: Laying out the piping lengths**

**Figure 9: Raw water line "snaking" across the tundra**

**Figure 10: Raw water line raised to cross a low point**

**Figure 11: Feeding the heat trace cable through sleeve in the insulation**

**Figure 12: Laying out the piping route (tent shelter for pipe fusing activities in back left)**

**Figure 13: Pipe fusing inside the tent shelter (activity enclosed in protective tenting to retain heat required for fusing)**

**Figure 14: Testing of the finished line**

**Figure 15: Raw water intake piping entering the water building**

**Figure 16: Raw water pipeline entering the water building**

## 3.2 Water Treatment System

**Figure 17: Pre-construction of the water system at Mine Site [northeast view]**

**Figure 18: Preparing water building for water treatment equipment (fire water tanks shown outside)**

**Figure 19: Placement of interior equipment in water building**

**Figure 20: Installation of skid mounted tanks, piping, valving and equipment**

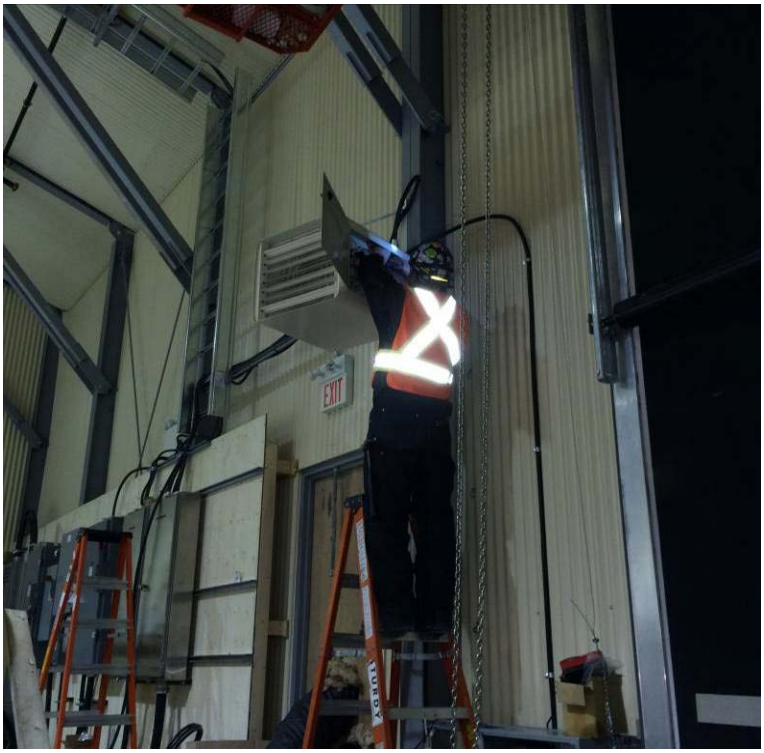



**Figure 21: Outfitting the HVAC inside the building**

**Figure 22: Completed water systems [northeast view]**

## 3.3 Sewage Treatment System

**Figure 23: Sewage treatment facility (left) and water treatment plant (center) [south view]**

**Figure 24: Completed sewage treatment system [east view]**

**Figure 25: Treated effluent discharge connection on north side of sewage treatment plant**

**Figure 26: Installation of heat trace lines on treated effluent discharge piping**

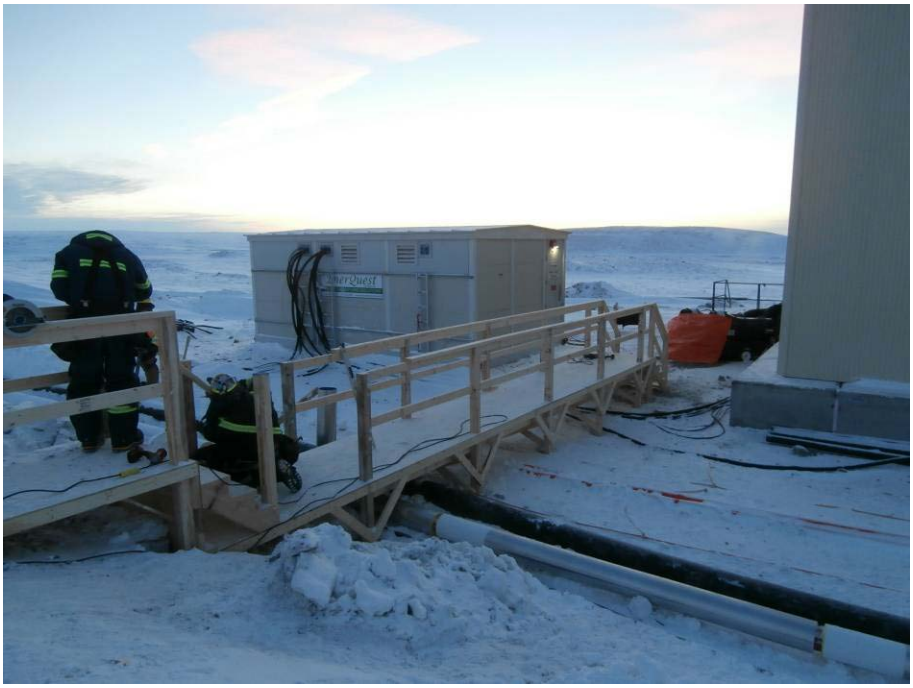


**Figure 27: Interconnecting piping runs over berm between water building, sewage treatment building, and accommodation facilities at Mine Site**

## 3.4 Treated Effluent Discharge

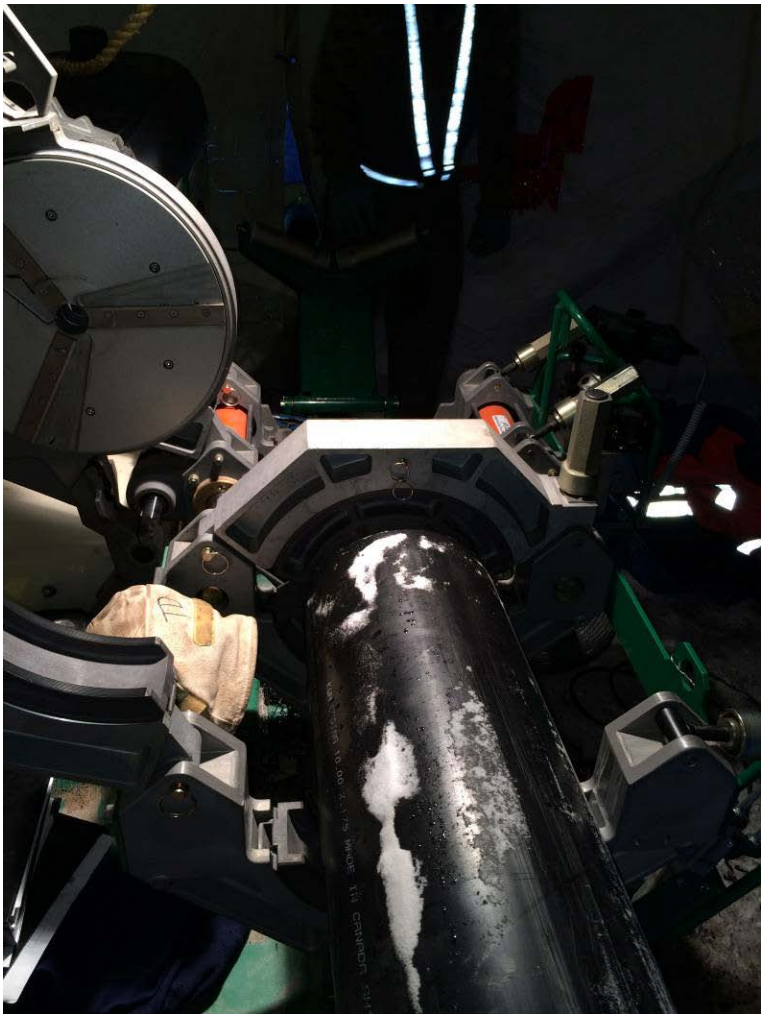


**Figure 28: Preparing to fuse two HDPE piping lengths (activity enclosed in protective tenting)**

**Figure 29: Treated effluent pipeline exiting sewage treatment plant (bottom/center of photo) and running east to bottom/left of photo [west view]**

**Figure 30: Treated effluent discharge road crossing construction**

**Figure 31: Treated effluent pipeline entering top/right of photo, discharging in three (3) locations: 2 heat traced/ insulated for all-weather use over rip-rap (furthest two rip-rap from camera, left to right), 1 non-insulated for summer discharge only [northwest view]**

**Figure 32: Treated effluent pipeline discharge locations [west view]. Summer discharge line discharges in lower left/center of photo.**

**Figure 33: All-weather treated effluent discharge point over rip rap**

# 4. As-Built Drawings

The as-built drawings incorporate contractor red line markups, field instructions, requests for information, field sketches, and all other inputs provided by the field engineering team. The as-built drawings are attached in Appendix A.

**Table 4-1: Water System 'As-Built' Drawing List**

| Drawing Number | Title | Revision |
|---|---|---|
| H349000-4000-00-014-0017 | Mine Site Water System Layout General Arrangement | 0 |
| H349000-4710-00-042-0001 | Mine Site Raw Water Intake Plan, Details and Sections | 1 |
| H349000-4711-10-035-0001 | Mine Site Raw Water Intake Earthworks & Drainage - Plan and Section | 2 |
| H349000-4720-75-031-0001 | Mine Site Raw/Fire Water System Piping & Instrumentation Diagram | 1 |
| H349000-4720-75-031-0002 | Mine Site Potable Water System Piping & Instrumentation Diagram | 1 |
| H349000-4731-75-031-0001 | Mine Site Sewage Water Treatment Piping & Instrumentation Diagram | 1 |

# 5. Field Decisions

The following sections describe relevant field decisions made during construction:

a. Original design included installation of rock anchors on the outdoor HDPE piping to restrict piping movement caused by seasonal thermal expansion. Pipe movements are no longer a significant concern. The HDPE piping does still move due to thermal expansion, but this does not damage the system. As such these rock anchors have been removed from the project design in most locations. Rock anchors were installed in select locations along the Mine Site effluent discharge piping to ensure the pipeline does not encroach onto the road due to thermal expansion.

b. Due to limited material availability onsite, road crossing schedule 80 pipe sleeve diameters vary to suit clearance between the ID of the sleeve and the OD of insulated process piping.

c. Modified heat trace installation for outdoor HDPE piping to include Heater Cable Sensing RTD's instead of Ambient Sensing RTD's to prevent overheating of the heat trace cable.

## 5.1 Raw Water System

a. Raw water jetty pump was installed with an offset pump centerline to accommodate the offset of the installed wet well.

b. Power supply to raw water pump house and heat trace cables changed from individual cable pulls running in parallel to a single primary pull separated with a splitter and disconnects near the pumphouse connections.

c. The 13U network cabinet supplied for the raw water pumphouse was significantly larger than necessary. The large cabinet was replaced in-field by a Corning WCH-06P to save on space.

d. A timber valve box was constructed to encase the raw water tee located behind the Weatherhaven camp (4" valve set with check valve). Box was insulated and sealed to prevent snow ingress.

e. Designed and installed modified pipe/cable tray supports to cross area of low elevation near the PWSP pond.

## 5.2 Water Treatment System

a. Installed electric heaters in the water building in place of the design diesel heating system. The diesel heaters were late in delivery for installation at Milne Port. Project decision was to move to electric heating permanently at both facilities.

b. Modifications were made to the electrical distribution to accommodate electric heat in the Water Building and Sewage Truck Building at Mine Site.

c. Layout of water treatment equipment inside the building was adjusted in the field to better suit layout of piping and electrical cable.

d. HDPE piping material was free-issued to Horizon in place of Horizon's design/supply of CPVC for installation of outdoor runs of treated water piping as a result of lessons learned during construction at the Milne Port facility.

### 5.3 Sewage Treatment System

a. Roof flashing and roof sealant were added to the roof joints between the 6 sea containers that make up the sewage treatment plant. Spray foam was added to joints and wall penetrations to weather-proof.

b. The power and IT cables installed on grade outside of the sewage treatment plant were unprotected and a trip hazard. Steel pipe(s) were split and placed around the cables and backfilled over to form a safe access walkway.

c. The feeder cable between the E-house (4750-BLD-001) and the sewage treatment plant has been changed from 1x1kV 3/C 350MCM Teck cable to 1x1kV 4/C 1/0 AWG Tech cable.

d. Added an RPZ (backflow prevention) valve to the Mine Site sewage treatment plant potable water supply in accordance with manufacturer's recommendation and code requirements.

e. HDPE piping material was free-issued to Horizon in place of Horizon's design/supply of CPVC for installation of outdoor runs of sanitary sewage piping as a result of lessons learned during construction at the Milne Port facility.

f. The supplied STP discharge pumps and motors (duty/standby) were replaced in-field by units with reduced design head. The project's compressed delivery/shipping schedule did not allow for this equipment change before shipment of the STP equipment to site.

### 5.4 Treated Effluent Discharge

a. A timber valve box was constructed to encase the treated effluent discharge at Mary River (three 3" ball valves) and at the tee at the road crossing (2" joins with 3" piping, includes two 3" ball valves and future check valves). Box was insulated and sealed to prevent snow ingress.

## 6. Performance Evaluation

### 6.1 Raw Water System

As of the data collection cut-off date for this report (December 7, 2014) there have been no adverse observations in operational performance of the raw water system.

The civil earthworks of the raw water jetty has been repaired twice due ice stresses (freeze/thaw cycles) and water currents removing the 6 inch material from the outer surface of the constructed jetty. During the second repair, 6 inch clear was added on top of the armour stone to avoid future removal of the jetty earthworks material. As a result, the overall jetty footprint is now larger than shown in the original issued for construction (IFC) design.

## 6.2 Water Treatment System

The water quality out of the water treatment system is tested weekly using colorimetric analysis to ensure the potable water supplied to the Mine Site camp is free from detectable concentrations of total coliform and e-coli. Periodic sampling and potable water analyses in accordance with applicable Health Canada guidelines is also performed, the samples being sent to an external accredited laboratory. As of the data collection cut-off date of this report (December 7, 2014) there have been no adverse observations in operational performance of the water treatment system. The water treatment system has consistently tested within the allowable parameters for water quality with no abnormal observations in operational performance.

## 6.3 Sewage Treatment System

The treated effluent quality out of the sewage treatment system is tested daily using colorimetric analysis to ensure the treated effluent water discharged is within specified Type A Water Licence criteria. Effluent is sampled in accordance with Type A Water Licence requirements and sent to an external accredited laboratory for analyses. As of the data collection cut-off date for this report (December 7, 2014) the plant has consistently maintained effluent compliance with the exception of several minor exceedances caused by upset influent conditions. In these instances, the plant was rapidly brought back into compliance and in some cases effluent was redirected on a short term basis to the PWSP. The results of the effluent quality analyses are presented in monthly and annual Water Licence Reports submitted to the Nunavut Water Board as required by the Type A Water Licence.

There have been some occurrences of observed high vacuum levels in the operating sewage treatment system. The facility was built to the approved design, and continues to operate within the required parameters; however as a result of the observed high vacuum levels Operations have been coordinating with the vendor to determine whether system changes may improve performance moving forward.

## 6.4 Treated Effluent Discharge

As of the data collection cut-off date for this report (December 7, 2014) there have been no adverse observations in operational performance of the treated effluent discharge piping network, running between the sewage treatment system and the discharge point at Mary River.

# 7. Vibration Monitoring

No vibration monitoring was conducted during the construction of the Mine Site water systems as it was not deemed necessary based on scope of activities required for construction.

Control for quarrying activity was conducted as per the project's specific management plans:

- BAF-PH1-830-P16-0040 (H349000-4100-07-245-0001): Quarry Management Plan Mine Site Quarry (QMR2).
- BAF-PH1-830-P16-0004 (H349000-1000-07-126-0011): Borrow Pit and Quarry Management Plan.

# 8. Environmental Monitoring

Environmental monitoring during the construction of the Mine Site water systems was conducted as per the BAF-PH1-830-P16-0008 Environmental Protection Plan (EPP) recently updated in July 2014.

In addition to the EPP, BIM self-performed earthworks construction follows the requirements of the BAF-PH1-830-STD-0001 Environmental Health and Safety Management Framework issued December 2010. The Baffinland on-site Environmental Management Team was responsible for environmental monitoring at all sites during construction and following-up with the construction team(s) if there were any reported environmental incidents or non-conformances.

Water system construction was also required to follow the requirements of the Surface Water and Aquatic Ecosystems Management Plan (March 2014), BAF-PH1-830-P16-0026. This Management Plan outlines the best management practices implemented to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitat used during construction. In addition this plan details the systems in place to mitigate and manage drainage and runoff at the building sites, address point and non-point discharges to surface waters and assess those discharges on water quality and quantity relative to their receiving water systems.

Water system construction also followed the requirements of the Fresh Water Supply, Sewage, and Wastewater Management Plan (January 2014), BAF-PH1-830-P16-0010, as required by the Type A Water Licence.

The Spill Contingency Plan (March 2014), BAF-PH1-830-P16-0036, in conjunction with the Emergency Response Plan (March 2014), BAF-PH1-830-P16-0007, provides guidance and instructions for first responders and Baffinland Management in the event of a spill event or other emergency such as fire or accident.

The risks to the water quality in the respective rivers and streams as a result of construction of the water systems would originate from following sources based on construction methodology:

- Spills from equipment.
- Increase in sediment load in the water.

There were no recorded spills from equipment used at the construction site. During the period of construction, water quality monitoring conducted at downstream stations under Part D, Section 16 and Part I, of the Type “A” Water Licence 2AM-MRY1325 indicated total suspended solids (TSS) and other parameter at levels below the specified Water Licence criteria. The results for water quality monitoring were provided in monthly reports submitted to the Nunavut Water Board and other stakeholders. In consideration of the above, the environmental mitigation strategies were effective in maintaining runoff water quality.

# 9. Earthworks Data

The survey data collected was used in generating the as-built drawings included in 0. Survey data was not recorded for pieces of equipment inside the respective facilities. The survey data collected has been included in Appendix B.

# 10. Unanticipated Observations

## 10.1 Raw Water System

The raw water intake wet well required re-work to accommodate for ground settlement after initial wet well installation and before completion of the raw water pumphouse construction.

## 10.2 Water Treatment System

There were no unanticipated observations during construction.

## 10.3 Sewage Treatment System

There were no unanticipated observations during construction.

## 10.4 Treated Effluent Discharge

A short section of pipe was damaged by excessive heat during commissioning of the heat trace system. The root cause was found to be incorrect installation of the heat trace cable with a double pass at the end of the pipe (coinciding with the pipeline high point). The pipe and heat trace were repaired and the installation corrected prior to system start-up.

# 11. Surface Monitoring

Not conducted.

# 12. Required Maintenance

None conducted to-date.

# 13. Adaptive Management

For discussion of adaptive management principles and practices applied during the Construction Phase of the Project and their overall effectiveness please refer to the 2013 Annual Report to the Nunavut Impact Review Board. Any additional adaptive management practices implemented as a result of works completed in 2014 will be reported in the updated 2014 Annual Report to the Nunavut Impact Review Board.

# 14. Concordance with Type "A" Water Licence

The Nunavut Water Board Type "A" Licence 2AM-MRY1325, Schedule D, outlines the requirements for Construction Monitoring Reports. The following table provides a concordance of the report, herein, with the requirements included in Part D.

**Table 14-1: Table of Concordance for Schedule D**

| Schedule D Item No. | Schedule D Description | Corresponding Section in this Report |
|---|---|---|
| 1a | description of all infrastructure and facilities designed and constructed to contain, withhold, divert or retain Water and/or Waste; | 1 |
| 1b | a summary of construction activities including photographic records before, during and after construction of the facilities and infrastructure designed to contain, withhold, divert or retain Water and/or Waste; | 2, 3 |
| 1c | as-built drawings and design for facilities and infrastructure, in Item 1(a) of this schedule, designed and constructed to contain, withhold, divert or retain Water and/or Waste; | 4 |
| 1d | documentation of field decisions that deviate from the original plans and any data used to support or developed facilities and infrastructure to withhold, divert or retain Water and/or Waste; | 5 |
| 1e | a comparison of measured versus predicted performance of infrastructure and facilities; | 6 |
| 1f | any blast vibration monitoring and control for quarrying activity carried out in close proximity to fish bearing waters; | 7 |
| 1g | monitoring conducted for sediment and explosives residue release from construction areas; | 8 |
| 1h | monitoring undertaken in accordance with Part D of the during the Construction Phase of the Project; | 8 |
| 1i | details confirming that the requirements of the CCME guidance document entitled "Aboveground Storage Tank Systems for Petroleum and Allied Petroleum Products (2003)" have been met by the Licensee; | N/A |
| 1j | data collected from instrumentation used to monitor earthworks and the interpretation of that data; | 9 |

| Schedule D Item No. | Schedule D Description | Corresponding Section in this Report |
|---|---|---|
| 1k | a discussion of any unanticipated observations including changes in risk and mitigation measures implemented to reduce risk during construction; | 10 |
| 1l | an overview of any method including frequency used to monitor deformations, seepage and geothermal responses; | 11 |
| 1m | a summary of maintenance work undertaken as a result of settlement or deformation of dikes and dams; | 12 |
| 1n | a summary of adaptive management principles and practices applied during the relevant phases of the Project and their overall effectiveness. | 13 |

# Appendix A

## As-Built Drawings

A. H349000-4000-00-014-0017 Rev00: Mine Site Water System Layout General Arrangement ***[1 page]***

B. H349000-4710-00-042-0001 Rev01: Mine Site Raw Water Intake Plan, Details and Sections ***[1 page]***

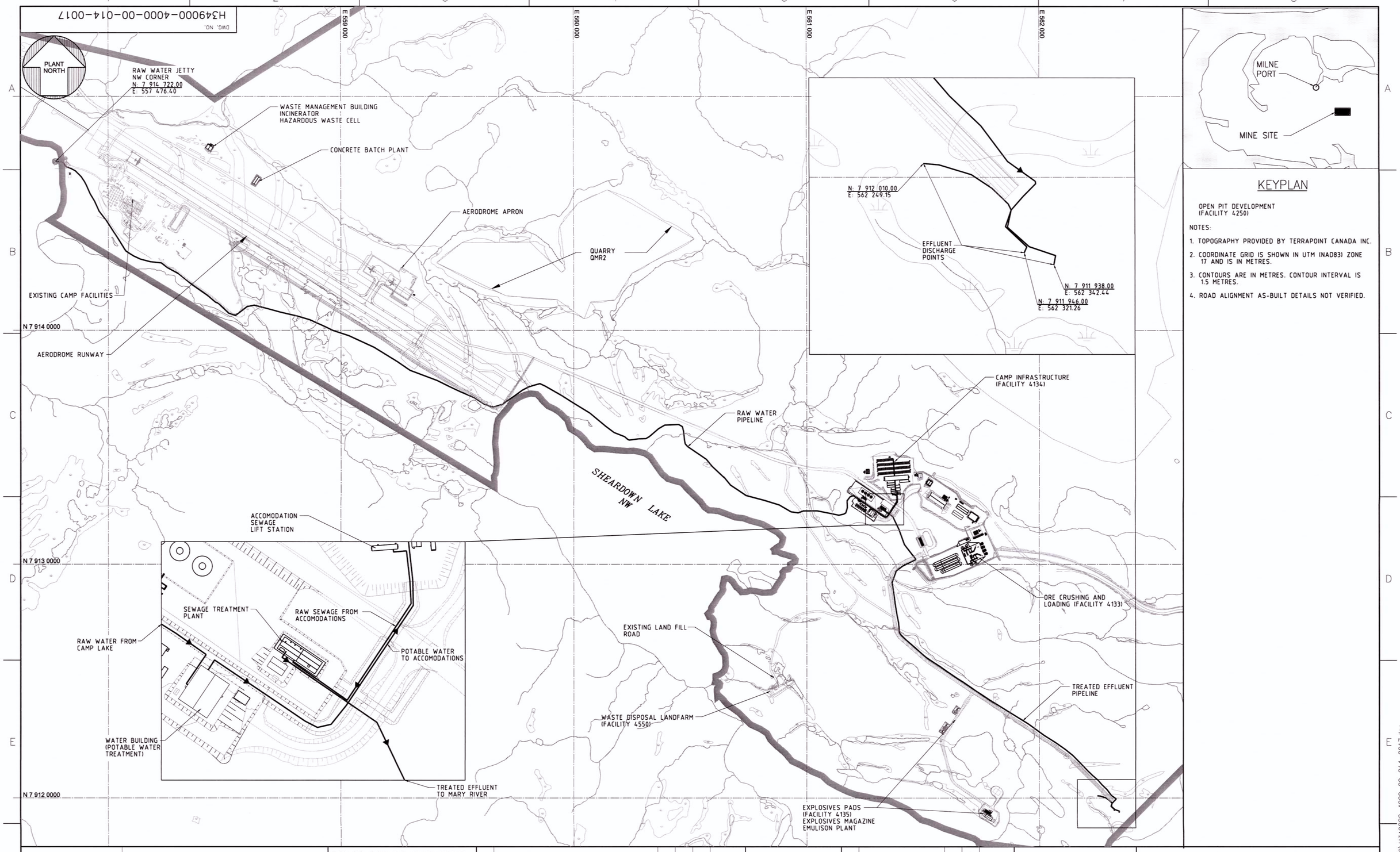
C. H349000-4711-10-035-0001 Rev02: Mine Site Raw Water Intake Earthworks & Drainage - Plan and Section ***[1 page]***

D. H349000-4720-75-031-0001 Rev01: Mine Site Raw/Fire Water System Piping & Instrumentation Diagram ***[1 page]***

E. H349000-4720-75-031-0002 Rev01: Mine Site Potable Water System Piping & Instrumentation Diagram ***[1 page]***

F. H349000-4731-75-031-0001 Rev01: Mine Site Sewage Water Treatment Piping & Instrumentation Diagram ***[1 page]***

DWG. NO. H349000-4000-00-014-0017







## KEYPLAN

OPEN PIT DEVELOPMENT
(FACILITY 4250)

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. ROAD ALIGNMENT AS-BUILT DETAILS NOT VERIFIED.

| DRAWING NO. | DRAWING TITLE |
|---|---|
| REFERENCE DRAWINGS | |



| NO. | DESCRIPTION | BY | CHK'D | APP'D | DATE |
|---|---|---|---|---|---|
| REVISIONS | | | | | |

AS BUILT

NO CHANGES.
CONSTRUCTED WITHIN
ACCEPTABLE TOLERANCES.

| REV. | ISSUE FOR | AUTH. BY | DATE |
|---|---|---|---|
| 0 | AS BUILT | BCP JC | 2015-01-13 |
| ISSUE AUTHORIZATION | | | |

HATCH

| | |
|---|---|
| DESIGNED BY | DRAWN BY J. CLELAND |
| DATE | DATE 2015-01-09 |
| CHECKED BY S. HESS | DISCIP. ENGR. S. HESS |
| DATE 2015-01-09 | DATE 2015-01-09 |
| PROJ. DES. COORD. T. THERRIEN | PROJ. ENGR. J. CLELAND |
| DATE 2015-01-09 | DATE 2015-01-09 |
| PROJ. MGR. J. CLELAND | |
| DATE 2015-01-09 | |

Baffinland

MARY RIVER PROJECT

MINE SITE
MINE SITE WATER SYSTEM LAYOUT
GENERAL ARRANGEMENT

| SCALE | DWG. NO. | REV. |
|---|---|---|
| 1:7500 OR AS NOTED | H349000-4000-00-014-0017 | 0 |

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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