MARY RIVER MINE

TOTE ROAD PERMANENT CROSSING PLAN - ROUND CSP CULVERT INSTALLATIONS

WEEKLY PROGRESS REPORT **WEEK 8 – March 31 to April 6, 2024**

CLIENT:	**Baffinland Iron Mines Corporation**	**PROJECT NO.:**	**NB102-00181/93**
TO:	**Baruck Wile, Rudy Dietrich, Frank Hynes, Michael Burns, Dale Tulloch, Abid Najey, Jim Patterson, Shannon Mulhall, David Bruce, Katie Babin, Todd Swenson (Baffinland), Michael Johnson (NSC)**	**FILE NO.:**	**.F08**
CC:	**Richard Cook, Toby Perkins, Andy Phillips, Greg Johnstone, Matthew Trask, Darren Kocken (KP)**	**REF. NO.:**	**65**
FROM:	**Michael Bourdignon, Mackenzie Aiken**	**PAGES:**	**24**

1 – GENERAL

1.1 RESPONSIBILITIES

- **Baffinland Iron Mines Corporation (Baffinland) -** Owner, drilling and blasting, traffic management plans, and overall project management.
- **Nuna -** Surveying, excavation, culvert installation, and backfill.
- **Knight Piésold Ltd. (KP) -** QA/QC for the excavation, culvert installation, and backfill.
- **ALS Laboratory (ALS) -** Laboratory testing of collected samples.

1.2 KNIGHT PIÉSOLD LTD. (KP) SITE STAFF

- Matthew Trask (DS) - March 31, 2024, to April 3, 2024
- Michael Bourdignon (DS) - April 3, 2024, to April 6, 2024
- Mackenzie Aiken (NS) - March 31, 2024, to April 6, 2024

1.3 HEALTH AND SAFETY

- No health and safety incidents occurred during the reporting period.
- Completed KP safety meeting minutes daily.
- Completed Baffinland field level risk assessments (FLRA's) daily.
- KP attended Nuna's daily toolbox meetings and 6:00 am/pm.
- BIM Projects health and safety reminded everyone to assess each task before beginning it to minimize the risk of injuries and damages.
- Code Blue on the nightshift of April 4, 2024 – work stopped for the nightshift.

1.4 WEATHER

- The weather ranged between sunny and clear to overcast and heavy snow with moderate wind with daily temperature highs between -12˚C and 0 ˚C.

1.5 MEETINGS AND CORRESPONDENCE

- KP issued daily progress reports for March 31 to April 6, 2024 (Reference numbers 52 - 53, 56 - 57, 59 - 61).

2 – CONSTRUCTION ACTIVITIES

2.1 GENERAL

- Construction activities finalized at CV-057 and CV-059. Construction activities included placement of blasted local material at CV-057, side slope stabilization, culvert apron area backfilling, and surveying at both CV-057 and CV-059.

- Construction activities at CV-001 included continuing and completing backfill with 32 mm minus material above the culverts, placement and compaction of local borrow fill material above the culverts and for north and south bound lane approaches, completing culvert infilling, side slope stabilization, ripping and excavated aprons, and culvert apron area backfilling.
- Construction activities at BG-04 included continuing backfill with 32 mm minus material above the culverts and completing the culvert infilling (placement of boulders and boulder clusters is still pending to be completed).
- Snow removal for CV-216 inlet and outlet aprons in preparation for blasting.

2.2 BAFFINLAND

- Baffinland Projects inspected CV-059 and CV-057.

2.3 NUNA

- Nuna continued the placement of local fill and road topping material at CV-057.
- Nuna commenced and completed the culvert infilling of CV-001.
- Nuna commenced and completed the construction of the side slopes with non-woven geotextile overlayed with Fine Riprap and apron areas of CV-057.
- Nuna commenced and completed the construction of the side slopes with non-woven geotextile overlayed with Fine Riprap and apron areas of CV-001.
- Nuna commenced hauling fine and coarse riprap material from the Mary River Mine site to CV-001.
- Nuna commenced and completed the excavation of the aprons and 2H:1V side slopes at CV-001.
- Nuna commenced the backfill of the aprons at CV-001
- Nuna installed the low and high flow culverts at BG-04. The backfill of 32 mm minus culvert backfill material around and above the culverts at BG-04 is on-going.
- Nuna commenced hauling additional 32 mm minus material from Port to BG-04.

2.4 KP

- KP visited CV-057, CV-059, CV-001, and BG-04 throughout the week on dayshift and nightshift.
- KP inspected the side slope stabilization and culvert apron construction activities at CV-001.
- KP monitored placement and compaction of 32 mm minus backfill material, 3/16” minus culvert bedding placement, low flow CSP culvert(s) installation and the high flow CSP culvert installation at BG-04.
- KP monitored culvert infilling activities at CV-001 and BG-04.
- KP monitored side slope and culvert apron area preparation and construction works at CV-059 and CV-057.

3 – CONSTRUCTION QUALITY ASSURANCE (CQA) ACTIVITIES

3.1 QUALITY ASSURANCE

KP issued the foundation approval for BG-04.

KP issued the surveillance form for BG-04 culvert infill material entrained with snow/ice.

KP monitored the completion of infilling the interior of the low flow culvert at CV-001 with coarse riprap and stream substrate material. The level of infilling was verified to be at 40% (0.7 m) infilled using a measuring tape. In-culvert boulders were verified to be placed in a staggered arrangement with spacing of approximately 1 m from adjacent boulders. KP also monitored the grading, geotextile placement, and slope stabilization at CV-001.

KP monitored the backfill and compaction of 200 mm lifts of 32 mm minus material at BG-04.

KP monitored the completion of infilling the interior of the low flow culvert at BG-04 with coarse riprap and material similar to stream substrate material. The level of infilling was verified to be at 40% (0.7 m) infilled using a measuring tape. In-culvert boulders and boulder clusters are pending to be completed.

KP monitored the placement of the two (2) 2.0 m diameter low flow culverts and one (1) 1.8 m diameter high flow culvert at BG-04 and one (1) 1.0 m diameter high flow CSP culvert at CV-001. A GPS survey was conducted by Nuna to verify installation elevations and horizontal offsets; the elevations are within tolerances specified by KP.

KP monitored the side slope stabilization and the placement of Fine Riprap on top of non-woven geotextile at CV-057.

KP monitored the shaping of the side slopes and excavation, preparation and construction of the culvert aprons and slope stabilization at CV-001.

3.2 QUALITY CONTROL

A sample of material similar to stream substrate material was collected from km 97.5 on March 31, 2024 (Sample ID: SSM-04)

A control sample of 32 mm minus Culvert Backfill Material was collected from CV-001 on March 30, 2024 (Sample ID: C-CBF-06)

A record sample of 32 mm minus Culvert Backfill Material was collected from CV-001 on March 30, 2024 (Sample ID: R-CBF-03)

A control sample of 32 mm minus Culvert Backfill Material was collected from BG-04 on March 31, 2024 (Sample ID: C-CBF-07)

A sample of material similar to stream substrate material was collected from km 97.5 on April 1, 2024 (Sample ID: SSM-05)

A record sample of 32 mm minus Culvert Backfill Material was collected from BG-04 on April 2, 2024 (Sample ID: R-CBF-04)

A control sample of 32 mm minus Culvert Backfill Material was collected from BG-04 on April 2, 2024 (Sample ID: C-CBF-08)

The results of the sample of material similar to stream substrate material mixed with snow from BG-04 was collected. The 1.0 L sample of soil was placed in a graduated cylinder and allowed to melt/settle to determine the percent volume of snow entrained in the sample. The results indicate the sample contained greater than 50% snow/ice by volume.

3.3 LABORATORY TESTING

Table 1: Laboratory Results

KP SAMPLE ID	ALS LAB ID	Plotting ID	Culvert ID	NAME DESCRIPTION	MATERIAL DESCRIPTION	SAMPLE COLLECTION DATE	SAMPLE TESTING DATE	SAMPLE WEIGHT(Kg)	LABORATORY RESULTS							
									Moisture Content (ASTM D2216)	Particle Size Distribution (ASTM D422)						
										31.5	25	16	10	6.3	1	0.1
									%	%	%	%	%	%	%	%
CONTROL SAMPLES																
C-CBF-06	H636331	C-CBF-06 (H636331)	CV-001	Control sample - Culvert Backfill Material	32mm minus culvert backfill	2024-03-30	2024-04-02	10.53	10.34	99.6	85.3	50.8	25.6	12.8	2.0	0.0
SSM-04	H636534	SMM-04 (H636534)	N/A	Stream Substrate Material 04	Gravelly SAND	2024-03-31	2024-04-02	8.62	4.75	93.6	92.4	89.5	85.7	82.0	55.2	-
SSM-05	H636536	SMM-05 (H636536)	N/A	Stream Substrate Material 05	Gravelly SAND	2024-04-01	2024-04-03	8.66	5.97	99.0	97.1	95.0	93.1	91.9	87.8	-
C-CBF-08	H636537	C-CBF-08 (H636537)	BG-04	Control sample - Culvert Backfill Material	32mm minus culvert backfill	2024-04-02	2024-04-03	10.50	2.42	100.0	93.1	63.9	39.0	25.4	5.9	0.0
C-CBF-07	H636535	C-CBF-07 (H636535)	BG-04	Control sample - Culvert Backfill Material	32mm minus culvert backfill	2024-03-31	2024-04-02	10.51	2.95	99.1	89.3	63.1	39.8	25.9	6.7	0.0
RECORD SAMPLES																
R-CBM-06	H636533R	R-CBM-06 (H636533R)	BG-04	Record Sample - 3/16" Culvert Bedding Material high fic	Crushed granite, 5 mm minus sized	2024-03-30	2024-04-01	7.04	6.75	100.0	100.0	99.3	98.5	97.2	48.5	0.0
R-CBF-03	H636532	R-CBF-03 (H636532)	CV-001	Record Sample - Culvert backfill material	32mm minus culvert backfill	2024-03-30	2024-04-02	9.64	9.58	99.38	95.48	76.98	33.98	10.98	3.38	0.0
R-CBF-04	H636537	R-CBF-04 (H636537)	BG-04	Record Sample - Culvert backfill material	32mm minus culvert backfill	2024-04-02	2024-04-03	11.95	4.86	99.6	90.0	57.2	37.1	26.0	9.6	0.0

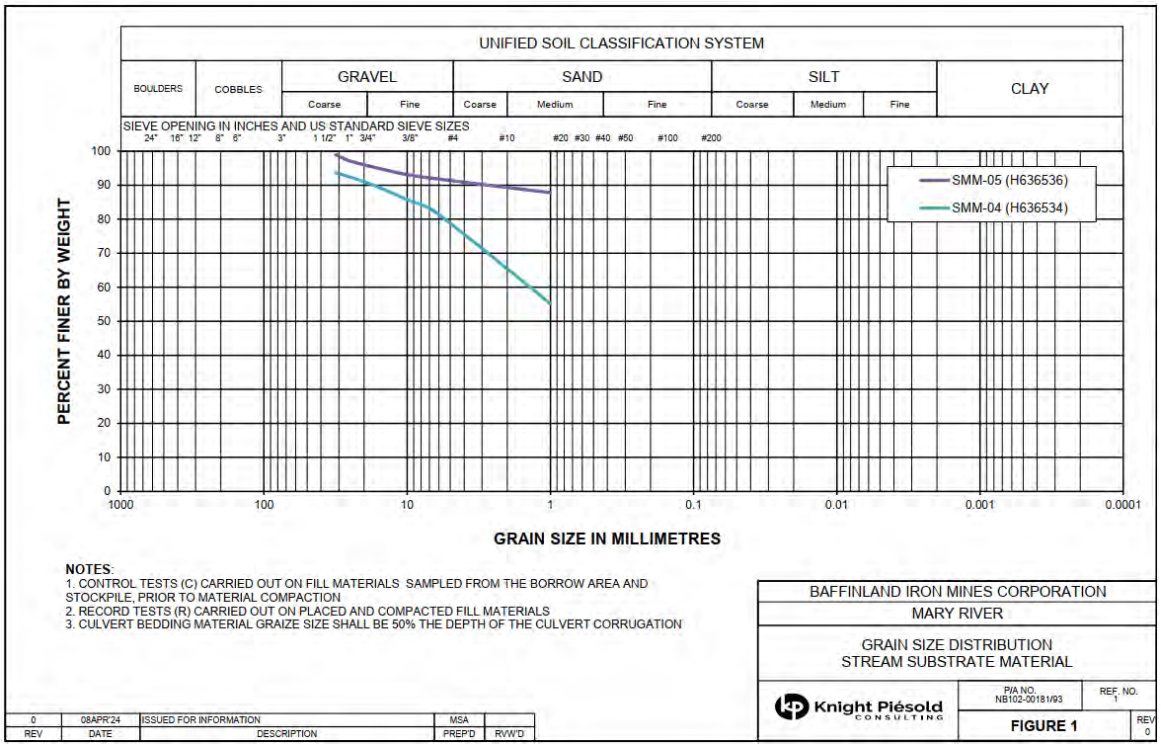

Figure 1: Grain Size Distribution – Stream Substrate Material

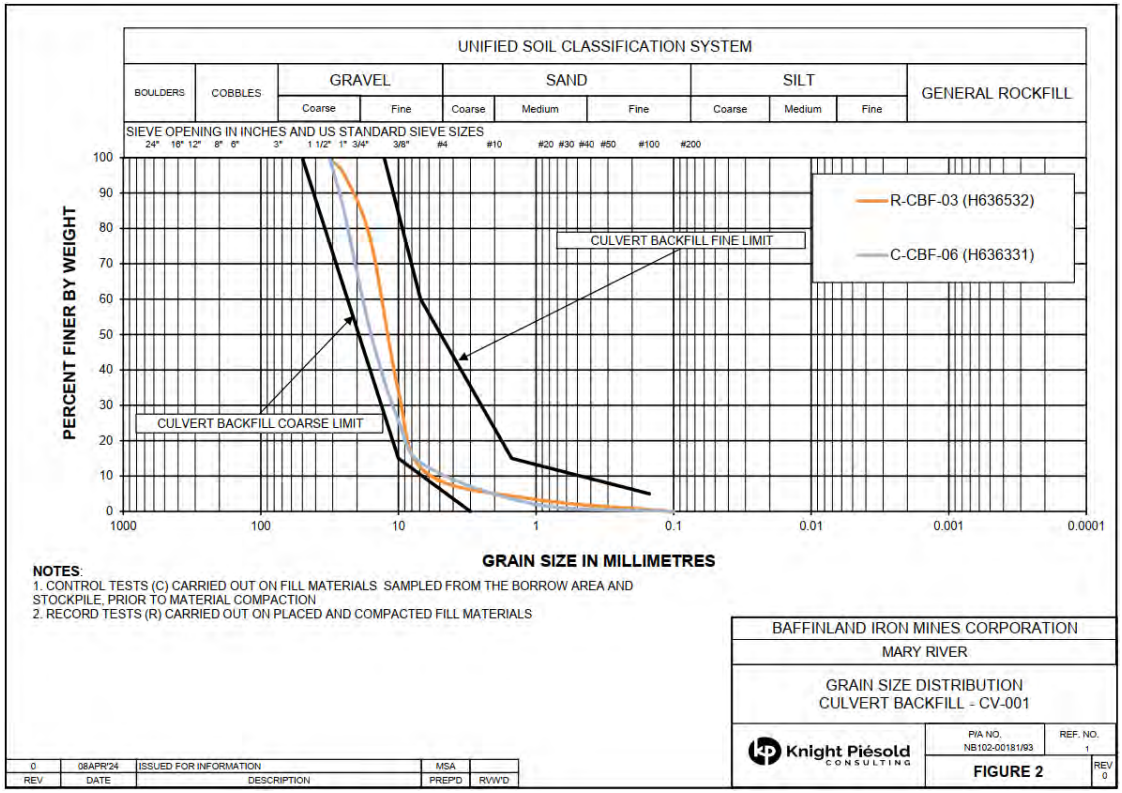

Figure 2: Grain Size Distribution – Culvert Bedding Material for CV-001

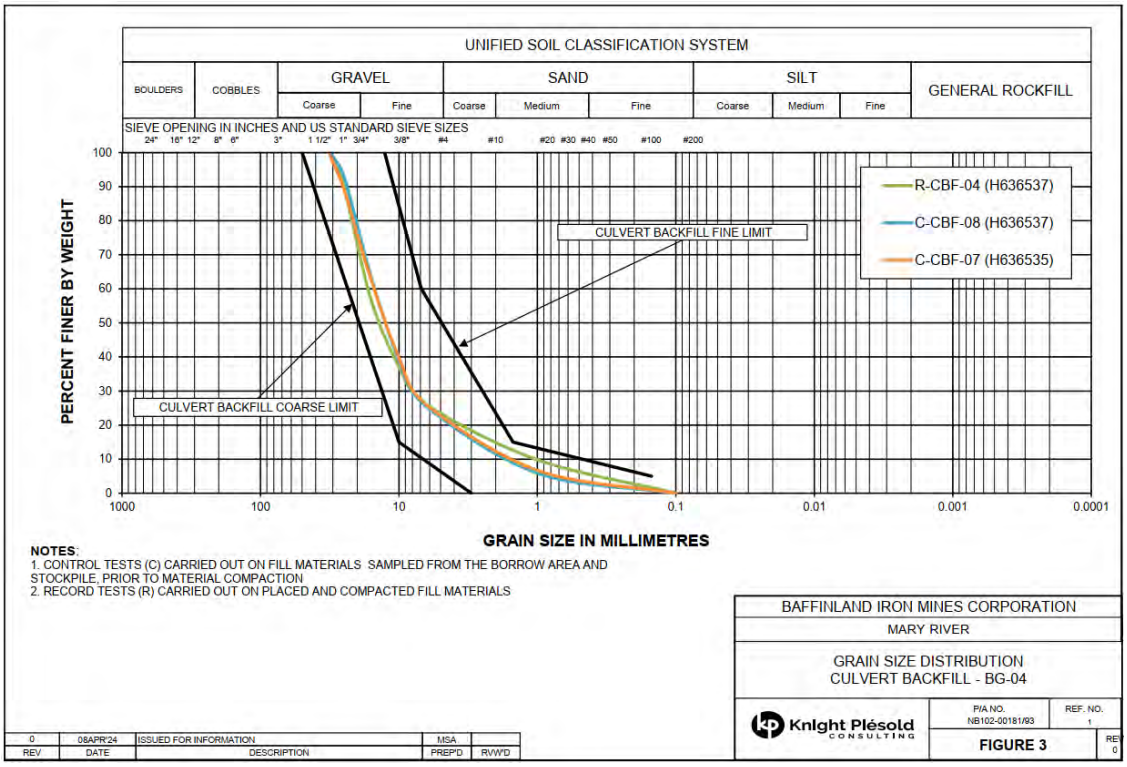

Figure 3: Grain Size Distribution – Culvert Backfill Material for BG-04

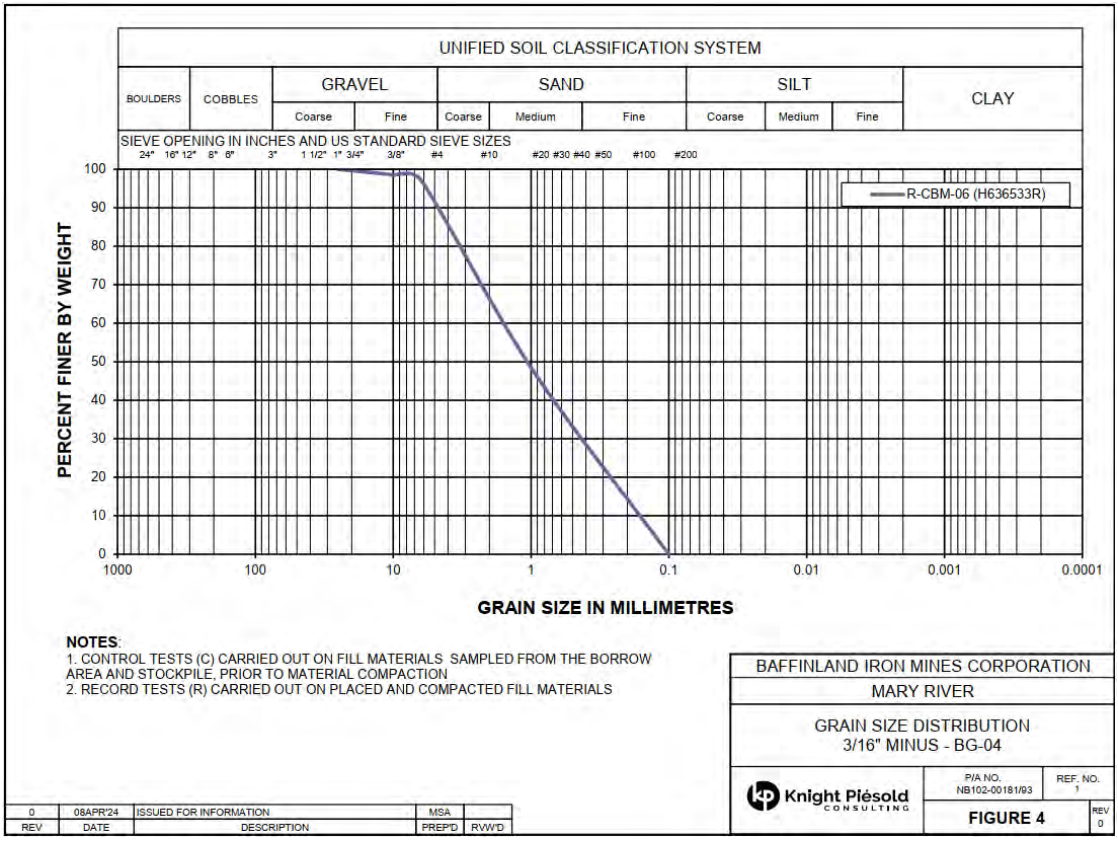

Figure 4: Grain Size Distribution – Culvert Bedding Material for BG-04

4 – ENGINEERING ITEMS

- **March 31** – the following items were discussed:
  - Nuna was advised to not install the damaged section of culvert at BG-04. A new section (undamaged) of culvert was used instead to complete the installation.
- **April 1** – the following items were discussed:
  - No Engineering items were discussed on this day.
- **April 2** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - CV-059 will be walked with the road maintenance supervisor and projects to determine if construction is complete and to determine if a handoff to the road maintenance personnel can be completed.
    - All culvert infill material has been placed at CV-001.
    - Snow removal occurred at CV-216 in preparation for drilling and blasting over the next few days.
    - Nuna has highlighted potential design changes that will be discussed with BIM at BG-27
- **April 3** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - CV-001 backfilled to the design elevation.
    - CV-059 and CV-057 are almost complete.

- CIRNAC is currently on site.
- CV-216 – Environment noted saturated ground and open water. Environment noted that the water can be pumped if needed.
- Sequence of culvert construction may be altered due to the bypass road at BG-27 currently within the construction area.
- Mike Burns and Greg Johnstone discussed the snow within the culvert infilling material. Greg informed Mike that the snow and ice within the culvert infill material may settle and cause fish passage issues within the culvert. Greg stated that it is recommended that the material is replaced with culvert infill material without snow and ice.
- Don from Nuna stated that it would be very difficult to remove the culvert infill material.
- Abid from Baffinland stated that they will leave the material within the culvert, but ensure that material going forward will be without ice and snow.
- Greg stated that this is Baffinland's decision and KP will be providing a surveillance form documenting the non-complaint material.

- **April 4** – the following items were discussed:
  - No Engineering items were discussed on this day.
- **April 5** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - CV-059 and CV-057 are almost complete.
    - CV-216 - Environment noted saturated ground and open water (0.5 m deep). Environment noted that the water can be pumped if needed, though it is possible that the water is flowing from the adjacent Muriel Lake on the downstream side of the culvert.
    - Sana is to begin crushing 32 mm minus in the coming days. KP recommends regular sampling of the crushed material to ensure the crushed product is within specifications.
- **April 6** – the following items were discussed:
  - No Engineering items were discussed on this day.

5 – PHOTOS

Photo 1 Placing geotextile and fine riprap on the west 2H:1V side slope at CV-057. Photo taken March 31, 2024, facing east.

Photo 2 East apron area complete with coarse riprap mixed with stream substrate material at CV-057. Photo taken March 31, 2024, facing south.

Photo 3 Placing and compacting 32 mm minus culvert backfill material at BG-04. Photo taken March 31, 2024, facing south.

Photo 4 2.0 m diameter low flow CSP culverts fully installed at BG-04. Photo taken March 31, 2024, facing north.

Photo 5 North apron area and prepared coarse riprap and stream substrate material for low flow CSP culvert infilling at CV-001. Photo taken March 31, 2024, facing south.

Photo 6 South end (outlet) of CV-001 culvert infilling to 0.72 m above the base of the low flow culvert. Photo taken March 31, 2024, facing outlet.

Photo 7 **Compaction of 32 mm minus culvert backfill material lift on south side at BG-04. Photo taken March 31, 2024, facing north.**

Photo 8 **Compaction of 32 mm minus culvert backfill lift on south side at BG-04. Photo taken March 31, 2024, facing northeast.**

Photo 9 Compacting 32 mm minus material under the high flow CSP culvert location at BG-04. Photo taken April 1, 2024, facing south.

Photo 10 Placed and graded local fill material for the construction of the south approach ramp at CV057. Photo taken April 1, 2024, facing north.

Photo 11 Completed riprap placement in the west apron at CV-059. Photo taken April 1, 2024, facing north.

Photo 12 Low flow culvert at CV-001 completely infilled to 0.72 m above the base of the low flow culvert. Photo taken April 1, 2024, facing south.

Photo 13 Placed 1.8 m diameter high flow CSP culvert at BG-04. Photo taken April 1, 2024, facing north.

Photo 14 Placed and compacted 32 mm minus culvert backfill lifts at BG-04. Photo taken April 1, 2024, facing northwest.

Photo 15 32 mm minus Culvert Backfill Material record sample R-CBF-04 collected from BG-04. Photo taken April 1, 2024, facing northwest behind high flow culvert.

Photo 16 Cleaned approach ramp and above top of 32 mm minus material areas at CV-001 for placing local fill. Photo taken April 2, 2024, facing southeast.

Photo 17 Local fill material placed by dozer over CV-001 culvert. Photo taken April 2, 2024, facing west.

Photo 18 Ripping of outlet culvert apron at CV-001 culvert. Photo taken April 2, 2024, facing west.

Photo 19 Shaped slope with Fine Riprap being placed over non-woven geotextile at CV-057. Photo taken April 2, 2024, facing north.

Photo 20 Placed and compacted 32 mm minus Culvert Backfill Material around sides of the high and flow culvert at BG-04. Photo taken April 3, 2024, facing south.

Photo 21 **Snow mixed in with Culvert Infilling Material at BG-04 low flow culvert. Photo taken April 2, 2024, facing inlet.**

Photo 22 **Close up of snow mixed in with Culvert Infilling Material at BG-04 low flow culvert. Photo taken April 2, 2024.**

Photo 23 Boulder cluster placement in west low flow culvert at BG-04. Photo taken April 3, 2024, facing inlet.

Photo 24 CV-001 excavated inlet apron. Photo taken April 3, 2024, facing northwest.

Photo 25 CV-001 excavated outlet apron. Photo taken April 3, 2024, facing northwest.

Photo 26 Boulder cluster placement at BG-04. Photo taken April 4, 2024.

Photo 27 Stream substrate material being added to Riprap fill in voids throughout the 0.80 of riprap in West low flow culvert at the outlet side. Photo taken April 4, 2024, facing inlet.

Photo 28 Snow removal from the inlet of CV-001. Photo taken April 5, 2024, facing north.

Photo 29 Geotextile placement on the outlet road slope at CV-001. Photo taken April 5, 2024, facing east.

Photo 30 Zoomed out size of coarse riprap used at CV-001. Photo taken April 5, 2024.

Photo 31 **Culvert Infill Material progress during nightshift at BG-04 East low flow culvert. Photo taken April 5, 2024.**

Photo 32 **Side slope stabilization surface before Non-Woven Geotextile. Photo taken April 5, 2024, facing northwest.**

Photo 33 **Fine Riprap placed on top of Geotextile at CV-001 along the southbound lane side slopes. Photo taken April 6, 2024, facing north.**

MARY RIVER MINE

TOTE ROAD PERMANENT CROSSING PLAN - ROUND CSP CULVERT INSTALLATIONS

WEEKLY PROGRESS REPORT **WEEK 8 – April 7 to April 13, 2024**

CLIENT:	**Baffinland Iron Mines Corporation**	**PROJECT NO.:**	**NB102-00181/93**
TO:	**Baruck Wile, Rudy Dietrich, Frank Hynes, Michael Burns, Dale Tulloch, Abid Najey, Jim Patterson, Shannon Mulhall, David Bruce, Katie Babin, Todd Swenson (Baffinland), Michael Johnson (NSC)**	**FILE NO.:**	**.F08**
CC:	**Richard Cook, Toby Perkins, Andy Phillips, Greg Johnstone, Darren Kocken, Matthew Trask (KP)**	**REF. NO.:**	**75**
FROM:	**Michael Bourdignon, Mackenzie Aiken**	**PAGES:**	**16**

1 – GENERAL

1.1 RESPONSIBILITIES

- **Baffinland Iron Mines Corporation (Baffinland) -** Owner, drilling and blasting, traffic management plans, and overall project management.
- **Nuna -** Surveying, excavation, culvert installation, and backfill.
- **Knight Piésold Ltd. (KP) -** QA/QC for the excavation, culvert installation, and backfill.
- **ALS Laboratory (ALS) -** Laboratory testing of collected samples.

1.2 KNIGHT PIÉSOLD LTD. (KP) SITE STAFF

- Michael Bourdignon (DS) - April 7, 2024, to April 13, 2024
- Mackenzie Aiken (NS) - April 7, 2024, to April 13, 2024

1.3 HEALTH AND SAFETY

- No health and safety incidents occurred during the reporting period.
- Completed KP safety meeting minutes daily.
- Completed Baffinland field level risk assessments (FLRA's) daily.
- KP attended Nuna's daily toolbox meetings at 6:00 am/pm.
- BIM project safety attended Nuna toolbox safety meetings.

1.4 WEATHER

- The weather ranged between sunny and clear to overcast and heavy snow with moderate wind throughout the nightshift, with daily temperature highs between -24˚C and -4 ˚C.

1.5 MEETINGS AND CORRESPONDENCE

- KP attended the 7:30 am Daily Coordination Meetings
- KP issued daily progress reports for April 7 to April 13, 2024 (Reference numbers 63, 64, 66, 67, 68, 71 and 72)
- KP issued the weekly report for March 31 to April 6, 2024 (Reference number 65)
- KP issued Foundation Acceptance Form BG-04-FND-02 for Culvert BG-04
- KP issued Surveillance Form BG-04-SRV-02 for Culvert BG-04
- Tote Road Culvert Update Meeting on Friday April 12, 2024, at 3:00 pm regarding BG-04 and CV-216.
- BIM-KP Tote Road Meeting on Saturday April 13, 2024, at 3:00 pm regarding BG-04 and CV-216.

2 – CONSTRUCTION ACTIVITIES

2.1 GENERAL

- Construction activities finalized at CV-057 and CV-059. Construction activities included completing the placement of 2-inch road topping material, surveying culvert infill in-culvert boulders at both CV-057 and CV-059 and removing ice road by-passes.
- Construction activities at CV-001 included completing culvert aprons, finalizing the Non-Woven Geotextile and Fine Riprap for the side slope stabilization and placement of 2-inch road topping material.
- Construction activities at BG-04 included finishing backfill with 32 mm minus material and local blast material, snow removal, ripping and excavation for culvert aprons and side slopes, backfill of aprons with Coarse Riprap mixed with Stream Substrate Material, Placement of Fine Riprap on top of Non-woven geotextile along the side slopes for stabilization and completed the placement of 2-inch road topping material (placement of boulders and boulder clusters is still pending to be completed).
- Snow removal for CV-216 inlet and outlet aprons in preparation for blasting.
- Blasting occurred on April 9, 2024 at 9:00 PM.
- Excavation of CV-216 is pending completion. Likely only one (1) shift of excavation remaining.

2.2 BAFFINLAND

- Baffinland Projects inspected CV-059 and CV-057.
- Drilling completed at CV-216 on April 9, 2024
- Blast occurred at CV-216 on April 9, 2024
- Baffinland and KP completed the in-culvert surveys at CV-057 and CV-059.

2.3 NUNA

- Nuna continued the placement of local fill and road topping material at CV-057.
- Nuna completed the culvert infilling of CV-001.
- Nuna completed the construction of the side slopes with non-woven geotextile overlayed with Fine Riprap and apron areas of CV-057.
- Nuna commenced and completed the construction of the side slopes with non-woven geotextile overlayed with Fine Riprap and apron areas of CV-001.
- Nuna commenced hauling fine and coarse riprap material from the Mary River Mine site to CV-001.
- Nuna completed the excavation of the aprons and 2H:1V side slopes at CV-001.
- Nuna completed the backfill of the aprons at CV-001.
- Nuna completed the backfill of 32 mm minus culvert backfill material and local blast material at BG-04.
- Nuna commenced hauling additional 32 mm minus material from Port to BG-04 and from BG-04 to km 80 laydown.
- Nuna completed snow removal, ripping and excavation of the culvert aprons and side slopes in preparation for Non-Woven Geotextile, Fine Riprap and Coarse Riprap mixed with Stream Substrate Material at BG-04.
- Nuna commenced the placement of Non-Woven Geotextile, Fine Riprap along the side slopes of BG-04 and the backfill of the aprons with Coarse Riprap mixed with Stream Substrate Material.
- Nuna commenced the excavation of CV-216.

2.4 KP

- KP Visited CV-057, CV-059, CV-001, BG-04, CV-102 and CV-106 throughout the week on dayshift and nightshift.
- KP inspected the side slope stabilization and culvert apron construction activities at CV-001.

- KP monitored placement and compaction of 32 mm minus culvert backfill material, 3/16 inch minus culvert bedding placement, low flow CSP culvert(s) installation and high flow CSP culvert installation at BG-04.
- KP monitored culvert infilling activities at CV-001 and BG-04.
- KP monitored side slope and culvert apron area preparation and construction works at CV-059 and CV-057.
- KP and BIM completed the in-culvert surveys at CV-057 and CV-059.

3 – CONSTRUCTION QUALITY ASSURANCE (CQA) ACTIVITIES

3.1 QUALITY ASSURANCE

KP issued surveillance form for BG-04 for the culvert infill material entrained with snow/ice.

KP approved culvert apron and side slope foundation surfaces for BG-04.

KP monitored the backfill of the culvert aprons and slope stabilization at CV-001.

KP monitored the backfill of 32 mm minus Culvert Backfill Material at BG-04.

KP monitored the backfill of local blast material above the 32mm minus Culvert Backfill Material at BG-04.

KP monitored the snow removal, ripping and excavation of the culvert aprons and side slopes at BG-04.

KP and BIM collected in-culvert survey measurements at CV-057 and CV-059.

3.2 QUALITY CONTROL

Nine (9) samples of 32 mm minus Culvert Backfill Material was collected by Sana at Port and sent to Mary River by OHT for grain size analysis testing on April 6, April 7 and April 13, 2024 (Sample ID: BLEND-CBF-04, BLEND-CBF-05, BLEND-CBF-06, BLEND-CBF-07, BLEND-CBF-08, BLEND-CBF-09, BLEND-CBF-10, BLEND-CBF-11 and BLEND-CBF-12).

Grain size analysis testing results for BLEND-CBF-04, BLEND-CBF-05, BLEND-CBF-06 and BLEND-CBF-07 were received by KP and BIM from ALS on April 12, 2024. Results for BLEND-CBF-08 through BLEND-CBF-12 are still pending from the laboratory.

Eight record samples of the BG-04 Stream Substrate Material entrained with snow was sampled on April 9, 2023 to determined the volume of snow/ice entrained in the placed material.

3.3 LABORATORY TESTING

Table 1: Laboratory Results

KP SAMPLE ID	ALS LAB ID	Plotting ID	Culvert ID	NAME DESCRIPTION	MATERIAL DESCRIPTION	SAMPLE COLLECTION DATE	SAMPLE TESTING DATE	SAMPLE WEIGHT(Kg)	LABORATORY RESULTS							
									Moisture Content (ASTM D2216)	Particle Size Distribution (ASTM D422)						
										31.5	25	16	10	6.3	1	0.1
									%	%	%	%	%	%	%	%
CONTROL SAMPLES																
BLEND-CBF-04	BLEND-CBF-04	BLEND-CBF-04	N/A	Culvert Backfill Blend Sample 04	32mm minus culvert backfill	2024-04-06 DS	2024-04-12	12.92	1.84	100.0	98.0	88.8	45.2	25.4	5.6	0.0
BLEND-CBF-05	BLEND-CBF-05	BLEND-CBF-05	N/A	Culvert Backfill Blend Sample 05	32mm minus culvert backfill	2024-04-06 NS	2024-04-12	13.76	1.5	100.0	97.9	70.8	45.6	25.5	5.4	0.0
BLEND-CBF-06	BLEND-CBF-06	BLEND-CBF-06	N/A	Culvert Backfill Blend Sample 06	32mm minus culvert backfill	2024-04-06 DS	2024-04-12	14.84	1.17	100.0	96.9	59.1	34.5	19.6	4.6	0.0
BLEND-CBF-07	BLEND-CBF-07	BLEND-CBF-07	N/A	Culvert Backfill Blend Sample 07	32mm minus culvert backfill	2024-04-07 DS	2024-04-12	13.42	1.43	100.0	97.0	62.8	40.7	22.6	4.5	0.0

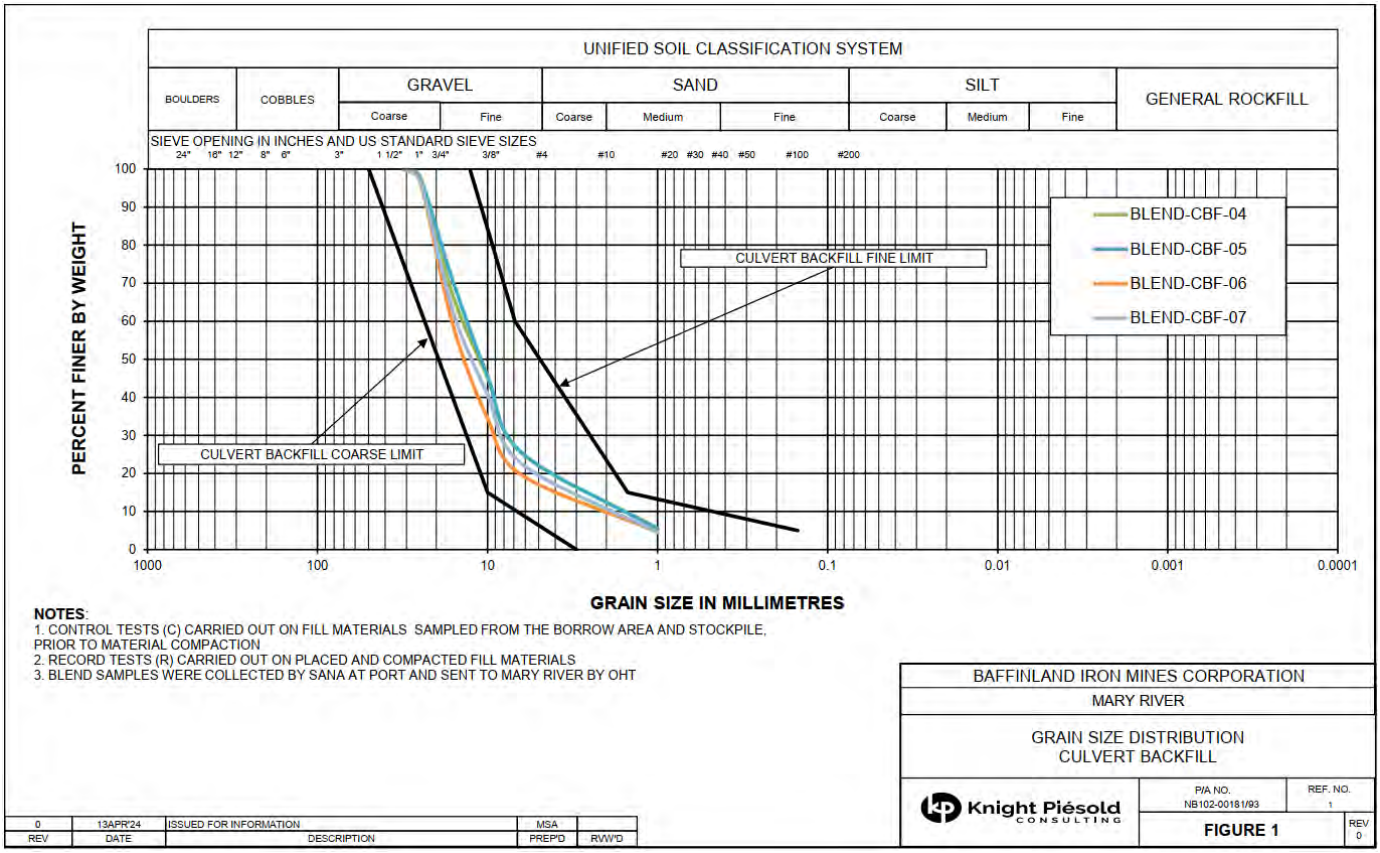

Figure 1: Grain Size Distribution – 32mm minus Culvert Backfill Samples from Sana Crusher

4 – ENGINEERING ITEMS

- **April 7** – the following items were discussed:
  - No Engineering items were discussed on this day.
- **April 8** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - CV-102 and CV-106 bypass roads are currently being completed.
    - CV-216 excavation of blasted material to be stockpiled at km 80.

- Greg Johnstone from KP asked the team if insulation is available for use at CV-102 and CV-106. Nuna stated there is insulation available and they will be sending KP a picture and spec sheet of the insulation available.
- Greg Johnstone reminded the team that as-builts are required within the culverts as discussed in the February 23rd daily report. Carla from BIM informed Greg that further discussion may be required.

BIM expressed a desire to collect additional samples of Stream Substrate Material (two samples per culvert) from the low-flow culverts at BG-04 with a BIM representative present. KP will coordinate the collection of these samples and the presence of a BIM representative tomorrow.

- **April 9** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - Nuna to send KP photos of the proposed insulation today.
    - CV-216 drill holes to be loaded over the next day or two.
    - KP and Baffinland will collect an additional 4 samples of the BG-04 stream substrate material to evaluate snow/ice volume percentage.
    - Nuna to submit an RFI for a design change of the riprap tied into the road topping.

  Following the 7:30 am meeting, a subsequent meeting was held to discuss as-built surveying of the boulder structures within the culverts. Multiple options were discussed, and the chosen path forward was to complete an as-built using a measuring tape to measure the x, y and z distances within the culvert.

- **April 10** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - Final grading is being completed at CV-057 and CV-059.
    - Blasting of CV-216 occurred last night at 9:00 pm.
    - Over 100 cubic metres of water per day is required to complete the ice roads at CV-102 and CV-106.
    - Abid from BIM stated to disregard RFI 13 from Nuna. The geotextile will be tied in underneath the road topping material.
    - Greg from KP mentioned that truck boxes should be cleaned out after switching materials to ensure no cross contamination.

- **April 11** – the following items were discussed:
  - No Engineering items were discussed on this day.

- **April 12** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - Nuna to provide KP with insulation specifications.
    - Josh, the road Superintendent and Jim Patterson discussed the concern that a safety berm was not designed at BG-04. Greg Johnstone from KP informed them that this was Baffinland's direction to KP. Jim Patterson asked for written correspondence from this, Greg Johnstone subsequently forwarded the correspondence to Jim Patterson.
    - Nuna provided as-builts for CV-057 and CV-059 to KP.
    - Ice road construction is on-going at CV-102 and CV-106.
  - The following engineering items were discussed during the 3:00 pm Tote Road Culvert Update Meeting:
    - Ice was encountered during the excavation of CV-216. A survey point found that the ice (at least 2 m thick) lies below the design culvert placement depth (see Photo 2).

- The current proposed solution is to install a 10 cm layer of insulation below the culverts (above the ice) following a similar design to CV-102 and CV-106 (changes may follow as an updated design is finalized). KP to follow up with an updated design in the coming days.
- The current hole in the ice (2 to 3 m deep) below the design culvert placement depth is to be backfilled with 32 mm minus Culvert Backfill Material in 200 mm lifts and compacted with 8 passes using the MIKASA MVH-408DZ compactor.
- KP advised BIM and Nuna that the ice encountered at CV-216 should not be exposed to the sun or hot temperatures to limit melting of the ice. BIM and Nuna agreed to minimize exposure of the ice during excavation and backfill.
- Potential solutions for a berm/barrier on the road at BG-04 and CV-216 were discussed including jersey barriers, gabion walls, and soil berms.
- Richard Cook of KP highlighted the potential need to update the designs for other culvert crossing locations to incorporate safety berms (or other equivalent).
- A scheduled follow-up meeting at 3:00 pm tomorrow to discuss the updated design to CV-216 and the need for safety berms (or another equivalent) at BG-04 and CV-216.
- Richard Cook of KP issued an email at 6:30 pm outlining potential options to increase the crossing width to accommodate earthen berms at CV-216.

- **April 13** – the following items were discussed:
  - The following engineering items were discussed during the 7:30 am Daily Coordination Meeting:
    - Next planned blast is at CV-102 and is planned for the coming week.
    - Ice road construction is on-going at CV-102 and CV-106.
    - The 8.0 m of snow mixed with stream substrate material in the two low flow culverts at BG-04 is currently being heated with a frost fighter to melt the snow and ice. KP, Nuna and BIM will check on the progress today.
  - The following engineering items were discussed during the 3:00 pm Tote Road Culvert Update Meeting:
    - KP issued a figure yesterday afternoon showing proposed excavation, backfill and insulation installation to address the ice issue at CV-216. This figure was reviewed by KP's permafrost specialist. KP will issue revised drawing(s) for CV-216 based on this change next week. Richard noted that this coming week will already be very busy looking to issue the pipe arch culvert design letter to DFO, so it may be later in the week before the revised drawing(s) are issued.
    - Following up on Richard's email from last night, Baffinland would like to pursue Option 2. Briefly, this includes the following measures to widen the road crest to accommodate earthen safety berms:
      - Lengthen the three existing 2.0 m low-flow culverts by 4 m.
      - Steepen the slide slopes from 2H:1V to 1.5H:1V and install gabion mattresses instead of the normal riprap armouring. A procedure and JHA will need to be prepared for placing and filling the gabion mattresses.
      - Switch out the 2.0 m dia. high flow culvert with a 1.8 m dia. culvert, to generate the additional 2.0 m diameter culvert lengths needed to extend the low flow culverts.
    - Baffinland confirmed that a safety berm at BG-04 will be required. The outlet side of the culvert has already been constructed, so Baffinland asked KP to review what would be required in terms of extending the culverts only on the upstream end to widen the road to accommodate the safety berms. The Baffinland team was referring to applying the same 4 m culvert length increase as at CV-216, but KP noted the circumstances are different at BG-04, so the change at CV-216 cannot be applied to BG-04.

- KP noted that changes to both BG-04 and CV-216 to include safety berms will need to be confirmed acceptable with DFO early next week. This will be discussed with Connor Devereaux of Baffinland on Monday. We think it should be enough to describe these changes and file IFC drawings with DFO afterward, but we will see what DFO says.
- Regarding the snow in the low flow culverts at BG-04 some melting of snow has occurred, in one culvert more than the other (a heater connection came loose on one culvert and a snowstorm shut down the road). The amount of settlement of the infill material from melting appears to be minor based on KP's photos. The heaters will be maintained for another day or two and we will reassess on Monday. KP asked if the fill in the culverts could be pushed to the side to expose more snow, but Nuna personnel cannot enter the culverts because the height in the backfilled culverts presents an ergonomic risk.
- KP to review what will be required to widen the crossing at BG-04, and present that to Baffinland on Monday or Tuesday (this is the priority)
- KP to discuss the changes at CV-216 and BG-04 with Connor on Monday, so that the changes can be presented to DFO for acceptance.
- KP to follow-up with revised drawings to reflect changes at CV-216 and BG-04.
- BIM and KP to reassess heating the snow in the BG-04 culverts on Monday.

5 – PHOTOS

Photo 1 **Placement and grading of 20 cm lift of 32 mm minus material at BG-04. Photo taken April 7, 2024, facing east.**

Photo 2 **Compaction of 20 cm lift of 32 mm minus material at BG-04. Photo taken April 7, 2024, facing east.**

Photo 3 Edge of 32 mm minus material trapezoid marked out in blue paint. Photo taken April 7, 2024, facing east.

Photo 4 Uncompacted 15 cm (6 inch) layer of 32 mm minus material above the low flow culverts. Photo taken April 7, 2024, facing east.

Photo 5 Coarse Riprap mixed with Stream Substrate Material placed for CV-001 outlet apron. Photo taken April 7, 2024, facing southeast.

Photo 6 Local borrow area fill placement and compaction against the 32 mm minus Culvert Backfill Material on the west side of the low flow culverts at BG-04. Photo taken April 7, 2024, facing north.

Photo 7 Local borrow area fill placement and compaction against the 32 mm minus Culvert Backfill Material on the west side of the low flow culverts at BG-04. Photo taken April 7, 2024, facing northeast.

Photo 8 Local borrow area fill placement beside compacted 32 mm minus Culvert Backfill material at BG-04. Photo taken April 7, 2024, facing southwest.

Photo 9 **Local borrow area fill and 32 mm minus Culvert Backfill placement and compaction at BG-04. Photo taken April 7, 2024, facing southeast.**

Photo 10 **Compaction of 20 cm lift of 32 mm minus material at BG-04. Photo taken April 8, 2024, facing east.**

Photo 11 Compacting final lift of 32 mm minus material at BG-04 at top of 32 mm minus trapezoid. Photo taken April 8, 2024, facing south.

Photo 12 Compacting 30 mm lift of common borrow material outside the 32 mm minus trapezoid. Photo taken April 8, 2024, facing east.

Photo 13 **Zoomed in sizing of common borrow material used outside of 32 mm minus trapezoid at BG-04. Photo taken April 8, 2024.**

Photo 14 **Zoomed out sizing of common borrow material used outside of 32 mm minus trapezoid at BG-04. Photo taken April 8, 2024.**

Photo 15 Non-woven geotextile installed on the outlet apron side slopes in preparation of Fine Riprap placement at BG-04. Photo taken April 12, 2024, facing west.

Photo 16 Fine Riprap placement on top of non-woven geotextile installed on the outlet apron side slopes at BG-04. Photo taken April 12, 2024, facing west.

Photo 17 Outlet apron and side slopes at BG-04. Photo taken April 12, 2024, facing east.

Photo 18 Frost fighters installed in the inlet end of the low flow culverts at BG-04. Photo taken April 11, 2024, facing east.

Photo 19 Ice found below the blasted material at CV-216. Photo taken April 12, 2024.

Photo 19 Frozen blasted material being excavated by Nuna at CV-216. Photo taken April 12, 2024, facing southwest.

Photo 21 Frozen blasted material being excavated by Nuna at CV-216. Photo taken April 12, 2024, facing southwest.

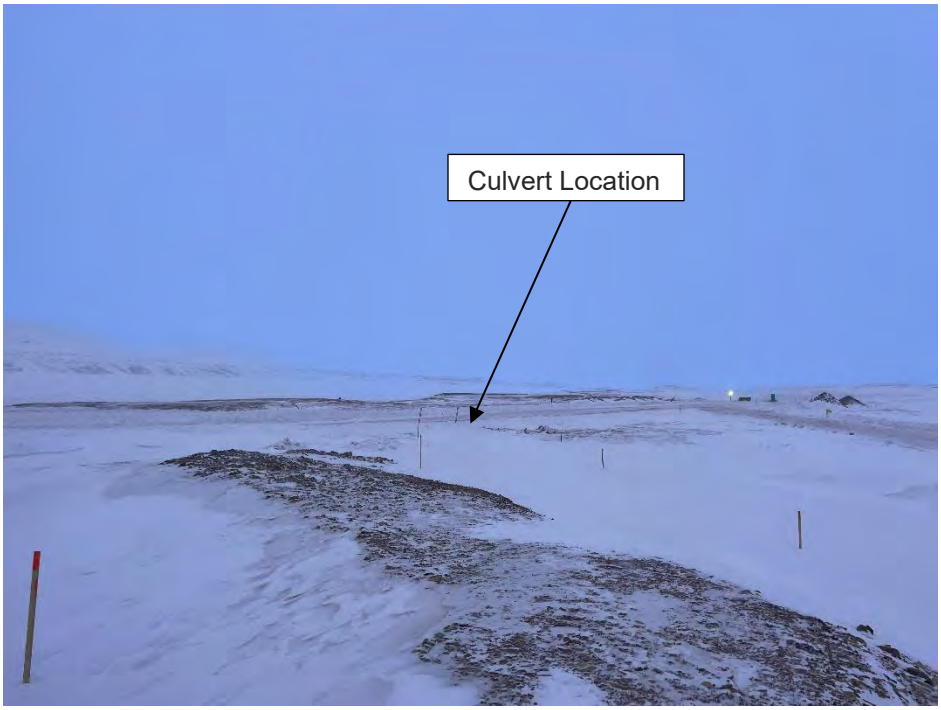

Photo 22 CV-106 Culvert location facing west towards the inlet. Photo taken April 12, 2024.

Photo 23 **Heating progress inside of northwest culvert inlet at BG-04. Photo taken April 13, 2024, facing south.**

Photo 24 **Heating progress inside of southeast culvert inlet at BG-04. Photo taken April 13, 2024, facing south.**

Photo 25 **Ongoing excavation of blasted material at CV-216. Photo taken April 13, 2024, facing northbound on the tote road.**