October 26, 2024

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Technical Advisor, NWB
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Submission of Annual Geotechnical Inspection – 2024, Mary River Project – Nunavut, Project # CA0039374.4332

Under Part D, Item 18 of Baffinland Iron Mines Corporation's (Baffinland) Type "A" Water Licence 2AM-MRY1325 Amendment No. 1 (Water Licence), Baffinland is required to conduct biannual geotechnical inspections of specified Mary River Project (the 'Project") infrastructure. Part D, Item 18, of the Water Licence states that:

> "The Licensee shall conduct inspections of the earthworks and geological and hydrological regimes of the Project biannually during the summer or as otherwise approved by the Board [Nunavut Water Board] in writing. The inspection shall be conducted by a Geotechnical Engineer and the inspection report shall be submitted to the Board within sixty (60) days of the inspection, including a cover letter from the Licensee outlining an implementation plan to respond to the Engineer's recommendations."

The 2024 geotechnical inspection was conducted by Laszlo Bodi, M.Sc., P.Eng., Senior Principal Civil/Geotechnical Engineer with WSP Canada Inc. The inspection focused on waste and water retention infrastructure located at the Mary River Project as required by Type "A" Water Licence No: 2AM-MRY1325 – Amendment No.1 Part I, Item 12. In addition to Part I, Item 12 requirements, Baffinland elected to voluntarily inspect water and waste conveyance structures aswell as select bridge and culvert infrastructure.

Baffinland requested, in writing to the Nunavut Water Board (NWB) (August 16th), to complete one annual inspection in 2024. The NWB responded favorably to Baffinland's request approving the change in frequency of the biannual geotechnical inspections to one annual inspection (September 20th). Baffinland conducted the third party annual geotechnical inspection within snow free conditions as requested to ensure waste and water retention infrastructure could be comprehensively inspected.

During the inspection, the following structures and facilities were inspected:

1.0 Mary River Mine Site

a) Berms of Exploration Camp Polishing Waste Stabilization Ponds - (MS-MRY04a,b,c).
b) Berms around Exploration Camp hazardous waste disposal cells - (HWB-1 to HWB-7).
c) Ore Stockpile Pond - MS-06,

d) Run of Mine Ore Stockpile Pond - MS-07,
e) Waste Rock Stockpile Facility - MS-08
f) Km 105 Surface Water Management Pond - MS-11
g) The berm around the Exploration Camp generator fuel bladder cell. (Genset cell)
h) Miscellaneous Fuel storage berms (3) and Aerodrome jet-fuel storage,
i) Bulk Fuel Storage Stormwater Facility –MS-03, MS-03b.
j) Non-hazardous Waste landfill facility and two adjacent, lined landfarm cells).
k) Camp Lake settling check dams.
l) Rock fill slope stability and riprap condition at the water (effluent) discharge area.
m) Surface water and drainage conditions at the QMR2 rock quarry.

2.0 Milne Inlet Port Site

a) Berms of hazardous waste disposal cells - (HWB-1, HWB-3 and HWB-4).
b) Polishing Waste Stabilization Pond (MP-01a).
c) Bulk Fuel Storage Facility - MP-03.
d) Land-farm facility (MP-04) and contaminated snow disposal cell (MP-04A).
e) Ore Stockpile Sedimentation Ponds - Pond #3, MP-05, MP-06 and MP-06A.
f) Drainage conditions at the Q01 rock quarry and the adjacent ditch network (north and south).
g) Surface water collection ditches (P-SWD-3, -5, -6, -7, W3/W14, 380-Person Camp, and PSC ditches).
h) Twin Tote Road culverts (conveying some of the surface water from the Q01 rock quarry area).
i) Rock fill and slope at the water/effluent discharge area.
j) LP-5 Storage Pad.
k) The Western Petroleum Fuel Module at the OHT fuel station.

3.0 Tote Road between the Mary River Mine and Milne Inlet Port

a) Bridge abutments along the Tote Road (4 locations).
b) Culverts at KM32+900 (Lake access road), KM33+100; KM36+000; KM59+800; KM80+500; KM90+100 and KM94+060 locations.

The attached report (Attachment 1) presents the findings and recommendations of the inspection for the aforementioned structures. Each recommendation referenced within the report is supported by Baffinland’s plan for addressing the recommendation identified in the 2024 Annual Geotechnical Inspection.

2024 Geotechnical Inspection Recommendations and Implementation Plan

3.0 Mary River Mine Site

3.1 Hazardous Waste-Cell Berms (HWB-1 to HWB-7)

Recommendation: It is recommended that foot and truck traffic on the slopes and crest of the berms be limited to maintain the integrity and stability of the berms. Trucks may only use the designated entry/exit ramps to access the cells, and those ramps should be frequently maintained. Furthermore, no materials should be placed on the slopes or crest of the berms, they must be stored within the cells only

Baffinland Action: Berm sections disturbed by required foot and truck traffic will continue to be maintained during routine maintenance activities. Baffinland continues to educate personnel on access to berms and will remove materials that should interact with berm walls.

a) Hazardous Waste Berm - HWB-3 and HWB-4

Recommendation: The debris, visible on the central berm between the two cells should be removed and disposed.

Baffinland Action: Debris was removed from the central berm and disposed of appropriately.

b) Hazardous Waste Berm - HWB-6

Recommendation: No material should be stored on the slopes or crest of the berms, therefore some of the stored materials in this cell should be rearranged.

Baffinland Action: Baffinland will ensure that no material is stored on the slopes or crest of the berm.

c) Hazardous Waste Berm - HWB-7

Recommendation: The level of ponding water in this cell should be monitored closely, and some of the water should be removed if required, to prevent the uncontrolled release of water.

Baffinland Action: Storm water retained within containment areas associated with the Project's HWBs is discharged to the receiving environment following water quality analysis and treatment, if required. Baffinland will continue to discharge storm water from HWB-7 as needed to ensure adequate freeboard is maintained.

3.2 Surface Water Management Ponds

a) MS-06 - Surface Water Management Pond Adjacent to the Crusher Facility (CF)

Recommendation: A culvert is located near the south-east corner of the pond, within an adjacent drainage ditch. This culvert is damaged, preventing the collected water from the upstream section of the ditch reaching the MS-06 pond.

Baffinland Action: The culvert will be inspected and cleaned and/or replaced as required.

b) MS-11 – Surface Water Management Pond and Dam at KM105

Side slope of South Embankment

Recommendation: It is likely that the rehabilitation of the slope will include the placement of sand cover and riprap in the upper (displaced) part of the cover layers, and the reconstruction of the safety berm at its original location adjacent to the anchor trench. It is also likely that placement of additional riprap along the toe of the south slope will be necessary (like a wide and heavy toe-berm) to provide additional support at the toe to prevent similar sliding of the cover layers in the future.

Baffinland Action: Baffinland will continue to monitor the potential movement of the slope through future geotechnical inspections in 2025. Internal geotechnical monitoring of the structure will be utilized to support independent advice.

3.3 Solid Waste Disposal Area and Two Landfarm Cells

Recommendation: The ponded water within cell#2 of the landfarm should be removed and properly disposed, prior to storing any material within the cell.

Baffinland Action: Baffinland will continue to monitor the water level within cell #2 and treat the stored water if required in the coming snow free season.

3.4 QMR2 Rock Quarry

Recommendation: It is suggested that consideration be given to the installation of slope-drain pipes, chutes, or flume drains from the sumps, as erosion protection measures on the side-slope, instead of letting the water to flow uncontrolled along the edge of the access road and down on the side-slopes.

Baffinland Action: Baffinland is assessing and has previously identified the above noted issue. Drainage improvements of the lower level of QMR2 quarry is being developed. A plan based on the above recommendation will be implemented in 2025.

4.0 Milne Port Site

4.1 Hazardous Waste – Cell Berms (HWB-1 to HWB-4)

a) HWB-1

Recommendation: Materials on pallets should be stored within the cell, not on the berms.

Baffinland Action: All materials were removed from the berms.

4.2 Q01 Rock Quarry – Main Level

Recommendation: *The drainage of the collected water from within the voids of the large granular fill pad into the nearby ditches still requires further control; flowing water on the surface of the new pad is still visible in many areas. It is suggested that additional drainage ditches be provided within the new fill pad (around its perimeter at strategic locations), to improve the control of surface water in the area. The collected water from those additional ditches should be drained/conveyed into the nearby P-SWD-5 drainage ditch, which also requires improvement*

Baffinland Action: Drainage improvement initiatives will be considered in 2025 with intent to convey water within the drainage of Q1 to the existing P-SWD-5 drainage ditch

4.3 Surface Water Collection Ditches (P-SWD-3, -5, -6, -7, W3/W14, 380-Person Camp and PSC ditches)

a) P-SWD-3

Recommendation: *To improve the drainage capability of the P-SWD-3 ditch, it is recommended that it should be reconstructed to drain the large quantity of surface water from the snow-dump to the north-east. The culvert in the ditch beneath the access road to the snow-dump has also been damaged recently. This culvert should be replaced and installed to the correct invert level (to be specified during the redesign and reconstruction process). To prevent the migration of fine soil particles from the ditch to the environment, a rockfill check dam should be installed/constructed at the discharge point of the upgraded/reconstructed ditch. The culvert under the access road to the quarry in the P-SWD-3 ditch should be removed and replaced with a larger diameter pipe.*

Baffinland Action: Drainage improvement initiatives will be considered in 2025 with intent to improve the drainage capability of the P-SWD-3 ditch. Damaged or impacted culverts will be evaluated to consider if it still effectively passes water.

b) P-SWD-5

Recommendation: *It is recommended that the somewhat finer soil, currently forming the side of the ditch, be removed to a depth/width of around 1 m and replaced with crushed rock fill. To minimize migration of fine soil particles from the quarry pad to the ditch, the crushed rock fill should be placed over a layer of geotextile fabric. The improvement of this section of the ditch shall be completed with the formation/excavation of additional drainage ditches, required to rectify the ponding water present in many parts of the lower (main) level of the quarry.*

Baffinland Action: Drainage improvement initiatives will be considered in 2025 with intent to improve the drainage capability of the P-SWD-5 ditch. Rip rap will be added to the exposed location along the ditch to mitigate minor erosion.

c) P-SWD-6

Recommendation: *It is recommended that surface water from the "new" pond and from the surrounding quarry area should be drained to the P-SWD-5 ditch or alternatively to a nearby valley. The upgraded drainage system will require the design and construction of new erosion-controlled drainage components in the valley (new ditches with geotextile and riprap cover, and at least three (3) new culverts. One of the new culverts will need to replace the inefficient culvert in the P-SWD-5 ("Q01-North") ditch, at the entrance to the quarry, as recommended above.*

Baffinland Action: Drainage improvement initiatives will be considered in 2025 with intent to improve the drainage capability of the P-SWD-6 ditch. Active pumping will be prioritized as opposed to ditching and installation of new culverts to convey water.

d) W3/W14

Recommendation: *The area around the culvert's inlet and the side-ditch flowing from the left to the culvert, still requires the placement of geotextile and riprap for erosion protection.*

Baffinland Action: Rip rap will be placed for erosion protection at W3/W14

e) PSC Drainage

Recommendation:

*It is recommended that the drainage conditions at the **P-SWD-3** and **PSC** ditches be reviewed and rectified as early as practically possible. Once the drainage conditions in the P-SWD-3 ditch would be improved/rectified, the slope condition at the PSC ditch can also be improved. The reparation should include the placement of some additional riprap in the affected area. Based on field observations, the outflow end of the PSC ditch should also be further upgraded by the installation of geotextile and riprap along the base and side-slopes of the ditch. To prevent the migration of fine soil particles from the ditch to the environment, a rockfill check dam should also be installed/constructed at the discharge point of the upgraded/reconstructed ditch*

Baffinland Action*:* Drainage improvement initiatives will be considered in 2025 with intent to improve inflow and outflow locations of the P-SWD-3 ditch.

4.4 Effluent Discharge Pipe

Recommendation: *To prevent further deterioration of the sandy and silty slopes in the upper zone of the valley, it is recommended that more crushed rock fill (riprap) be placed over the sandy base and slopes of the valley.*

Baffinland Action: Armouring or liner will be placed on the exposed section of the discharge location.

4.5 Western Globe Fuel Module (WGFM)

Recommendation: *It is suggested that the edges of the liner beneath the road fill be exposed using a hydrovac, and the humps reconstructed as designed. In addition, installation of timber beams is suggested within the humps, to prevent the flattening of the granular fill by the heavy trucks.*

Baffinland Action: The design of the fuel module will be reviewed and the containment humps reconstructed in snow free conditions.

5.0 Tote Road between the Mary River Mine and Milne Inlet Port

5.1 Bridges (4)

a) Bridge 97

Recommendation: *There are areas at two locations where some additional rock fill should be placed over fine soils at the surface, to prevent erosion and migration of the finer material into the river.*

Baffinland Action: Erosion mitigation measures will be evaluated at the identified zones and implemented in snow free conditions.

5.2 Selected Culverts (7)

a) KM32+900 Culvert and Check Dams

Recommendation: *To provide uninterrupted flow, the culvert should be cleaned or replaced with a longer pipe as soon as practically possible. More rockfill should also be placed around the culvert's inlet, while the silt, deposited at the front of its outlet, should also be removed. The crest of the nearby check-dams, show some loss of rock fill. The dams should therefore be raised by placing additional rock fill on their crests, and the ditch behind the dams should be cleaned (fine soil removed).*

Baffinland Action: The km 32 culvert will cleaned and steamed to ensure that drainage flows uninterrupted. The inlet and outlet of the culvert will be maintained and the associated check dam evaluated.

b) KM33+100 Culverts

Recommendation: *It is likely that these culverts will need to be reinstalled after the removal of the upper zone of the thaw-unstable ice-rich soil. The new culverts will need to be placed over thaw-stable, compacted granular fill as pipe bedding, with a thickness of at least 1.5 m.*

Baffinland Action: The culvert will be monitored to ensure that effective drainage is maintained however new culverts will not be installed unless required.

c) KM80+500 Culverts

Recommendation: *The culverts were installed over poor soil subgrade which, after thawing, has lost its strength and bearing capacity, resulting in significant differential settlements of all pipes. To prevent similar settlement problems in the future, the thaw unstable, ice-rich soils will need to be removed from beneath the new culverts and replaced with thaw-stable, compacted granular materials to a depth of at least 1.5 m below the invert level of the pipes.*

Baffinland Action: A comprehensive evaluation is occurring on this crossing. The integrity of the culverts and effective drainage will be restored through reinstallation or redesign of the culvert crossing.

d) KM90+100 Culvert

Recommendation: *It is suggested to closely monitor the embankment at both ends of this culvert and make appropriate steps (if needed) to prevent sloughing of the material at the toe of the road embankment, by lengthening the culvert at both ends, and by placement of additional riprap on the adjacent embankment slopes, particularly at the toe.*

Baffinland Action: The ends of the culverts will be monitored and potential material sloughing adjacent to the culvert mitigated by additional rip rap and sedimentation and erosion mitigation measures.

Regards,

William Bowden

William Bowden
Senior Environmental Superintendent

Attachments:

Attachment 1: Annual Geotechnical Inspection – 2024 Mary River Project – Nunavut

Cc: Conor Goddard, Amoudla Kootoo (QIA)
Omer Pasalic, Sean Noble-Nowdluk, (CIRNAC)
Tim Sewell, Megan Lorde-Hoyle, Lou Kamermans, Francois Gaudreau, Martin Beausejour,
Connor Devereaux, Todd Swensen, Allison Parker, Dale Kristoff (Baffinland)

Attachment 1

Annual Geotechnical Inspection - 2024

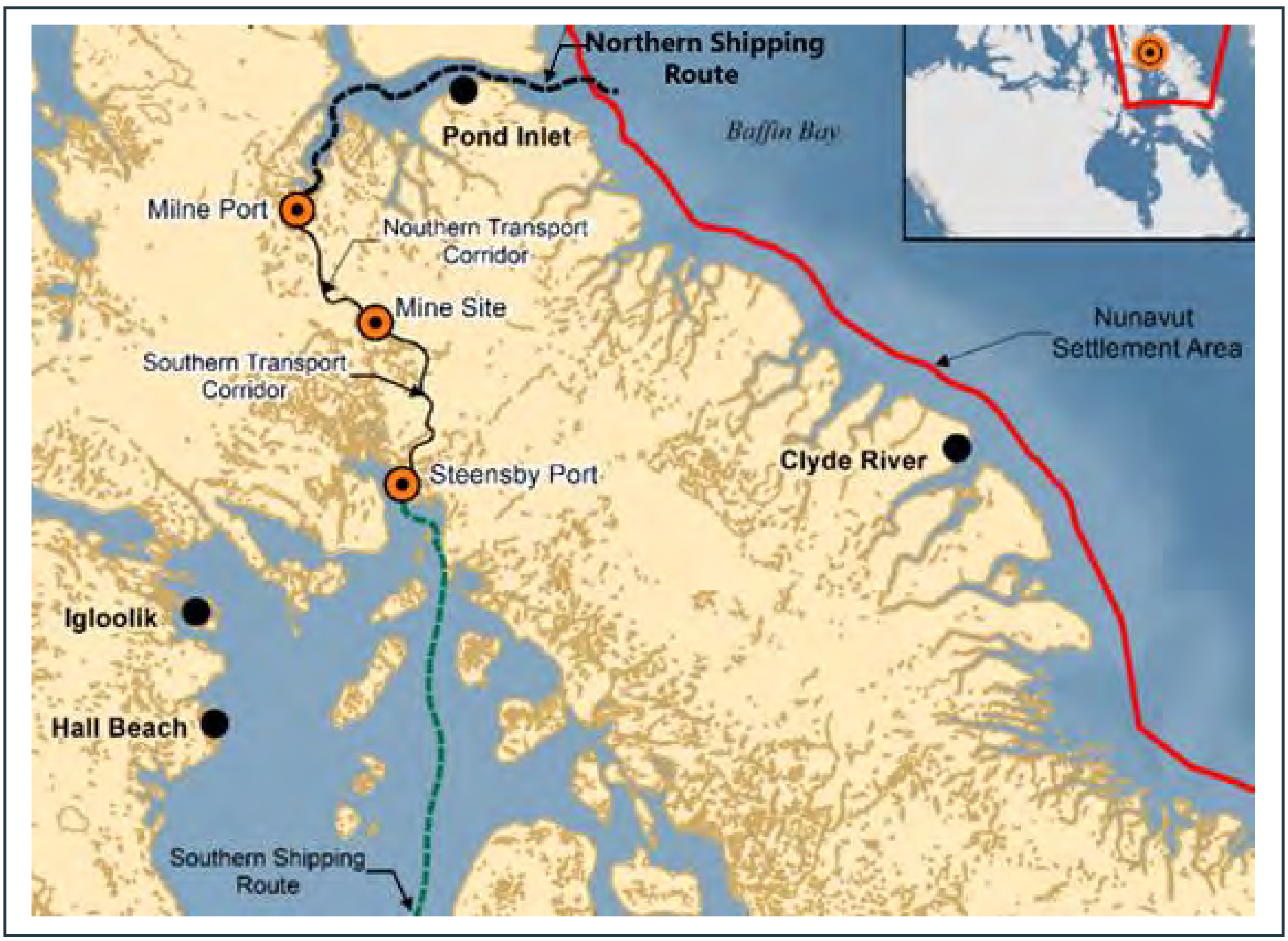
2275 Upper Middle Road East, Suite 300 | Oakville, ON, Canada L6H 0C3
Main: 416.364.8820 | Fax: 416.364.0193 | www.baffinland.com

BIM Corporation

September 27, 2024
Project #: CA0039374.4332

Annual Geotechnical Inspection – 2024

Mary River Project – Nunavut



Location of the Mary River Mine Site and Milne Inlet Port on Baffin Island - Source: Fisheries and Oceans Canada

WSP Canada Inc.
6925 Century Avenue
Mississauga, Ontario, Canada, L5N 7K2

September 27, 2024
CA0039374.4332

Mr. Connor Devereaux - Environmental Manager, Mary River Iron Mine, BIM Corporation
Mr. Todd Swenson - Environmental Superintendent, Mary River Iron Mine, BIM Corporation
360 Oakville Place Drive, Suite 300,
Oakville, Ontario, L6H 6K8

Re: Annual Site Inspection and Reporting 2024 - Mary River Iron Mine Complex, Nunavut

WSP Canada Inc. has been retained by Baffinland Iron Mines Corporation to carry out Annual Geotechnical Engineering Services at the Mary River Project in Nunavut. Based on information and guidance, provided in connection with the site's infrastructure, the undersigned has completed the required inspection for 2024 and summarized the findings in the following report. In addition to field observations, the following historic reports and other documents had also been reviewed:

- Mary River Fueling Facility, Milne Inlet – Site Plan and Details (B.H. Martin, 2016)
- Inspection of the Milne Inlet Tote Road and Associated Borrow Sources – Tetra Tech (2019)
- Annual Geotechnical Site Inspections (2019, 2020, 2021 and 2022 1st report) – Wood E&I
- Construction Summary Reports – Crusher Pad Sedimentation Pond Expansion (2019); Waste Rock Pond Expansion Drainage System; KM-106 Run of Mine Stockpile & Sedimentation Pond (2020) and Mine Site Land-farm Cell 1 and Cell 2 (2022); Dam construction and liner installation at KM105 (2021-2022)
- KM105 Sedimentation Pond Design Brief and Issued for Construction Drawings – Knight Piésold Ltd. (2021)
- Annual Geotechnical Site Inspections (2022 - 2nd and 2023 reports) – WSP E&I Canada Limited

We trust that the content of this report meets your expectations. Should you have any questions regarding the details presented in the following document, please do not hesitate to contact our office.

Sincerely,

WSP Canada Inc.

REGISTERED PROFESSIONAL ENGINEER
L. BODI
LICENSEE
NT/NU

Laszlo Bodi, M.Sc.; P.Eng. – Senior Principal Civil/Geotechnical Engineer
WSP Canada Inc.

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1.0 Introduction

WSP Canada Inc., has completed the required geotechnical field inspection of 2024 at the Mary River Project, which is a condition of the Type "A" Water Licence No: 2AM-MRY1325 – Amendment No.1 ("Water Licence").

Based on the requirements outlined in the Water Licence, the annual field inspection shall include the review of various facilities and structures that contain waste materials (hazardous and non-hazardous), and store or retain surface water (ponds and ditches) at the Mary River Mine and Milne Inlet Port sites. The field review included visual assessment of the current condition of the berms and slopes and reporting on potential seepage/stability problems at the facilities, if any.

As required by Type "A" Water Licence No: 2AM-MRY1325 – Amendment No.1 Part I, Item 12, conditions of the waste and water retention infrastructure components need to be inspected and documented by photographs. The inspected structures and facilities in 2024, were visited in snow free conditions and included the following features:

A. Mary River Mine Site

a) Berms of Exploration Camp Polishing Waste Stabilization Ponds - (MS-MRY04a,b,c).
b) Berms around Exploration Camp hazardous waste disposal cells - (HWB-1 to HWB-7).
c) Ore Stockpile Pond - MS-06,
d) Run of Mine Ore Stockpile Pond - MS-07,
e) Waste Rock Stockpile Facility - MS-08
f) Km 105 Surface Water Management Pond - MS-11
g) The berm around the Exploration Camp generator fuel bladder cell. (Genset cell)
h) Miscellaneous Fuel storage berms (3) and Aerodrome jet-fuel storage,
i) Bulk Fuel Storage Stormwater Facility – MS-03, MS-03b .
j) Non-hazardous Waste landfill facility and two adjacent, lined landfarm cells.
k) Camp Lake settling check dams.
l) Rock fill slope stability and riprap condition at the water (effluent) discharge area.
m) Surface water and drainage conditions at the QMR2 rock quarry.

B. Milne Inlet Port Site

a) Berms of hazardous waste disposal cells - (HWB-1, HWB-3 and HWB-4).
b) Polishing Waste Stabilization Pond (MP-01a).
c) Bulk Fuel Storage Facility - MP-03.
d) Land-farm facility (MP-04) and contaminated snow disposal cell (MP-04A).
e) Ore Stockpile Sedimentation Ponds - Pond #3, MP-05, MP-06 and MP-06A.
f) Drainage conditions at the Q01 rock quarry and the adjacent ditch network (north and south).

g) Surface water collection ditches (P-SWD-3, -5, -6, -7, W3/W14, 380-Person Camp, and PSC ditches).
h) Twin Tote Road culverts (conveying some of the surface water from the Q01 rock quarry area).
i) Rock fill and slope at the water/effluent discharge area.
j) LP-5 Storage Pad.
k) The Western Petroleum Fuel Module at the OHT fuel station.

C. Tote Road Between the Mary River Mine and Milne Inlet Port

a) Bridge abutments along the Tote Road (4 locations).
b) Culverts at KM32+900 (Lake access road), KM33+100; KM36+000; KM59+800; KM80+500; KM90+100 and KM94+060 locations.

The above listed infrastructure components were visually inspected in snow free conditions between August 22 and August 27, 2024, by the author of this report, Laszlo Bodi M.Sc.; P.Eng. of WSP Canada Inc. During the inspection, the current condition of the above listed structures was visually reviewed, and the findings of the inspection are summarized in the following report. The locations of the inspected infrastructure components, berms, settling ponds and ditches are shown in the following key maps:

a) Mary River Mine site – Central Zone - East (Figure 1), North-Eastern Zone (Figure 2), South-Eastern Zone (Figures 3 and 4), Central Zone - West (Figure 5), Southern Zone (Figure 6), and Western Zone (Figure 7)

b) Milne Inlet Port site – North-Eastern Zone (Figure 8), North-Western Zone (Figure 9), South-Western Zone (Figure 10), and South-Eastern Zone (Figure 11)

c) Representative section of the Tote Road – (Figure 12)

Photographs of the inspected structures are shown in the following documents (attached to this report):

a) Appendix A: Mary River Mine site – Figures 13 to 52

b) Appendix B: Milne Inlet Port site - Figures 53 to 88

c) Appendix C: Bridge abutments (4 locations), and selected culverts (7 locations) - Figures 89 to 118

Mary River Mine Site

Figure 1: Site layout – Mary River Mine Site - Central Zone – East, showing the MS-03 and MS-03B Bulk Fuel Storage Facility and the MS-06 Ore Stockpile Pond. © 2023 Digital Globe, Inc.

Figure 2: Mary River Site layout – North-Eastern Zone – Waste rock stockpile facility (MS-08) and geotube ponds.

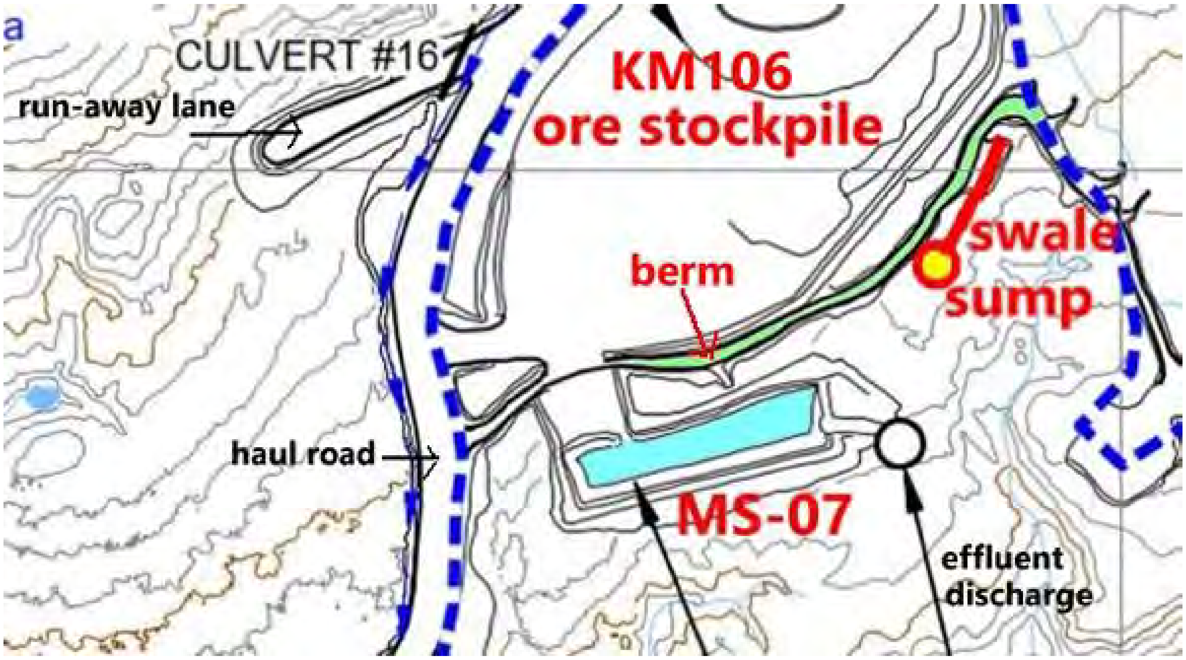

Figure 3: Site layout – Mary River Mine Site – South-Eastern Zone – KM106 run-of-mine ore storage facility and KM106/MS-07 run of mine ore stockpile pond.

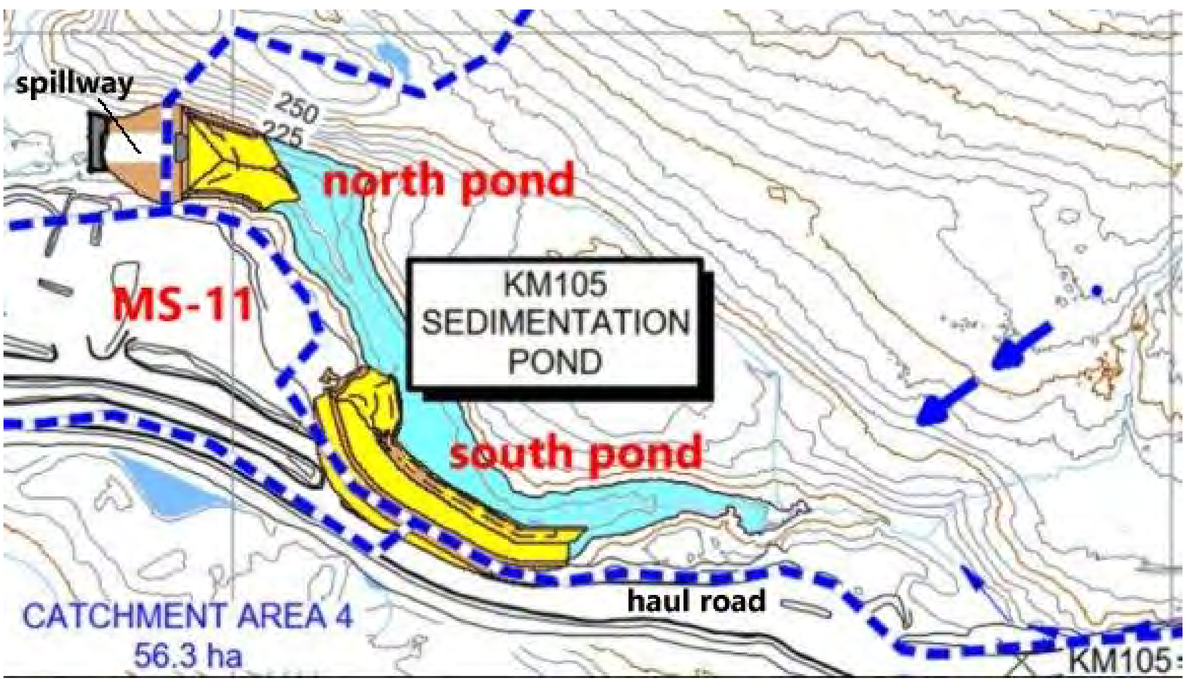

Figure 4: Site layout – Mary River Mine Site – South-Eastern Zone – KM105 surface water management pond /MS-11.

Figure 5: Site layout – Mary River Mine Site – Central Zone - West – Jet-fuel storage cell near the airstrip and QMR2 rock quarry. © 2023 Digital Globe, Inc.

Figure 6: Site layout – Mary River Mine Site – Southern Zone – Non-hazardous waste landfill area with two new land-farm cells, and the effluent discharge location. © 2023 Digital Globe, Inc.

Figure 7: Site layout – Mary River Mine Site - Western Zone – Exploration Camp Polishing Waste Stabilization Ponds (PWSP - MS-MRY04a,b,c), - HWB hazardous waste storage cells (1-7), genset cell, and Camp Lake check dams. © 2023 Digital Globe, Inc.

Milne Inlet Port Site

Figure 8: Site layout – Milne Inlet Port Site – North-Eastern Zone. © 2023 Digital Globe, Inc.

Figure 9: Site layout – Milne Inlet Port Site – North-Western Zone. © 2023 Digital Globe, Inc.

Figure 10: Site layout – Milne Inlet Port Site – South-Western Zone. © 2023 Digital Globe, Inc.

Figure 11: Site layout – Milne Inlet Port Site – South-Eastern Zone. © 2023 Digital Globe, Inc.

Figure 12: View of a section of the Tote Road between the Mary River Mine and Milne Inlet Port.

Details of the recent condition survey of the individual infrastructure components, reviewed in August 2024, are summarized in the following sections of the report while the relevant photographs, maps and sketches are shown in Appendix A, B and C, as integral parts of this document.

2.0 Mary River Mine Site

2.1 Polishing/Waste Stabilization Ponds (3 PWS ponds) (MS-MRY 4a,b,c)

There are three (3) polishing waste stabilization (PWS) ponds, located adjacent to the airstrip, as shown in Figure 7. Pond #1 is a single structure, while Ponds #2 and #3 were constructed as twin-cells, as shown in Figure 13. The photograph in Figure 13 is a historic aerial image (taken by the author of this report in 2020) showing the robust and stable berms around the three stabilization ponds. As mentioned in previous inspection reports, these ponds were associated with the exploration phase of the mine, and currently serve as emergency holding ponds in case problems would arise, which would prevent the discharge of treated effluent directly to the receiving environment. The robust, stable berms around the ponds generally comprise granular materials (rock fill, sand, and gravel), with high density polyethylene (HDPE) geomembrane liners. No damage is visible on the membranes in the cells or on the upstream face of the slopes (see Figures 14 to 16).

A relatively common issue in water storage ponds is the appearance of so-called “whales”. Whales are sections of the liners which have risen (float) above the surface of shallow water, particularly in shallow ponds, where the weight of water above the liner is limited. There are no concerns associated with the observed whales. Such "whales" were visible during previous inspections in both PWS-2, and PWS-3 ponds and similar "whales" were noticed during the recent (August 2024) inspection in both ponds, as shown in Figures 15 and 16; however, no damage to the liner or seepage from the ponds was noted.

2.2 Hazardous Waste-Cell Berms (HWB-1 to HWB-7)

There are seven (7) lined hazardous waste storage cells with stable perimeter berm structures at the Mary River mine site (HWB-1 to HWB-7). The HWB-6 cell is located at the north side of the airstrip near the incinerator, while the other six (6) cells are located opposite to HWB-6, at the south side of the airstrip, as shown in Figure 7. All seven (7) HWB cells are lined with HDPE liner, and comprise shallow, stable perimeter berms constructed from locally available, generally granular, thaw-stable soils. There is no visible instability at the berms (sloughing, excessive settlement, or tension cracks), other than some minor surface disturbance/soil displacement caused by foot and truck traffic on the surface of the slopes and crests at a few locations, as shown in the relevant images in Appendix A. It is recommended that foot and truck traffic on the slopes and crest of the berms be limited to maintain the integrity and stability of the berms. Trucks may only use the designated entry/exit ramps to access the cells, and those ramps should be frequently maintained. Furthermore, no materials should be placed on the slopes or crest of the berms, they must be stored within the cells only.

a) HWB-1

As shown in Figure 17, this cell is currently empty and had not been used for years. Concerns had been raised in the past that there is potential liner damage within this cell, and consequently no material has been stored in the cell since the concern was raised. However, as shown in Figure 17, some ponding water was visible in the cell during the August 2024 inspection, indicating that the liner may still be intact, as it was pointed out in earlier inspection reports.

b) HWB-2

As shown in Figure 18, only a few (5) shipping containers are currently stored in this cell. The robust perimeter berm around the cell appears to be stable and the presence of ponding water within the cell indicates good liner performance.

c) HWB-3 and HWB-4

These cells were constructed as "twin-cells" and were called "Fuel Containment" cells. As shown in Figures 19 and 20, both cells are holding fuel barrels, stored on wooden pallets, (jet-fuel and diesel). The berms and liner around and within the two cells are in good condition and no seepage from either of the cells was noted during the August 2024 inspection. The presence of water in the cells indicates good liner performance. The debris, visible on the central berm between the two cells should be removed and disposed (yellow circle in Figure 20).

d) HWB-5

As shown in Figure 21, this cell is currently empty and has not been in use for years. The shallow berms around the cell appear to be stable, although the result of some surface erosion on the slopes is visible. No ponding water is visible in this cell indicating potential liner damage. As mentioned earlier for HWB-1, these two cells (1 and 5) could be reconstructed as one large new cell with new berms and liner, should additional storage requirements become necessary at the site.

e) HWB-6

The berms around this cell and the internal "floor" have been regraded and stabilized recently using clean granular fill, as shown in Figure 22. The presence of ponding water within the cell indicates good liner performance. It shall be noted that this cell is almost always filled to its capacity. As mentioned earlier, no material should be stored on the slopes or crest of the berms, therefore some of the stored materials in this cell should be rearranged if it persists after the 2024 sealift backhaul.

f) HWB-7

One (1) large white fuel tank is stored in this cell together with hydrocarbon products stored within containment totes as shown in Figure 23. The perimeter berm around the cell appears to be stable and the ponding water within the cell is indicative of adequate liner performance. The level of ponding water in this cell should be monitored closely, and some of the water should be removed if required, to prevent the potential for uncontrolled release of the water.

2.3 MS-06, MS-07, MS-08 and MS-11 Surface Water Management Ponds

a) MS-06 – Surface Water Management Pond Adjacent to the Crusher Pad

The MS-06 surface water management pond collects surface water from the area of the crusher pad. The surface water is collected in side-ditches around the crusher pad and conveyed into the MS-06 pond. One of the culverts, located under the adjacent road at the crusher pad entrance, is connecting one of the side ditches with the north corner of the MS-06 surface water management pond. The culvert appears to be well maintained and there is uninterrupted flow of water through the culvert, as shown in Figure 24. The liner within the pond and on the upstream slopes of the stable perimeter berm appears to be intact, as shown in Figure 25.

A second culvert, shown in Figure 26, is located near the south-east corner of the pond, within an adjacent drainage ditch. As shown by the yellow circle in the image, this culvert is damaged and clogged, preventing the collected water from the upstream section of the ditch (yellow arrow) reaching the MS-06 pond. As recommended in earlier reports as well, this culvert should be replaced or restored to pass water effectively.

b) MS-07 – Surface Water Management Pond Adjacent to the KM-106 Stockpile

The MS-07 surface water management pond is located adjacent to the KM-106 ore stockpile area. The pond has robust, stable perimeter berm and intact geomembrane liner, as shown in Figure 27. No stability or seepage related problems were observed at this pond during the August 2024 site visit.

c) MS-08 – Surface Water Management Pond Adjacent to the Waste Rock Facility

Waste rock from the open pit mining operation is disposed of in the waste rock storage facility WRSF, which consists of waste rock piles, the MS-08 surface water management pond, and the continuously upgraded perimeter drainage ditches, excavated around the facility. Surface runoff and seepage from the WRSF is collected in the ditches (east and west) and conveyed to the MS-08 pond. The MS-08 surface water management pond is bounded by robust and stable berm, and the pond is lined with HDPE liner that is secured in place in anchor trenches, extending down into the permafrost.

During the August 2024 inspection, the MS-08 pond was almost empty, as shown in Figure 28. Figures 29 and 30 show the well-maintained drainage ditches (east and west) around the waste rock storage facility, conveying the collected surface water to the MS-08 pond.

Water from the MS-08 pond can be pumped to the nearby designated facility for treatment, if required. There is a lined treatment cell (geotube pond) located immediately next to the WRSF water treatment plant. As shown in Figure 31, the berm around the pond has recently been reconstructed and new geomembrane liner was installed within the pond, all in excellent condition.

d) MS-11 – Surface Water Management Pond at KM105

The KM105 surface water management pond (MS-11), shown in Figure 4, was designed (KM105 Sedimentation Pond Design Brief and Issued for Construction Drawings – Knight Piésold Ltd. 2021), and constructed to provide sediment control for runoff water originating from the following catchment areas:

- The undisturbed areas upslope of the KM105 ponds from which runoff cannot be easily diverted to other areas,
- The section of the transportation road near the ponds, and
- The area of the ponds (north and south) themselves.

The design of the pond's main dam included an emergency spillway with an invert elevation of 220.5 m, which is the design maximum water level in the MS-11 pond. At normal water level the pond has two separate (but connected) areas: the "north and south ponds", as shown in Figure 4. As specified in the 2021 design, the upstream slopes of the main dam and sections of the side slopes within the north and south ponds (yellow areas in Figure 4) are lined with HDPE geomembrane, placed between two layers of non-woven geotextile, and gravelly sand base and cover layers, and topped with a layer of crushed rock riprap for erosion protection (see Figures 32 and 33).

On the side slope of the south pond, the geomembrane liner and non-woven geotextiles extended up to the top of the slope of the embankment and were anchored into an anchor trench at the crest, as shown in Figure 34.

Two things could be noted in the Figure 34 image:

- One is the wide zone at the toe of the slope with only a thin layer of riprap (green zone) over the liner, providing limited resistance against the potential sliding of the cover layers (sand and riprap), placed above the liner on the steeper zone of the slope.
- The other is that one of the safety berms, constructed on the top of the riprap layer, immediately adjacent to the anchor trench at the crest of the embankment (see the red circle in the image). Based on information recently obtained at the mine it appears that during the filling of the ponds with runoff water, around June 11 and 12, 2022, sliding/sloughing of the cover layers and the displacement of the safety berm was noted along the crest of the embankment at the south pond. Figure 35, which was taken on June 22, 2022, shows the slipping (and cracking) of the cover layers (sand and riprap) and the downslope displacement (sliding) of the safety berm just a few weeks after the completion of the construction and during the early stage of filling the pond with water.

Figure 36 was taken during the recent site visit on August 26, 2024, which shows that the liner beneath the cover layers is still intact and anchored into the anchor trench at the top of the embankment's slope. This indicates that only the cover layers and the safety berm have moved (slipped) in June 2022, and that there was no "classical" slope failure within the embankment at the south pond. It appears that the embankment beneath the liner is stable, and the anchor trench is still at its original position along the edge of the crest (at road level), still supporting the liner as per the original design.

It is likely that the rehabilitation of the slope will include the placement of sand cover and riprap in the upper (displaced) part of the cover layers, and the reconstruction of the safety berm at its original location adjacent to the anchor trench. It is also likely that placement of additional riprap along the toe of the south slope will be necessary (like a wide and heavy toe-berm) to provide additional support at the toe to prevent similar sliding of the cover layers in the future. The problem appears to be concentrated to the zone above the liner and the main body of the embankment beneath the liner appears to be stable.

2.4 Berm of the Cell for Generator Fuel Bladders

This cell has previously contained fuel bladders for the generators; however, it was empty during the August 2024 site visit. As shown in Figure 37, the stable perimeter berm around the cell generally comprises granular materials and the cell is lined. Ponding water within the cell indicates good liner performance.

2.5 Fuel Storage Berms (3)

There are three (3) fuel storage facilities at the Mary River mine site. One (1) is located at the airfield and two (2) adjacent to the main office complex of the mine, as shown in Figures 1 and 5. The berms and liners at these facilities are in excellent condition, as shown in the relevant images in Appendix A.

a) Jet-fuel Tank Farm

The jet-fuel tank farm is located adjacent to the airfield, and it is bounded by a stable perimeter berm. In addition, a second berm, constructed from crushed rock fill, provides additional protection at two (2) sides (Tote Road and airport parking area) of the facility. The jet-fuel farm is lined to the crest of the perimeter berm, and the liner within the cell appears to be in good condition. A well-constructed ramp at the berm provides safe vehicular access to the fuel tanks, stored within the cell, as shown in Figure 38.

b) MS-03 Diesel Fuel Tank Farm

The robust, stable perimeter berm around the MS-03 diesel fuel tank farm is in excellent condition, as shown in Figure 39, and it is well maintained. Some ponding water within the cell indicates that the liner system is fully functional (i.e., no seepage from the cell is visible and the liner is well protected by granular fill throughout the cell). In Figure 39, note the crushed rock fill on the downstream slope of the berm along the adjacent road, for additional protection against erosion.

c) MS-03B Fuel Tank Farm

A large capacity fuel tank farm is located adjacent to the Tote Road, as shown in Figure 40. This tank farm was constructed as specified in the design drawings (subgrade, berms, bedding layer, liner, and protective cover). Based on site observations during the August 2024 visit (presence of ponding water in the cell), the liner in the facility is intact, and the perimeter berm is stable and well maintained.

2.6 Solid Waste Disposal Area and Two New Landfarm Cells

The non-hazardous solid waste disposal area is in the southern zone of the Mary River Mine site, as shown in Figure 6. Two (2) new landfarm cells were constructed near the gate of the main landfill facility, as shown in Figure 41. It is understood that the number of new landfarm cells may be increased to three (3) as shown in the image.

Existing Landfill Cells #1 and #2 have been completed covering an approximate area of 10,180 m^2, it is expected that new lifts may be constructed in the future to increase capacity. Figure 42 shows that only non-hazardous solid waste is deposited into the unlined main landfill facility and that the site is surrounded by a chain-link fence and a lockable gate.

Based on relevant documents prepared by Knight Piésold Consulting Engineers (KP), the landfarm cells (1 and 2) were designed as above-ground structures to avoid disturbing permafrost. According to the KP design documents, the berms for the two completed cells were constructed using 100mm minus granular material and covered by 150mm thick 25mm minus clean sand and gravel. The bedding layer was installed as a cushion layer to the 60-mil (1.5 mm) HDPE geomembrane, which is used to prevent any potential contact water from seeping into the subgrade and berms and escaping the containment system. The liner is covered with a 300mm thick, clean sand and gravel layer in the cells (floor and side-slopes). All liner-edges are anchored into a 300mm x 300mm key trench, located along the top of the berms. As shown in Figure 41, the cells are designed with a sump, located in one of the corners of each cell.

Figures 43 and 44 show the robust stable berms around the cells. During the August 2024 inspection it was noted that the currently empty cell #2 had lots of ponding water within the cell. This indicates good liner performance; however, the water should be removed and properly disposed, prior to storing any material within the cell.

2.7 Camp Lake Settling Check Dams and Gabion Walls

The Camp Lake check dams and gabion walls (all stable and well-maintained) are located along the access road to the mine's water intake jetty. The primary purpose of these structures is to collect (trap) fine soil particles (silts and clays) that could be eroded down from the adjacent slopes, and to prevent the siltation of the lake around the water intake structure. As shown in Figures 45 and 46 the rockfill riprap in the channel and the check-dams have been recently upgraded and a new gabion wall was installed along the road to the lake. The images show that the check-dams are working well, as intended. Figure 46 also shows a new check-dam and gabion wall, constructed adjacent to the lake to capture suspended solids (silts and clays) potentially eroding from the nearby airfield area and to prevent siltation in the lake.

2.8 Water (Effluent) Discharge Area

The effluent discharge point is located south of the Mary River mine complex, as shown in Figure 6. There is currently one (1) discharge pipe at that location conveying the clean, discharged water down the slope's surface to the adjacent valley. Trucks also bring water occasionally for discharge at this location and let the water flow down on the embankment comprising crushed rock fill, shown in Figure 47. As shown in the image, the slope is stable and well-protected against potential erosion by the rockfill cover.

2.9 QMR2 Rock Quarry

There is no activity (blasting and crushing) carried out currently in the QMR2 rock quarry. The exposed slopes (rock face) within the quarry appear to be in stable condition overall, with a few localized fall hazards (loose boulders) noted at the upper and lower levels of the quarry in some areas. However, as mentioned in earlier inspection reports, the lowest plateau (main level) of the quarry still exhibits somewhat poor surface water control and therefore periodic ponding water (rain and melted snow) still cover a section of the quarry's lower level, as shown in Figure 48. The ponding water is flowing uninterrupted along the side of the access road, as shown in Figure 49, still eroding the edge of the road and initiating erosion and some settlement of the road embankment.

As pointed out in earlier reports, the uncontrolled surface water presents not only potential slope stability issues in the area, but also traffic safety issues, particularly during freezing periods. To maintain traffic safety and stable side slopes when the operation in this facility will resume, the surface water at the quarry's main level should be collected in drainage ditches and sumps excavated at strategic locations, and then properly drained from the sump(s) down on the side-slope of the plateau. One potential location of the suggested drainage path is marked in Figure 5 by a blue arrow. It is suggested that consideration be given to the installation of slope-drain pipes, chutes, or flume drains from the sumps, as erosion protection measures on the side-slope, instead of letting the water to flow uncontrolled along the edge of the access road and down on the side-slopes.

2.10 KM106 Ore Stockpile Area

The area previously considered as a potential rock quarry is now serving as an ore stockpile site. As shown in Figure 3, the area is located south of the open pit, along the east side of the mine haul road (MHR). Most of the surface water from the stockpile area is diverted to the adjacent MS-07 pond by a diversion berm; however, some of the run-off water is collected in an adjacent drainage ditch/swale and a sump and pumped from the sump into the nearby MS-07 pond, as required.

Figure 50 shows a historic image (2022) of the diversion berm, drainage ditch/swale and sump in poor conditions. However, as shown in Figures 51 and 52, these infrastructure components have been recently rehabilitated/upgraded. The diversion berm was reshaped and raised somewhat, while the slopes and base of the drainage ditch and sump are now covered with riprap to minimize siltation of the collected water, which is being pumped into the nearby MS-07 pond.

3.0 Milne Inlet Port Site

3.1 Hazardous Waste-cell Berms (HWB-1 to HWB-4)

There were four (4) hazardous waste disposal cells, three (3) still active and one (1) decommissioned, with stable perimeter berms at the Milne Inlet Port site. HWB-1 (active) and HWB-2 (decommissioned) cells are single detached structures, located north-east and south-east of the MP-03 fuel storage area, respectively. HWB-3 and HWB-4 (active); however, were constructed as twin-cells, located south/south-west of the fuel storage area, as shown in Figure 8.

a) HWB-1

The HWB-1 is the largest cell of the four, bounded by stable perimeter berm, constructed of thaw-stable granular soils, as shown in Figures 53 and 54, in Appendix B. Two shipping containers, fuel barrels and other materials are stored in the cell generally on wooden pallets, as shown in Figure 53. Ponding water was visible in the rear sump area of the cell (Figure 54), indicating that the liner within the cell is intact and working as intended. No seepage from the cell was visible around the downstream toe of the perimeter berm and the granular fill, covering and protecting the liner across the cell's interior, is well maintained. Materials on pallets should be stored within the cell, not on the berms (note the container marked by the blue arrow in Figure 3, that should be moved from the berm's slope into the cell).

b) HWB-2

The HWB-2 was a small waste storage cell that is no longer in operation. As mentioned in earlier report, that cell was completely decommissioned, and the area has been regraded with clean aggregate and the area is now used for other purposes.

c) HWB-3 and HWB-4

The well-maintained HWB-3 and HWB-4 cells are located immediately next to each other (twin-cells), as shown in Figure 55 and Figure 56. These cells contained only shipping containers in the past; however, the cells have been recently emptied and "refurbished". Currently the cells contain fuel barrels on wooden pallets, with only one (1) shipping container stored in HWB-4. The lined stable berms around and between the cells and the interior surface have been re-graded/raised and appear to be in good condition with no indication of slope movements or seepage.

3.2 MP-01A Polishing Waste Stabilization Pond (PWSP)

The MP-01A polishing pond is located immediately south of the MP-03 fuel storage facility. As shown in Figure 57, the robust, stable perimeter berm around the pond is in excellent condition and the liner within the cell appears to be intact. No sign of slope instability, settlement or seepage from the pond was noted during the field inspection. As shown in the image, the pond is currently empty. Should the removal of the sediment from the cell become necessary, it should be carried out using a hydrovac equipment, to maintain the integrity of the liner.

3.3 MP-03 Fuel Tank Farm

The MP-03 fuel tank farm occupies a large area in the center of the Milne Inlet Port. As shown in Figure 58, the facility is well maintained and the perimeter berm around the site is in excellent condition. The presence of ponding water in the facility is an indication of good liner performance. The site is fenced in, and no indication of instability or seepage was noted at and around the robust berm at this facility.

3.4 MP-04 and 04A Landfarm and Contaminated Snow Disposal Cells

The MP-04 landfarm is in the southern zone of the Port at higher elevation (on the top of a hill), adjacent to the Q01 rock quarry. It is a large cell that stores potentially contaminated soils, as shown in Figure 59.

The lined, robust perimeter berm around the cell is in stable condition and the ponding water in one (1) corner of the cell (sump) indicates good liner performance. No wet downstream slopes or toe seepage were noted during the August 2024 site visit.

The MP-04A is a smaller cell, constructed immediately adjacent to cell MP-04 and is used generally for the disposal of contaminated snow. This pond is also bounded by robust stable perimeter berm, as shown in Figure 60. No seepage from the cell was noted anywhere around the downstream toe of the berm, and the ponding water within the cell indicates that the liner is in good condition. As requested in an earlier report, additional protective layer of sand and gravel fill was placed recently over the liner at the access ramp, which is now in good condition.

3.5 Surface Water Management Ponds and Ditches (Surface Water Management Pond #3, MP-05, MP-06 and MP-06A Ponds)

The iron ore that is mined, crushed, and screened at the Mary River Mine site is transported to Milne Inlet Port, and stockpiled across a large area near the ship-loader. Contact water (rain and melted snow) from the area is collected along the west and north sides of the ore stockpile in side-ditches and conveyed into four (4) surface water management ponds (pond #3, MP-05, MP-06 and MP-06/A), strategically located around the ore storage area, as shown in Figure 8 and Figure 9.

a) Surface Water Management Pond #3

Surface Water Management Pond #3 is located west of the ore storage area, as shown in Figure 9. The pond is bounded along three (3) sides by lined stable berm (Figure 61) and contains two (2) sumps. The geomembrane liner and protective geotextile on the internal slope of the berms were designed to extend 2.5 m below the surface and are anchored into the underlying permafrost zone to prevent any seepage from the pond into the ground below and to the surrounding environment. The berms and liner are in excellent condition. Excess water from the pond is frequently pumped into the nearby, large capacity MP-06 surface water management pond, whenever necessary.

b) MP-05 Pond

The MP-05 surface water management pond is located adjacent to the north-east corner of the ore stockpile, while the MP-06 and MP-06A ponds were constructed at the north-west corner. The three ponds are in excellent condition with stable, well-maintained berms and intact geomembrane liners, as shown in Figures 62, 64 and 65.

No instability, erosion or settlement was noted at the robust berms of the MP-05 pond and no toe seepage from the pond is visible anywhere around the pond's perimeter berm, as shown in Figure 62. The surface water from the ore stockpile is collected in well-maintained, clean drainage ditches, including the well-maintained east ditch, shown in Figure 63.

c) MP-06 and MP-06A Ponds

The large "twin" surface water management pond adjacent to the north-west corner of the ore stockpile area is divided into two (2) cells (MP-06 and MP-06/A) by a liner-covered internal berm. The main (south) part of the pond is called MP-06 and is shown in Figure 64. The northern cell is called the "overflow pond" MP-06/A, shown in Figure 65. The liner in the ponds and the stable, robust perimeter berm are in good condition, and no seepage was noted from the ponds, indicating good liner performance.

Figure 66 (a historic image) shows the condition of the "west" surface water collection ditch during last year's (2023) inspection. As shown in Figure 67, (this photograph was taken in August 2024) a new, widened berm was recently constructed along the adjacent road and partly within the ditch. It is understood that water from pond #3 is generally pumped into pond MP-06 (note the partially buried hose in the ditch in the image), not drained by gravity within the ditch.

3.6 Q01 Rock Quarry – Main Level

No activity was noted in the Q01 rock quarry at the time of the August 2024 inspection. In 2023, a large area of the quarry's lower level was covered with ponding water, indicating poor surface water control at the main level of the quarry. The drainage situation has been partially rectified recently by the placement of granular fill (crushed aggregate) across the lower level of the quarry and raising the ground elevation somewhat. As shown in Figures 68 and 69; however, the drainage of the collected water from within the voids of the large granular fill pad into the nearby ditches has not been solved, and hence, ponding and flowing water on the surface of the new pad are still visible in many areas. It is suggested that additional drainage ditches be provided within the new fill pad (around its perimeter at strategic locations), to improve the control of surface water in the area. The collected water from those additional ditches should be drained/conveyed into the nearby P-SWD-5 drainage ditch, which also requires improvement (see comments in section 3.7, below).

3.7 Surface Water Collection Ditches (P-SWD-3, -5, -6, -7, W3/W14, 380-Person Camp and PSC ditches)

There are several surface water collection drainage ditches across the Milne Inlet Port site, some of them are still under construction or require improvement, as shown in Figures 69 to 82. These open ditches are excavated somewhat into the native soils of the area and then their side-slopes and inverts were protected by crushed rockfill riprap or in many cases geotextile and riprap. Geotextile fabric has been used wherever the native subgrade along sections of the ditches is composed of somewhat finer soils, to prevent migration of the fine particles into the overlying crushed rock fill and eventually into the ditches. The issues (5) that were identified at these ditches during the August 2024 inspection are summarized below:

- As described in previous inspection reports, sloughing at the side slopes of the P-SWD-3 ditch, adjacent to the LP-2 laydown area, has occurred at several locations, as shown in Figures 70 and 71. It is evident that the sloughing of the slopes is a direct result of uncontrolled sheet-flow of surface water (melting snow from the adjacent snow-stockpile), flowing into the ditch that is not able to convey the water to the designated discharge location, marked by the green circle "A" in Figure 8. As pointed out first in the 2021 inspection report, the ditch invert currently slopes gently toward south-west, while the ditch was designed to drain the collected water toward north-east, toward the above noted discharge point (green circle "A" in Figure 8).

  To improve the drainage capability of this ditch, it is recommended that it should be reconstructed to drain the large quantity of surface water from the snow-dump to the north-east (to green circle "A"). As shown in Figure 71, the culvert in the ditch beneath the access road to the snow-dump has also been damaged recently. This culvert should be replaced and installed to the correct invert level (to be specified during the redesign and reconstruction process). To prevent the migration of fine soil particles from the ditch to the environment, a rockfill check dam should be installed/constructed at the discharge point of the upgraded/reconstructed ditch (green circle "A").

- A section of the P-SWD-5 ("Q01-North") ditch was noted with missing riprap cover, as shown in Figure 72. As pointed out in earlier reports as well, it appears that there is continuous subsurface water seepage from within the adjacent granular pad of the quarry's main level at this location, resulting in periodic sloughing/erosion of the side of the ditch just along this short section shown in the image. It is recommended that the somewhat finer soil, currently forming the side of the ditch, be removed to a depth/width of around 1 m and replaced with crushed rock fill. To minimize migration of fine soil particles from the quarry pad to the ditch, the crushed rock fill should be placed over a layer of geotextile fabric. The improvement of this section of the ditch shall be completed with the formation/excavation of additional drainage ditches, required to rectify the ponding water that is present in many parts of the lower (main) level of the quarry, as shown in Figures 68 and 69. Figure 73 shows a clogged, undersized culvert under the access road to the quarry in this P-SWD-3 ditch. This culvert should be removed and replaced with a larger diameter pipe.
- As shown in Figure 11, the P-SWD-6 ("Q01-South") ditch was constructed south of the rock quarry to drain surface water collected across the southern part of the quarry to strategically installed culverts at the south end of the ditch, and subsequently to the west side of the Tote Road. Unfortunately, an area at the southern edge of the quarry was over-excavated, resulting in large quantity of ponding water there that is not able to drain into the P-SWD-6 ditch since its invert level is located well above the base of this "man-made" pond, as shown in Figure 75. As pointed out in the 2023 inspection report, the collected surface water from the over-blasted area of the quarry currently flows uncontrolled over the surface of the nearby access road, presenting continuous safety risk to the local traffic to and from the quarry. It is recommended that surface water from the "new" pond and from the surrounding quarry area should be drained to the P-SWD-5 ditch or alternatively to a nearby valley, as shown in Figure 11. The upgraded drainage system will require the design and construction of new erosion-controlled drainage components in the valley (new ditches with geotextile and riprap cover, and at least three (3) new culverts). One of the new culverts will need to replace the inefficient culvert in the P-SWD-5 ("Q01-North") ditch, at the entrance to the quarry, as recommended above.
- Figure 78 shows the partially completed W3/W14 surface water collection ditch with crushed rock riprap slope protection. The area around the culvert's inlet and the side-ditch flowing from the left to the culvert, still requires the placement of geotextile and riprap for erosion protection.
- The PSC drainage ditch has a somewhat "L" shaped alignment (see Figure 8) and is located north of the P-SWD-3 drainage ditch, along the northern edge of the LP-2 laydown area. As shown in Figure 81, localized slope degradation/sloughing of the riprap is still visible at a narrow strip of the upper zone of the slope (marked by a yellow arrow). The sloughing of the slope is apparently caused by frequent water seepage from the granular fill of the LP-2 laydown pad. It is likely that the frequent

seepage at this location is a result of the inefficient drainage of surface water within the above discussed P-SWD-3 ditch.

As pointed out above, the collected surface water in the P-SWD-3 ditch should drain toward its north-east end. However, currently the water flows to the opposite direction. At the south-west end of the ditch the collected water seeps into the voids of the granular fill pad of the LP-2 laydown area and most likely exits at the location where the frequent slope erosion problem is visible at the PSC ditch (see the red circle in Figure 8). It is recommended that the drainage conditions at the P-SWD-3 and PSC ditches be reviewed and rectified as early as practically possible. Once the drainage conditions in the P-SWD-3 ditch would be improved/rectified, the slope condition at the PSC ditch can also be improved. The reparation should include the placement of some additional riprap in the affected area (see the zone shown by the yellow arrow in Figure 81).

Based on field observations, the outflow end of the PSC ditch should also be further upgraded by the installation of geotextile and riprap along the base and side-slopes of the ditch, shown in Figure 82. To prevent the migration of fine soil particles from the ditch to the environment, a rockfill check dam should also be installed/constructed at the discharge point of the upgraded/reconstructed ditch (see the green circle "B" in Figure 8 for location of the suggested check dam).

3.8 Tote Road Ditches and Culverts

Surface water from the P-SWD-6 drainage ditch is conveyed down toward the Tote Road through corrugated galvanized steel culverts, installed under an access road to the quarry and then under the Tote Road (Figures 83 and 84). The collected water is conveyed through the Tote Road culverts to small natural ponds, located along the west side of the Tote Road. Both culverts appear to be clean, and the seasonal flow through them is uninterrupted.

3.9 Effluent Discharge Pipe

The discharge end of the effluent water pipe in the Port is located just north of the fuel storage facility, as shown in Figure 8. The slope in the immediate vicinity of the discharge point is covered with riprap; however, deterioration of the adjacent slopes of the valley, comprising native sandy and silty soils, is visible as marked by the red arrows in Figure 85.

As shown in the image, there is also a steel corrugated pipe culvert discharging some water into the valley. To prevent further deterioration of the sandy and silty slopes in the upper zone of the valley, it is recommended that more crushed rock fill (riprap) be placed over the sandy base and slopes of the valley along the area marked by the red arrows. Placement of such rock fill will prevent erosion of the fine soil particles from the valley to the bay.

3.10 LP-5 Storage Pad

A network of natural cracks and depressions were noted on the surface at the edge of the LP-5 storage area in 2022. This storage pad was apparently constructed over patterned native ground, where the periodic formation and thawing of ice wedges resulted in a network of “stripes” (depressions/cracks) within the active layer. It is most likely that this network of “ground depressions” was generally “eliminated” beneath most of the storage pad during its construction; however, a few depressions may still develop, particularly along the edges. As recommended earlier, the cracks have been filled recently with the same material that was used for the construction of the pad (clean sand and gravel), and the granular pad is now in excellent condition, as shown in Figure 86.

3.11 Western Globe Fuel Module (WGFM)

The Western Globe Fuel Module (WGFM), shown in Figure 87, is located north of the 380 Camp. As opposed to design specifications, no humps are visible at the entry and exit points of the refueling station. The top image of Figure 88 presents part of a historic design drawing (drawing number C01), showing a section of a 900 mm wide (at its crest) and 450 mm high drainage control hump with 10H:1V slopes, specified by B.H. Martin Consulting Engineer and Architect in June 2016. The purpose of the humps at the entry and exit points of the refueling station was to prevent oily surface water escaping the refueling area. As shown in the top image of Figure 88 the entire area of the refueling station has a liner beneath the road fill, which liner should also have a 10H:1V slope up to the internal edge of the 900 mm wide humps. Under the heavy truck traffic at the station; however, those humps were flattened/spread in the past but shall be reinstated. It is suggested that the edges of the liner beneath the road fill be exposed using hydrovac, and the humps reconstructed as designed. In addition, installation of timber beams is suggested within the humps, to prevent the flattening of the granular fill by the heavy trucks in the future, as shown in the lower image of Figure 88.

4.0 Tote Road Between the Mary River Mine and Milne Inlet Port

The abutments and crib foundations at four (4) bridges and the condition of seven (7) selected culverts along the tote road were visually inspected during the August 2024 site visit. Review of the condition of the superstructure components of the bridges (steel frame and timber deck) was not part of the geotechnical inspection program but will be completed by structural bridge engineers.

The general condition of the foundations at the bridge abutments and the drainage control features at the mine haul road are summarized below, and the relevant images are shown in the attached Appendix C document. General comments are also presented at the end of the report (4.3) in connection with unpaved roads constructed on permafrost.

4.1 Bridges (4)

a) Bridge 17 (located approximately 17 km from Milne Inlet Port)

As shown in Figure 89 and Figure 90, the abutments and approach embankments at this bridge appear to be stable, and no scour was noted in the riverbed around the abutments during the August 2024 site visit. The abutments show no visible differential settlement or any structural discrepancy like deterioration of the steel bolt-a-bin abutments or sloughing of the riprap rock fill.

There were two (2) historic abutments located immediately adjacent to the "new" ones, but both have been recently removed at this bridge and replaced with rock fill, as shown in Figures 91 and 92. The rock fill slopes appear to be stable and provide additional erosion/scour protection to the adjacent abutments.

b) Bridge 63 (located approximately 63 km from Milne Inlet Port)

As shown in Figure 93 and Figure 94, the abutments and approach embankments of this bridge are stable and no scour around the abutments was noted during the site visit. The abutments show no visible differential settlement or any structural discrepancy like damages to the bolt-a-bin foundation cribs. There is the "remnant" of one (1) historic abutment (south) located immediately adjacent to the "new" one. Some damages to the metal bins of that old abutment are visible but it is surrounded with rock fill. As shown in Figure 94, the other (north) old crib has been removed and replaced with rock fill (cobbles and boulders).

c) Bridge 80 (located approximately 80 km from Milne Inlet Port)

As shown in Figures 95 and 96, the abutments and approach embankments at this bridge are stable and no scour around the abutments was noted during the site visit. As opposed to the other three bridges, the "old" bolt-a-bin crib abutments are still in place at this river crossing and are in relatively good condition, as shown in Figure 95.

d) Bridge 97 (located approximately 97 km from Milne Inlet Port)

As shown in Figures 97 to 100, the abutments of this bridge appear to be stable and no scour in the riverbed around the foundations and approach embankments was noted during the August 2024 site visit. The abutments show no differential settlement or any structural discrepancy like deterioration of the foundation bins. There are areas at two locations, shown in the zoomed-in Figures of 98 and 100, where some additional rock fill should be placed over fine soils at the surface, to prevent erosion and migration of the finer material into the river.

4.2 Selected Culverts (7)

a) KM 32+900 Culvert and Check Dams

A culvert and adjacent check dams were inspected near the Lake Access Road at KM 32+900. As shown in Figure 101, the culvert's inlet end is short, and has been damaged.

Buildup of fine sediment is visible at the entrance to the culvert, potentially clogging the corrugated pipe. The image in Figure 102 also shows large quantity of finer soils (silt and fine sand), deposited at the front of the pipe's outlet. To provide uninterrupted flow, the culvert should be cleaned or replaced with a longer pipe as soon as practically possible. More rockfill should also be placed around the culvert's inlet, while the silt, deposited at the front of its outlet, should also be removed (Figure 102). The crest of the nearby check-dams (Figure 103), show some loss of rock fill. The dams should therefore be raised by placing additional rock fill on their crests, and the ditch behind the dams should be cleaned (fine soil removed).

b) KM 33+100 Culverts

Figures 104 and 105 show the inlet and outlet of the twin culverts at KM 33+100. No water was flowing through the culverts during the August 2024 inspection. It was noted that some sagging of the corrugated pipes beneath the road has occurred at these culverts. It is likely that the subgrade beneath the culverts included ice-rich, thaw-unstable soils. Heat, transferred to this type of subgrade through the pipes during the start of the summer had resulted in thawing of the ice-rich soil, which in turn has resulted in the sagging (differential settlement) of the pipes under the weight of the road embankment. There is potential that these culverts will need to be reinstalled after the removal of the upper zone of the thaw-unstable ice-rich soil. The new culverts will need to be placed over thaw-stable, compacted granular fill as pipe bedding, with a thickness of at least 1.5 m.

c) KM 36+000 Culverts

Figures 106 and 107 show the inlet and outlet of the twin culverts at KM 36+000. These culverts appear to be in good condition, and uninterrupted flow was visible through both pipes during the site visit.

d) KM 59+800 Culverts

Figures 108 and 109 show the inlet and outlet of the twin culverts at KM 59+800. These culverts appear to be in good condition, and uninterrupted flow was visible through both pipes during the site visit.

e) KM 80+500 Culverts

Figures 110 and 111 show the inlet and outlet of five culverts at KM 80+500. As shown in the images, particularly in Figure 110, all five culverts suffered serious differential settlements (sagging) and all of them will need to be replaced as soon as practically possible. It is visible in Figure 110 that the native subgrade beneath the culverts appears to comprise fine-grained, most likely ice-rich, thaw-unstable soils. The culverts were installed over this poor soil subgrade which, after thawing, has lost its strength and bearing capacity, resulting in significant differential settlements of all pipes. To prevent similar settlement problems in the future, the thaw unstable ice-rich soils will need to be removed from beneath the new culverts and replaced with thaw-stable, compacted granular materials to a depth of at least 1.5 m below the invert level of the pipes.

f) KM 90+100 Culvert

Figures 112 and 113 show the inlet and outlet of three corrugated pipe culverts, one relatively new (green arrow) and two old (red arrows) pipes. As shown in the images, only one of the three pipes is operational. Figure 113 also shows that the operational (green arrow) pipe is not perpendicular to the road, but follows the alignment of the stream, crossing the road at an angle (skewed barrel). Such culvert alignment may often result in increased erosion of the road embankment at the inlet and outlet ends of the culverts (note the yellow circle in Figure 113). It is suggested to closely monitor the embankment at both ends of this culvert and make appropriate steps (if needed) to prevent sloughing of the material at the toe of the road embankment, by lengthening the culvert at both ends, and by placement of additional riprap on the adjacent embankment slopes, particularly at the toe.

g) KM 94+060 Culvert

Figures 114 and 115 show the inlet and outlet of three culverts at KM 36+000. These culverts appear to be in good condition, and uninterrupted flow was visible through all three pipes during the site visit.

4.3 The Haul Road and Permafrost

It was pointed out in WSP's previous (2023) inspection report that the drainage condition along the haul road between the crusher pad and the open pit was significantly improved recently to control potential surface erosion, to minimize the impact on the near surface zone of the permafrost, and to prevent any slope instability in the vicinity of the road alignment. The improvement included upgrading the side ditches along the uphill side of the haul road and the formation/construction of whoa-boys and cross ditches to capture surface water (run-off) flowing on the surface of the wide haul road and divert the water from the road to the side ditches, as shown in historic Figures 116 and 117 (2023 images).

Locally concentrated, uncontrolled run-off may result in potential erosion problems during the summer months, when the air temperature is rising above zero degree Celsius, particularly in ice-rich soils within the active layer and the upper zone of the permafrost beneath the road and side-slopes. However, based on borehole results across the project area and field observations, only pore and some segregated ice appear to be the predominant ice formations within the relatively thin overburden in the Mary River area at higher elevations, particularly along the haul road. As shown in Figures 116 and 117, the native overburden along the haul road is generally thin and comprising thaw-stable, generally drained and predominantly granular materials and therefore, it appears that no weak, thaw-unstable or compressible soils are present within the overburden along the haul road.

The thermal regime in the active layer and the underlying permafrost depends mainly on the thermal properties of the soils and the interaction between the atmosphere and the ground. Thermal disturbance of the permafrost foundation may lead to instabilities in the road embankment, ranging from longitudinal cracks at the embankment surface to lateral spreading of the side slopes. However, no such disturbances are visible along the haul road, simply because the road was constructed over thaw-stable materials along its alignment and the drainage of surface water is well controlled by ditches and berms.

Wedge and buried ice formations appear to be found at lower elevations and in deeper boreholes only, therefore the impact of road infrastructure and run-off water on the permafrost zone is concentrated to limited number of locations along the Tote Road. Note that the Mary River project is in the northern area of the continuous permafrost zone, where the thickness of the permanently frozen ground is several hundred meters. The active layer, which is the top layer of the ground above the permafrost mass, that thaws each summer and refreezes each fall until the next summer, is thin in the Mary River project area, generally less than 1.2 m.

As pointed out in our previous inspection report, thawing of the upper zone of the permafrost may be caused:

- By natural climatic cycles which can increase the temperature of the ground near the surface causing the upper zone of permafrost to thaw/melt (resulting in the variation in thickness of the active layer and potential damage to infrastructure in certain areas, where thaw-unstable soils are present).
- Indirectly by human activity through changing climate or warming of ground over time due to the construction of heated infrastructure components like buildings.
- Directly by human activity through disturbance of the upper zone of the ground, like large and potentially deep excavations (open pits, for example). When the active layer is disturbed or removed, the exposed permafrost (immediately beneath the active layer) will begin to thaw/melt. Such activity can be excavation/cut of zones along roads (transportation corridors), or excavation of ponds (solid and liquid waste management), or by the installation of culverts over thaw-unstable subgrade soils.

During the 2024 inspection one of these potential hazards (culverts on thaw-unstable soils) was noted at two locations only, along the entire Tote Road between Mary River and Milne Inlet Port. Hence, the actual extent of such potential problems, listed above, is negligible along the road. The reason to this is the fact that the Tote Road between Mary River and Milne Inlet Port was constructed by generally following the original topography and within the narrow, 30 m wide road alignment right-of-way (ROW) to minimize costs and the impact on the permafrost. As pointed out in the 2019 Tetra Tech report, material for the construction of generally shallow road embankments was sourced from within the active layer and comprised thaw-stable, generally granular materials. Instead of cutting deeper into the permafrost at limited sites, the fill materials were obtained from about 90 widely spaced borrow areas, where the cut into the ground (into the permafrost with potentially greater ice content) was limited.

In summary, the impact of road construction and operation on the permafrost, between Mary River and Milne Inlet Port, is low and generally occurred during construction. Current, potentially adverse effect can be attributed to poor surface water and erosion control along the sides of the road at a few limited locations. These deficiencies can be rectified by the installation of appropriate culverts and by implementing a more efficient surface water control in areas where large, trapped ponding water areas become visible during the early stage of the short thaw period of the years.

Culverts on permafrost foundation at the base of an embankment generally meet the conditions of strength and deformability under the loads from the weight of the embankment soil, and the temporary load from the trucks traveling on the road above the culverts. Problems usually arise when culverts are installed over ice-rich, thaw unstable soils, followed by the construction of road embankment. Such problematic locations were noted at the twin culverts at KM 33+100 and at the five culverts at KM 80+500 (see Figures 104, 105, 110 and 111 in Appendix C). It was noted during the field inspection that the native subgrade in the areas of those culverts generally comprise fine-grained, ice-rich soils, that are becoming unstable during thawing, resulting in significant differential settlements of structures or culverts constructed/installed above them.

It is known that there are temperature variations in the longitudinal direction of culverts and therefore the thickness of the frozen or thawed ground around and beneath culverts will vary in the longitudinal direction. This will potentially cause uneven frost heave (winter) or thaw settlement (summer) of the culverts and consequently, decrease structural stability of the road, may endanger traffic safety and damage the drainage system around the embankment. As shown in the above noted four images in Appendix C, the twin and five culverts at the two locations have suffered noticeable differential settlements and heave, and they are not able to function as culverts (no or minimal water is flowing through them). It is recommended that these culverts be removed and replaced with new culverts. During removal of the culverts, the ice-rich, thaw-unstable subgrade soils from beneath the culverts must also be removed to a depth of around 1.5 m below the pipes' invert level and replaced with thaw-stable, compacted granular fill. The new culverts will need to be installed over the improved subgrade, to prevent differential settlements and heave of the culverts in the future.

5.0 Conclusion

WSP Canada Inc., has completed the required geotechnical site inspection of 2024 at the Mary River Project in Nunavut. Based on field observations, the condition of the inspected infrastructure components can be summarized as follow:

- The surface water management ponds and waste disposal areas are enclosed by relatively shallow, stable, in many cases robust, perimeter berms. The berms show no signs of instability, there are no tension cracks or excessive settlements, and no detrimental slope erosion is visible on the berms. These structures were constructed by using thaw-stable, generally granular, locally available materials, placed over thaw-stable subgrades. Foot traffic on the berms (crest and slopes) must be minimized, while truck traffic on them must always be avoided.

Wherever truck traffic into the cells is necessary, ramps are provided, and those ramps shall be maintained in good condition. No materials shall be stored on the slopes or crests of the berms, they must be placed inside the cells.

- The waste storage cells, and surface water management ponds comprise HDPE/LLDPE liners, which are in good condition. No seepage from the currently operating ponds and cells was noted.
- Open drainage ditches and culverts across the Mary River and Milne Port sites are generally in good condition with some erosion and sloughing of slopes visible at a few locations, particularly where the riprap slope protection is missing. As part of the maintenance program, the eroded sides of the ditches should be repaired/regraded, and the missing rock fill riprap replaced. One (1) of the drainage ditches in the Port (P-SWD-3) still requires special attention. As pointed out in earlier reports as well, currently the floor of this drainage ditch slopes away from the designed discharge point (north-east end), which resulted in a situation where the ditch is discharging water into the granular fill pad of the LP-2 storage area and causing problems at the nearby PSC ditch as well. It is recommended that the P-SWD-3 ditch be redesigned and reconstructed to facilitate efficient drainage of all surface water to the north-east. The design must consider the fact that large amount of snow is stockpiled adjacent to this ditch every winter that generates excessive quantity of run-off water in the spring/summer that must be drained more efficiently toward the north-east. Installation of a rockfill check-dam at the outlet of that ditch is also recommended. There is a culvert installed into this ditch, which culvert was recently damaged and should be replaced during the reconstruction of the ditch.
- Other (returning) problematic areas are the lower levels of the rock quarries both in Mary River and Milne Inlet Port. In the port the overall surface water control shall be reevaluated, and the drainage problems be solved, as suggested in earlier reports as well. Installation of new culverts, improved drainage ditches and a new discharge point in a nearby valley may need to be included in the review and new design in the Port.

  In the main quarry in Mary River, the improvement in surface water control will need to include collection ditches, one or two sumps, and a water discharge structure on the face of a high slope, as detailed above in this report.

  The MS-11 surface water management ponds (north and south) at KM-105 in Mary River, were designed and constructed to provide sediment control for runoff, originating from large areas along the mine haul road. Soon after the completion of the dam and slopes, the collected water from the pond has found its way bypassing the liner at the main dam (north pond) and seeped toward downstream beneath the spillway. It is understood that the potential location of the leak is still under investigation and steps will be made to rectify the situation and bring the pond back into service.

Based on information recently obtained at the mine it appears that during the filling of the ponds with runoff water, around June 11 and 12, 2022, sliding/sloughing of the cover layers and the displacement of the safety berm was noted along the crest of the embankment at the south pond. Figure 35 in Appendix A, which was taken on June 22, 2022, shows the slipping (and cracking) of the cover layers (sand and riprap) and the downslope displacement (sliding) of the safety berm just a few weeks after the completion of the construction and during the early stage of filling the pond with water. Figure 36 in Appendix A was taken during the recent site visit on August 26, 2024, which shows that the liner beneath the cover layers is still intact and anchored into the anchor trench at the top of the embankment's slope. This indicates that only the cover layers and the safety berm have moved (slipped) in June 2022, and that there was no "classical" slope failure within the embankment at the south pond. It appears that the embankment beneath the liner is stable, and the anchor trench is still at its original position along the edge of the crest (at road level), still supporting the liner as per the original design.

6.0 Closing Remarks

We trust that the above technical report and its appendices provide you with satisfactory information in connection with the reviewed infrastructure components at the selected sites of the Mary River Project. Should you have any questions regarding this report, please do not hesitate to contact our office.

Sincerely,

WSP Canada Inc.

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Baffinland Iron Mines Corporation

September 27, 2024
Project #: CA0039374.4332

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APPENDIX "A" - Mary River Mine Complex - Photographs

Figure 13 to Figure 52

Aerial view of the Western Zone of Mary River – Source: Baffinland Iron Mine (historic image)

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2.0 Mary River Mine Complex

2.1 Polishing/Wastewater Stabilization Pond Berms (3 PWS ponds)

Figure 13: Historical aerial image of the layout of the three PSW ponds with robust, stable berms.

Figure 14: PWS pond #1. Well-maintained, stable perimeter berm and intact liner at the pond.

Figure 15: PWS pond #2 with stable, well-maintained berms and liner. – Sections of the liner ("whales") are visible in the pond above the water (yellow arrows), which do note pose a risk to the integrity of the liner.

Figure 16: Robust, stable perimeter berms and intact liner at the PWS-3 pond. Note a "whale" in the pond, similar to the ones present in the neighbouring PWS-2 pond.

2.2 Hazardous Waste Disposal Cell Berms (HWB-1 to HWB-7)

a) HWB-1

Figure 17: View of the empty HWB-1 cell, which has not been in use for years.

b) HWB-2

Figure 18: View of the robust, stable berm around HWB-2. The presence of water in the cell indicates good liner performance.

c) HWB-3 and HWB-4

Figure 19: View of stable perimeter berm and various fuel barrels in HWB-3.

Figure 20: View of stable perimeter berm around the HWB-4 cell, with fuel barrels on wooden pallets stored in the cell. The presence of water in the cell indicates good liner performance. The debris, visible on the right berm should be removed and disposed (yellow circle).

d) HWB-5

Figure 21: View of the empty HWB-5 cell, which has not been in use for years (like HWB-1).

e) HWB-6

Figure 22: View of the recently regraded stable berm at the HWB-6 cell. The presence of ponding water in the cell indicates good liner performance. This cell is almost always filled to its capacity.

f) HWB-7

Figure 23: View of the stable berm around the HWB-7 cell, with an old fuel tank and oil filled plastic containers stored in the cell. The ponding water indicates good liner performance.

2.3 MS-06, MS-07, MS-08, and MS-11 Surface Water Management Ponds and Ditches

a) MS-06 – Surface Water Management Pond Adjacent to the Crushing Facility

Figure 24: View of the discharge end of the recently cleaned culvert, draining the collected surface water from the crusher pad area to the MS-06 pond.

Figure 25: View of the robust, stable berm around the MS-06 pond, with intact liner.

Figure 26: View of one of the side-ditches and a culvert leading to the MS-06 pond. As shown by the yellow circle, the culvert is damaged and clogged, preventing the collected water from the upstream section of the ditch (yellow arrow) reaching the pond.

b) MS-07 – Surface Water Management Pond Adjacent to the new KM106 ore storage

Figure 27: View of the robust, stable perimeter berm and intact liner at the MS-07 surface-water management pond at KM106.

c) MS-08 pond and drainage ditches next to the waste rock facility

Figure 28: View of the stable, robust berm and intact liner at the MS-08 pond, which was almost empty at the time of the August 2024 visit. Note the snow already on the ground in August.

Figure 29: View of the well-maintained drainage ditch around the west side of the waste rock disposal facility, leading to the MS-08 pond.

Figure 30: View of the well-maintained drainage ditch around the east side of the waste rock facility, leading to the MS-08 pond.

Figure 31: View of the completely refurbished perimeter berm and new liner at the geotube pond, located adjacent to the treatment plant.

d) “MS-11” surface water management pond at KM105, with emergency spillway.

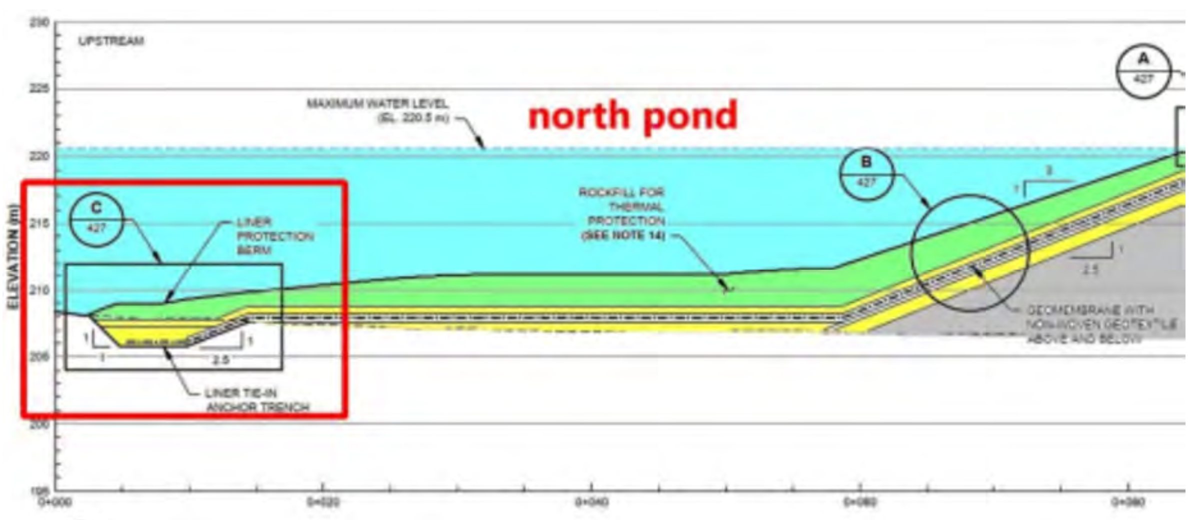

Figure 32: Section at the upstream side of the main dam (note the detail within the red rectangle at the left, showing an anchor trench into the permafrost). – Source: KM105 Sedimentation Pond Design Brief and Issued for Construction Drawings – Knight Piésold Ltd. 2021

Figure 33: Installation of HDPE liner into the anchor trench at the toe of the main dam at MS-11.

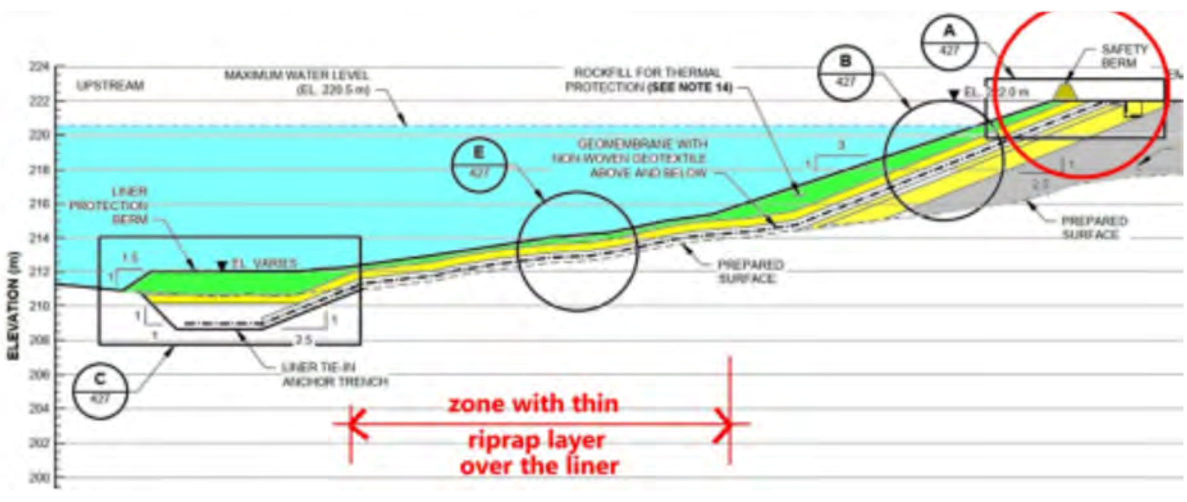

Figure 34: Section of the side slope in the south pond. – Source: KM105 Sedimentation Pond Design Brief and Issued for Construction Drawings – Knight Piésold Ltd. 2021

Figure 35: Sliding of the cover layers and safety berm above the liner in the south pond (image was taken on June 22, 2022).

Figure 36: View of the displaced safety berm and the intact liner at the south pond (image was taken on August 26, 2024).

2.4 Generator Fuel Berm

Figure 37: View of the stable perimeter berm around the empty “fuel bladder” cell. The ponding water in the cell indicates good liner performance.

2.5 Fuel Farm Berms

a) Jet-fuel Tank Farm

Figure 38: View of the well-maintained sand and gravel berm and access ramp at the lined jet-fuel storage facility. Ponding water in the cell indicates good liner performance.

b) MS-03 Diesel Fuel Tank Farm

Figure 39: Well-maintained, stable berm around the MS-03 diesel fuel farm, with some ponding water, which is indication of good liner performance. Note the rock fill on the downstream slope of the berm for additional protection against erosion.

c) MS-03B New Fuel Tank Farm

Figure 40: View of the well-maintained stable berm and interior granular fill over the liner at the new fuel tank farm. Note the ponding water in the cell, indicating good liner performance.

2.6 Solid Waste Landfill Facility and New Landfarm Cells

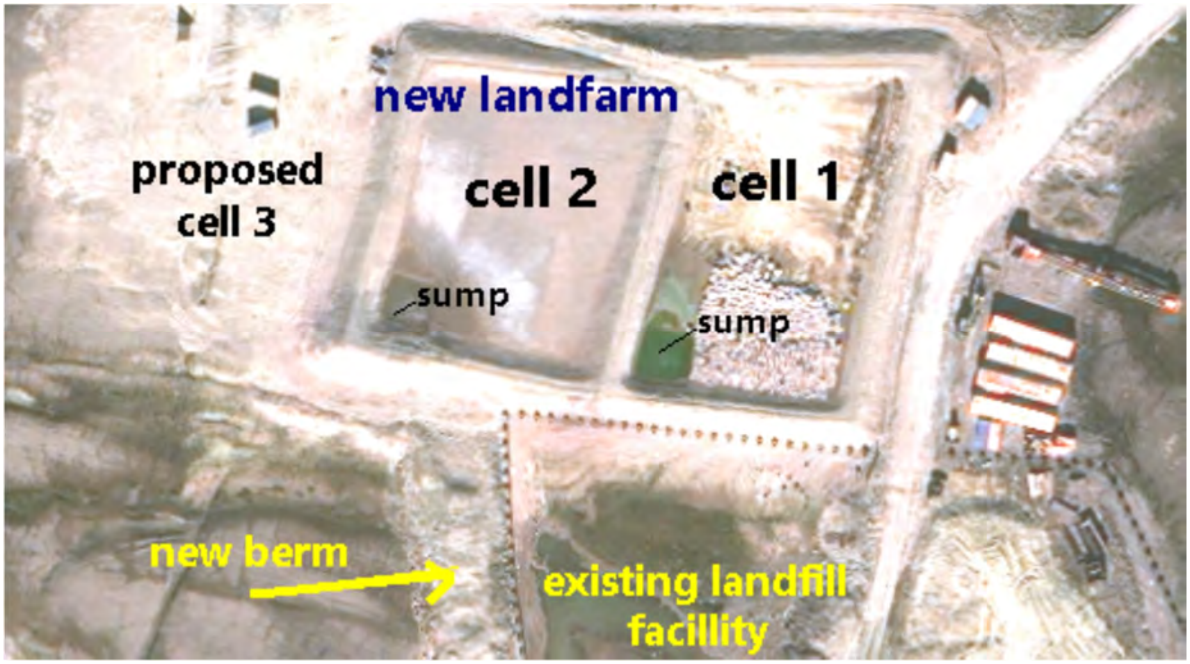

Figure 41: Satellite view of the solid waste landfill facility and the adjacent two, recently constructed landfarm cells (1 and 2). Cell 3 is proposed for construction in the future.

Figure 42: View of soil cover over non-hazardous solid waste in the fenced-in, gated landfill facility.

Figure 43: View of a section of the stable berm at the landfarm's Cell 1.

Figure 44: View of the stable berm around the currently empty cell-2 of the new landfarm. The ponding water indicates good liner performance. Note that the water should be removed prior to storing any material in this cell.

2.7 Camp Lake Settling Check Dams and Gabion Walls

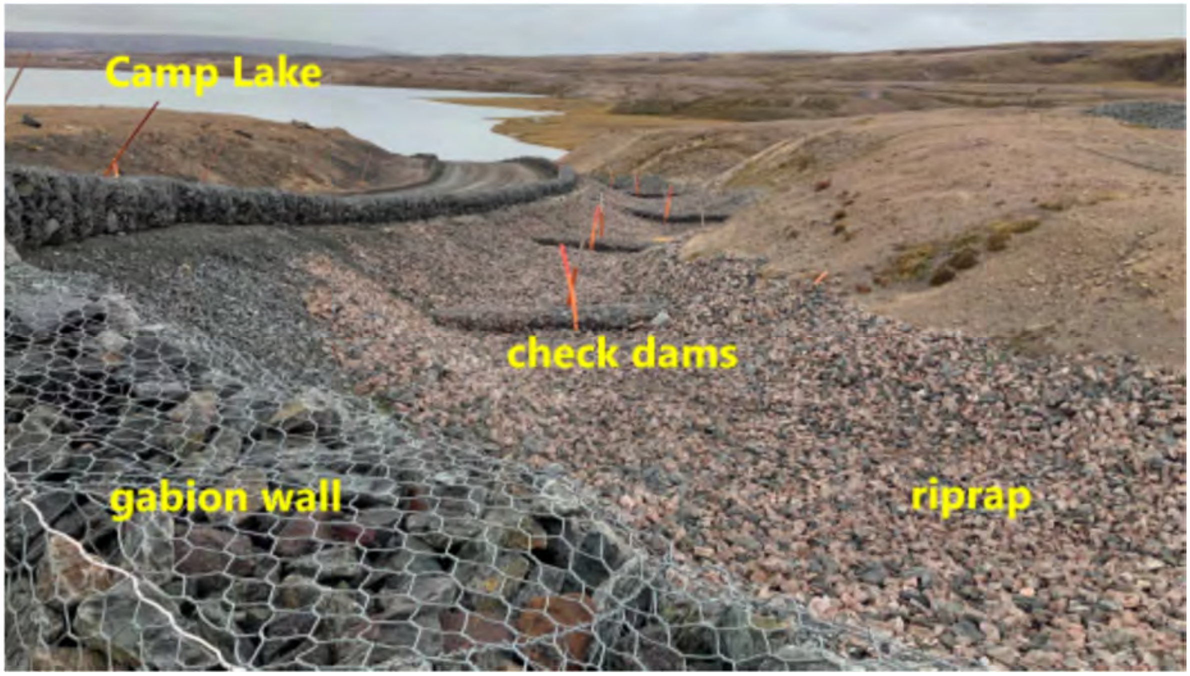

Figure 45: View of the upgraded Camp Lake check dams and new gabion wall in good conditions, constructed along the road to the lake.

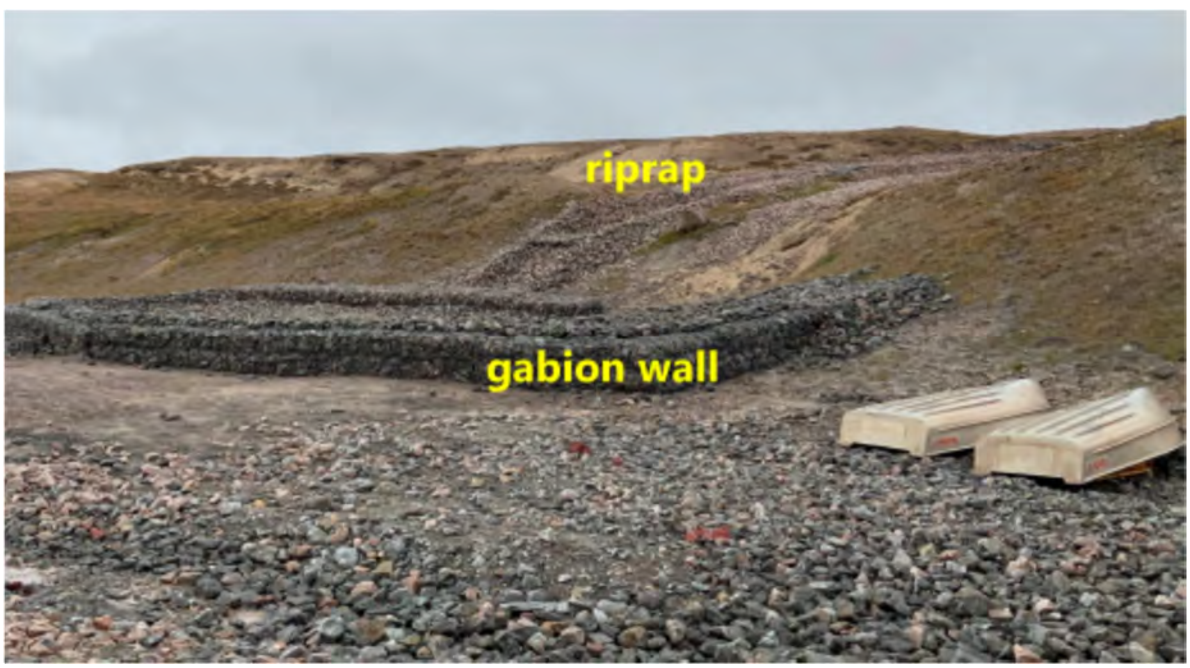

Figure 46: View of the new gabion wall and riprap adjacent to Camp Lake to capture suspended solids potentially eroding from the airfield area and to prevent siltation in the lake.

2.8 Rockfill Slope at the Water Discharge Area

Figure 47: View of the stable slope with rockfill erosion protection at the water discharge area.

2.9 QMR2 Rock Quarry

Figure 48: Drainage problems still exist at the first quarry level. Surface drainage shall be rectified.

Figure 49: Serious erosion problem still exists along the edge of the access road to the quarry.

2.10 KM106 Ore Stockpile Area

Figure 50: View of a historic image (2022) of the diversion berm, drainage ditch/swale and sump in poor conditions, south of the KM-106 ore stockpile area. See these recently upgraded infrastructure components in Figures 51 and 52 (next page).

Figure 51: View of the new, recently upgraded diversion berm and drainage ditch/swale south of the ore stockpile area.

Figure 52: View of the new drainage ditch/swale and sump pit south of the KM-106 ore stockpile area, collecting local run-off. Note the recently completed riprap erosion protection along the sides of the swale and sump. Water from the sump is pumped into the nearby MS-07 pond.

Baffinland Iron Mines Corporation

September 27, 2024
Project #: CA0039374.4332

Annual Geotechnical Inspection – 2024

APPENDIX "B" – Milne Inlet Port Site - Photographs

Figure 53 to Figure 88

View of a section of Milne Inlet Port

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3.0 MILNE INLET PORT

3.0 Milne Inlet Port Site

3.1 Hazardous Waste-Cell Berms - (HWB-1 to HWB-4)

a) HWB-1

Figure 53: View of the stable perimeter berm around the lined HWB-1 cell with various materials and two shipping containers stored within the cell. Materials on pallets should be stored within the cell, not on the berms (note the container marked by the blue arrow).

Figure 54: View of the sump and emergency spillway at the back of the HWB-1 cell with stable berm.

b) HWB-3 and HWB-4 Twin Cells

Figure 55: View of the well-maintained HWB-3 cell with stable berm, containing fuel barrels. The interior subgrade in the two cells had been regraded recently using clean sand and gravel fill.

Figure 56: View of stable berm and the sump in the HWB-4 cell, storing jet fuel and shipping containers. Note the improved granular base within the cell, protecting the geomembrane liner.

3.2 MP-01A Pond

Figure 57: View of the robust, stable berm and intact liner at the practically empty MP-01A pond.

3.3 MP-03 Fuel Tank Farm

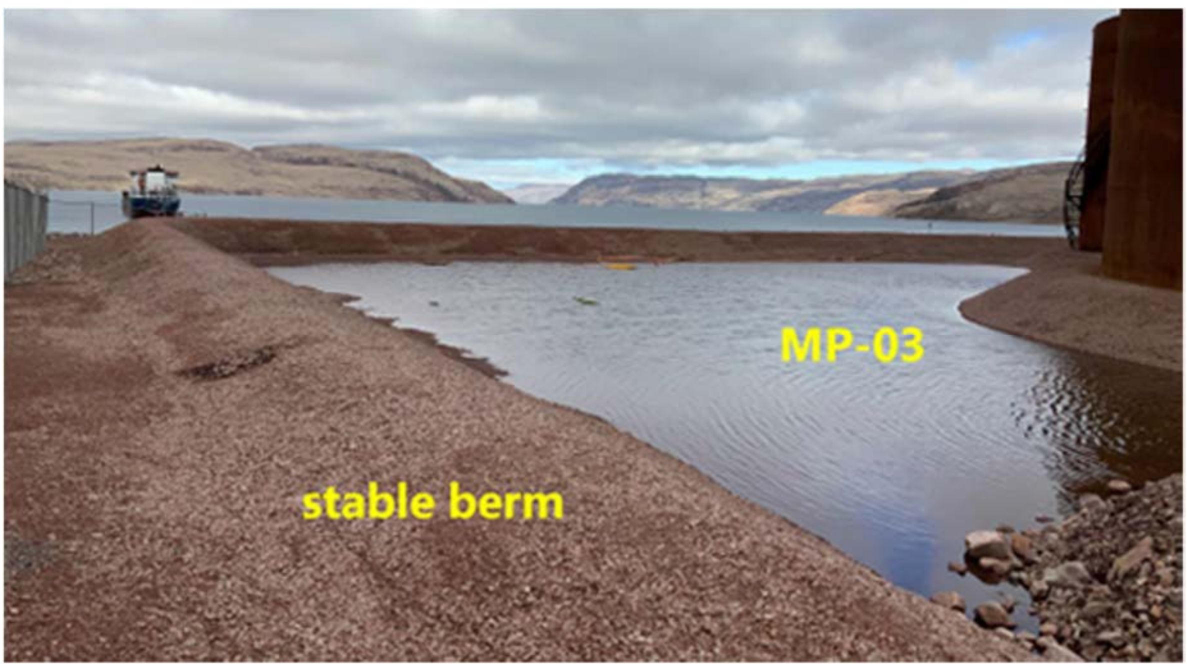

Figure 58: View of the well-maintained stable perimeter berm around the lined MP-03 fuel tank farm. The ponding water indicates good liner performance.

3.4 MP-04 and 04A Land-farm and Contaminated Snow Disposal Cell

Figure 59: View of stable perimeter berm around the MP-04 landfarm, with ponding water in one corner of the cell (sump). Note the standard soil cover over the buried solid waste.

Figure 60: View of the lined MP-04A contaminated snow disposal cell with robust, stable perimeter berm. The ponding water (melted snow) indicates good liner performance. Additional protective layer of sand and gravel fill was placed recently over the access ramp.

3.5 Surface Water Management Ponds and Ditches (Pond #3, MP-05, and MP-06 Pond)

a) Surface Water Management Pond #3

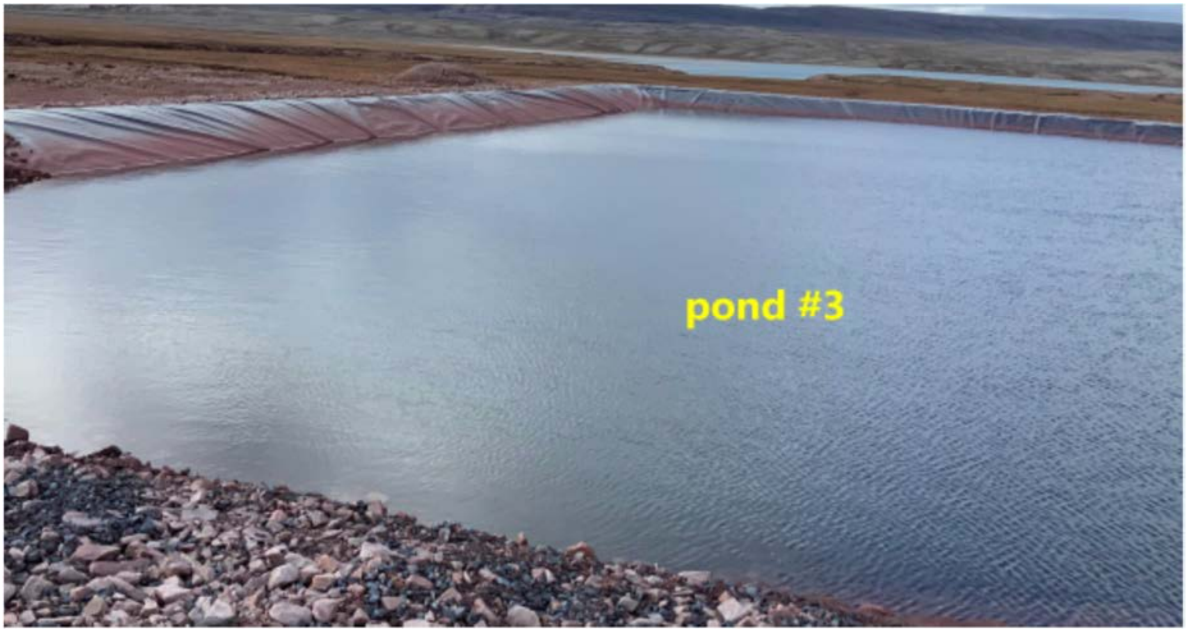

Figure 61: View of surface water management pond #3, with lined, stable berms.

b) MP-05 Surface Water Management Pond

Figure 62: View of the robust, stable perimeter berm and intact liner at the MP-05 pond.

Figure 63: View of the "east" surface water collection ditch adjacent to the ore storage area, draining to the MP-05 pond.

c) MP-06 and MP-06/A Surface Water Management Ponds

Figure 64: View of the lined MP-06 pond with robust, stable berms. Note the lined intake channel at the far-left end of the pond.

Figure 65: View of the lined MP-06A overflow pond with robust stable berms.

Figure 66: View of the 2023 condition of the "west" surface water collection ditch adjacent to the ore storage area, draining water from pond #3 to the MP-06 pond. This photograph was taken in 2023. Note the changes in ditch condition in Figure 67, which was taken in August 2024.

Figure 67: View of the 2024 condition of the "west" surface water collection ditch adjacent to the ore storage area. Note the new, widened berm along the ditch, partly constructed within the ditch.

3.6 Q01 rock quarry – Main Level

Figure 68: View of ponding and flowing water at may areas of the lower (main) level of the Q01 rock quarry. The drainage problem should be rectified prior to restarting the operation in the quarry.

Figure 69: Poor surface water control in many areas of the lower (main) level of the Q01 rock quarry.

3.7 Surface Water Collection Ditches (P-SWD-3, P-SWD-5, P-SWD-6, P-SWD-7, W3/W14, 380-Person Camp, and PSC Ditches)

a) P-SWD-3 (south side of the LP2 laydown area)

Figure 70: View of the southern section of the P-SWD-3 surface water collection ditch with failed slope sections and ponding water due to inadequate longitudinal channel slope.

Figure 71: View of the damaged culvert (yellow circle) and the northern section of the P-SWD-3 surface water collection ditch with failed slopes and ponding water.

b) P-SWD-5 (along the main level of the Q01 rock quarry)

Figure 72: P-SWD-5 – “Q01-North” surface water collection ditch with missing riprap at one section of the ditch. Note the continuous seepage from the granular fill pad of the quarry’s lower level.

Figure 73: View of the clogged, undersized culvert beneath the access road to the Q01 rock quarry. This culvert should be removed and replaced with a larger diameter pipe.

c) P-SWD-6 (south of the Q01 rock quarry)

Figure 74: View of the P-SWD-6 surface water collection ditch. As opposed to the original design intent, no water is drained from the quarry in this ditch with its invert level constructed above the current (lower) level of the quarry (see Figure 75 as well).

Figure 75: View of the over-excavated southern area of the Q01 quarry with ponding water (see Figure 11 for location). Note the start of the P-SWD-6 ditch in the image, with its invert level well above the new ground level in the area (bottom of the pond).

d) P-SWD-7 (ditch and culverts adjacent to the new freight dock)

Figure 76: View of the P-SWD-7 surface water collection ditch and culverts (inlet).

Figure 77: View of the well-maintained P-SWD-7 surface water collection ditch and culverts (outlet).

e) W3/W14 (surface water collection ditch)

Figure 78: View of the partly completed W3/W14 surface water collection ditch with crushed rock riprap slope protection. The area around the culvert's inlet and the side-ditch from the left still require the placement of geotextile and riprap for erosion protection.

f) 380-Person Camp (surface water collection ditch)

Figure 79: View of the well-maintained south section of the 380-Person Camp surface water collection ditch.

Figure 80: View of the east section of the 380-Person Camp surface water collection ditch in good condition.

g) PSC (new surface water collection ditch)

Figure 81: View of the "west end" of the PSC surface water collection ditch (red circle in Figure 8). Note the localized slope degradation due to frequent water seepage from the granular fill of the LP-2 laydown pad (yellow arrow). The culvert shown in the image can be removed.

Figure 82: View of the "east end" of the PSC surface water collection ditch (also shown by green circle B in Figure 8). Additional riprap and a check dam should be installed along this section of the ditch.

3.8 Tote Road Ditch and Culverts

Figure 83: View the inlet of twin culverts draining surface water from the P-SWD-6 ditch and from the road's side-ditch, under the tote road.

Figure 84: View of the outlet of the twin culverts, installed within the road embankment.

3.9 Effluent Discharge Pipe

Figure 85: View of the end of the water discharge pipe (blue arrow) and a nearby culvert (yellow arrow) draining water to the same valley. More ripraps should be placed into the upper section of the valley, marked by red arrows, to prevent erosion of the valley floor and side-slopes.

3.10 LP-5 Storage Pad

Figure 86: View of the recently regraded LP-5 storage area.

3.11 Western Globe Fuel Module (WGFM)

Figure 87: View of the Western Globe Fuel Module (WGFM) north of the 380 Camp. No humps are visible at the entrance and exit points of the refueling station.

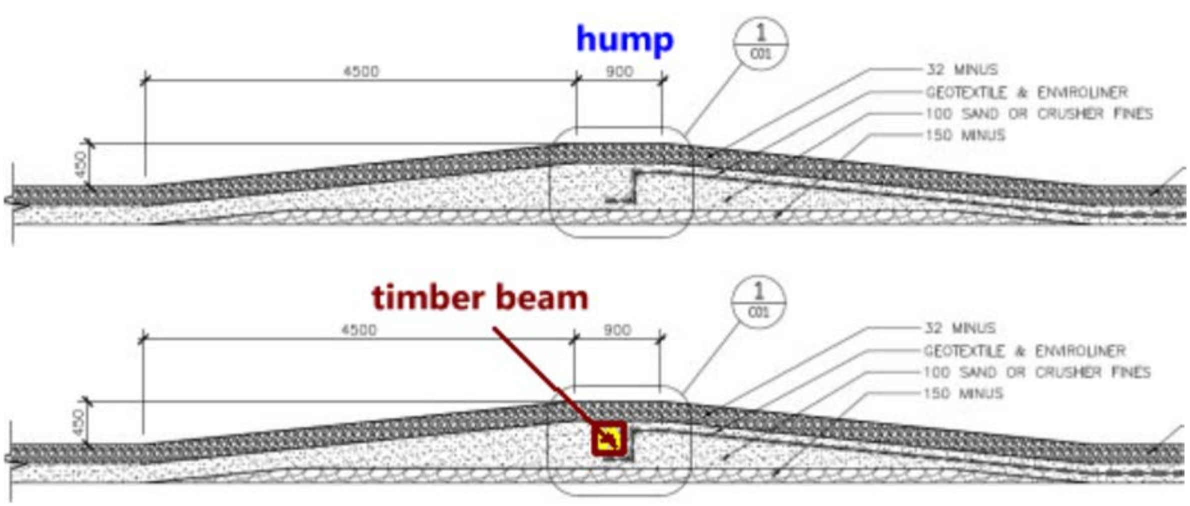

Figure 88: Top image: Section of 900 mm wide (at its crest) drainage control hump with 10H:1V slopes for the Western Globe Fuel Module (WGFM), specified by B.H. Martin Consulting Engineer and Architect, in June 2016. Lower image: A 10” by 10” timber beam should be installed within the humps to prevent the flattening of the granular fill by the heavy trucks. The humps should prevent potential oily surface water escaping the refueling area toward the ends of the WGFM.

Baffinland Iron Mines Corporation

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APPENDIX "C" – Tote/Haul Road - Photographs

Figures 89 to 118

Aerial view of a section of the Tote Road near Milne Inlet Port.

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4.0 Tote Road Between the Mary River Mine and Milne Inlet Port

4.1 Bridges (4)

a) Bridge 17 (located 17 km from Milne Inlet port)

Figure 89: View of the stable abutments with riprap erosion protection at the north side of bridge KM17.

Figure 90: View of the stable abutments with riprap scour protection at the south side of bridge KM-17.

Figure 91: View of the west abutment, where the old metal crib has been removed and replaced with new riprap erosion protection at the south side of bridge KM17.

Figure 92: View of the east abutment, where the old metal crib has been removed and replaced with new riprap erosion protection at the south side of bridge KM17.

b) Bridge 63 (located approximately 63 km from Milne Inlet port)

Figure 93: View of the west side of bridge 63, with stable abutments and riprap scour protection.

Figure 94: View of the stable abutments at the east side of bridge 63. Also note that one (south) of the two "old" crib abutments is still in place, while the north one has been removed and replaced with rock fill (cobbles and boulders).

c) Bridge 80 (located approximately 80 km from Milne Inlet port)

Figure 95: View of the west side of bridge 80, with riprap scour protection around the abutments.

Figure 96: View of the abutments with riprap scour protection at the east side of bridge 80.

d) Bridge 97 (located approximately 97 km from Milne Inlet port)

Figure 97: View of the stable abutments at the west side of bridge KM 97. As shown, there is only one remaining old crib abutment present at this bridge. Note the area between the old and new abutments (yellow circle) where additional rock fill should be placed for erosion protection.

Figure 98: View the enlarged image of the area between the old and new abutments (yellow circle) where additional rock fill should be placed for erosion protection.

Figure 99: View of the stable abutments at the east side of bridge KM97. Note the area marked by the yellow circle where additional rock fill should be placed at the shore of the river and adjacent to the approach embankment to the bridge abutment, for erosion protection.

Figure 100: View of the enlarged image of the area marked by the yellow circle in Figure 99, where additional rock fill should be placed for erosion protection.

4.2 Selected Culverts (7)

a) KM 32+900 Lake access road culvert and check dams

Figure 101: View of the damaged culvert at its inlet at KM 32+900. The culvert should be replaced as soon as practically possible. More rockfill should also be placed around the culvert's inlet.

Figure 102: View of the outlet of the culvert at KM 32+900. The ditch at the front of the culvert should be cleaned from the sediment during culvert replacement, and more ripraps should be placed.

Figure 103: View of the ditch and check dams at KM 32+900. The ditch should be cleaned (yellow circle) and the crest of the check dams repaired/raised (yellow arrows) during maintenance work.

b) KM 33+100 Culverts

Figure 104: View of the inlet of the twin culverts at KM 33+100. No water was flowing through the culverts that show some sagging in their centre, under the weight of the road embankment.

Figure 105: View of the outlet of the twin culverts at KM 33+100. No water was flowing through the culverts that show some sagging in their centre, under the weight of the road embankment.

c) KM 36+000 Culverts

Figure 106: View of the inlet of the twin culverts at KM 36+000, in good condition.

Figure 107: View of the outlet of the twin culverts at KM 36+000, in good condition.

d) KM 59+800 Culverts

Figure 108: View of the inlet of the twin culverts at KM 59+800, in good condition.

Figure 109: View of the outlet of the twin culverts at KM 59+800, in good condition.

e) KM 80+500 Culverts

Figure 110: View of the inlet of five culverts at KM 80+500. All five culverts suffered serious differential settlements (sagging) and all of them will need to be replaced as soon as practically possible.

Figure 111: View of the outlet of five culverts at KM 80+500. All five culverts suffered serious differential settlements (sagging) and all of them will need to be replaced as soon as practically possible.

f) KM 90+100 Culverts

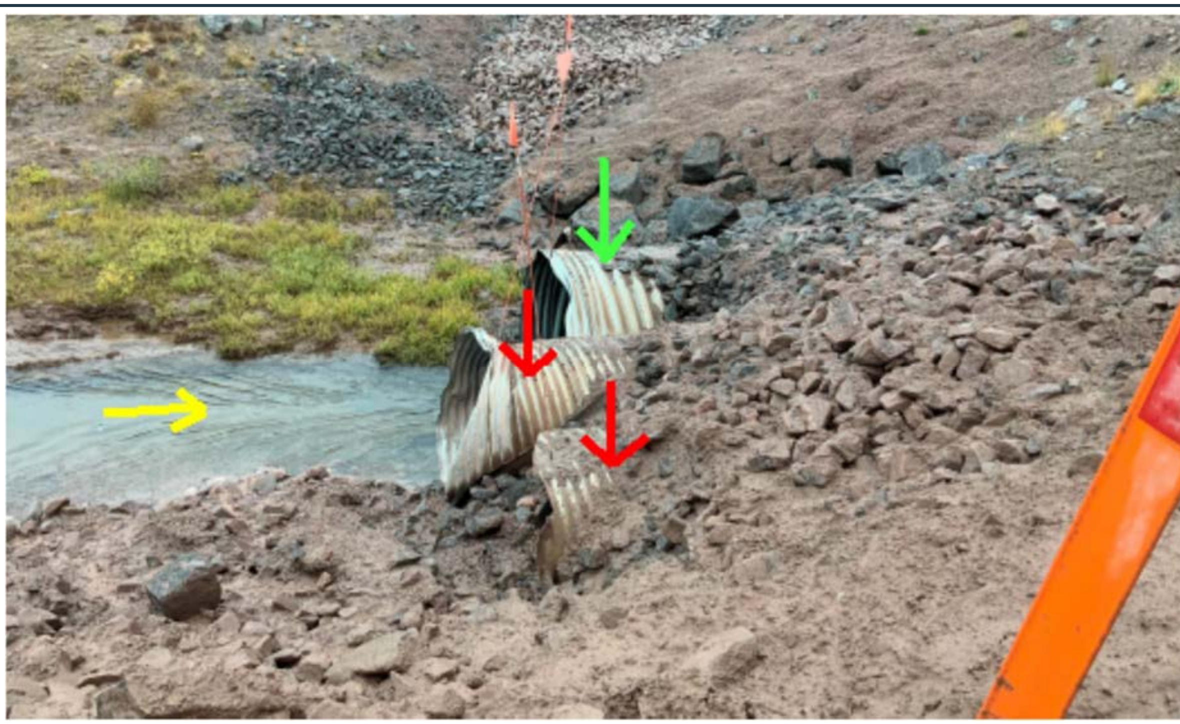

Figure 112: View of the inlet of three culverts at KM 90+100. Only one (green arrow) is operational.

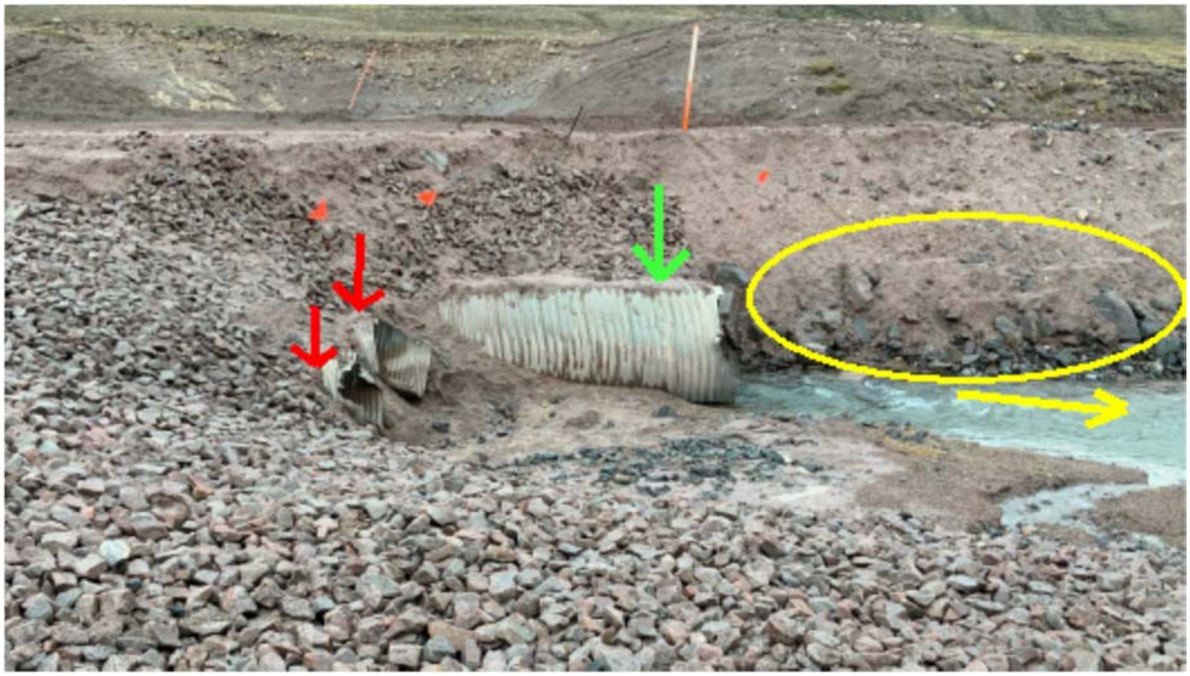

Figure 113: View of the outlet of three culverts at KM 90+100. Only one (green arrow) is operational.

g) KM 94+060 Culvert

Figure 114: View of the inlet of three culverts at KM 94+060, in good condition.

Figure 115: View of the outlet of three culverts at KM 94+060, in good condition.

4.3 Roads on Permafrost

Figure 116: View of a 2023 image of the well-maintained haul road between the crusher pad and the open pit around KM-107. Note the safety berm along the downslope side and the upgraded, erosion-controlled drainage ditch along the upslope side of the road with additional rock fill in critical areas.

Figure 117: View of a 2023 image of a cross drain (combination of a whoa-boy and shallow ditch) intercepting run-off flowing down the haul road and direct the collected water to the side-ditch. The excellent condition of the haul road is an indication of effectiveness of such drains.

Figure 118: View of the well-maintained haul road at KM106, in August 2024.