# APPENDIX G.9

# Review of 2020 Dust Suppression Water Withdrawls

Knight Piésold CONSULTING

Management System Certified by: bsi ISO 9001 ISO 14001 ISO 45001 CERTIFIED

# MEMORANDUM

| | | | |
|---|---|---|---|
| **Date:** | April 23, 2021 | **File No.:** | NB102-00181/65-A.01 |
| | | **Cont. No.:** | NB21-00234 |
| **To:** | Mr. Connor Devereaux | | |
| **Copy To:** | Ms. Kendra Button, Mr. Leon Kennedy | | |
| **From:** | Richard Cook | | |
| **Re:** | **Review of 2020 Dust Suppression Water Withdrawals, Mary River Project** | | |

## 1.0 INTRODUCTION

Knight Piésold Ltd. (KP) is pleased to provide Baffinland Iron Mines Corporation (Baffinland) with this review of the 2020 dust suppression water withdrawals for the Mary River Project.

## 2.0 BACKGROUND

Baffinland applies water as well as water mixed with calcium chloride to the Milne Inlet Tote Road during the open water summer period to reduce dust generation resulting from Project traffic over the road. The Project's Type A Water Licence 2AM-MRY1325 (NWB, 2015) allows Baffinland to withdraw daily maximum volumes of water from 15 sources comprising five lakes and 10 streams. The maximum daily volumes are based upon a previous assessment by KP that supported Baffinland's Amendment No. 1 application (KP, 2014).

In that previous assessment, KP assessed the effects of water withdrawals on the instantaneous flows of streams, using estimated mean monthly and 10-year low flows. Lakes were assessed assuming the proposed water withdrawal volumes were extracted daily, and these were calculated as a proportion of the monthly lake outflow under mean and 10-year low flow conditions. The assessment concluded that sufficient flow will be available under all assessed flow conditions at the five lake stations and five of the 10 stream stations. Restricted water withdrawals were recommended for an additional five stream stations; water withdrawals from these locations can occur during the months of June and July under all flow conditions, and during August and September in years when mean monthly flow conditions are experienced. These terms were adopted by the Nunavut Water Board (NWB) into the amended water licence. The 15 water stations and approved maximum daily water volumes are presented in Table 1, and their locations are shown on Figure 1.

The maximum daily water volumes proposed by KP and adopted by the amended water licence were developed under a scenario that assumed that all 15 water stations would be used to water the road. It was assumed that the portion of road measured from the midpoint between each of the other closest stations would be watered by a given water station, with some level of contingency applied. Germane to this review, the maximum daily volumes were not established as thresholds of potential effects. Additionally, all the stations currently being used by Baffinland are those that do not have restriction on water withdrawals (shaded water stations in Table 1).

**Table 1 Currently Utilized Water Withdrawal Stations**

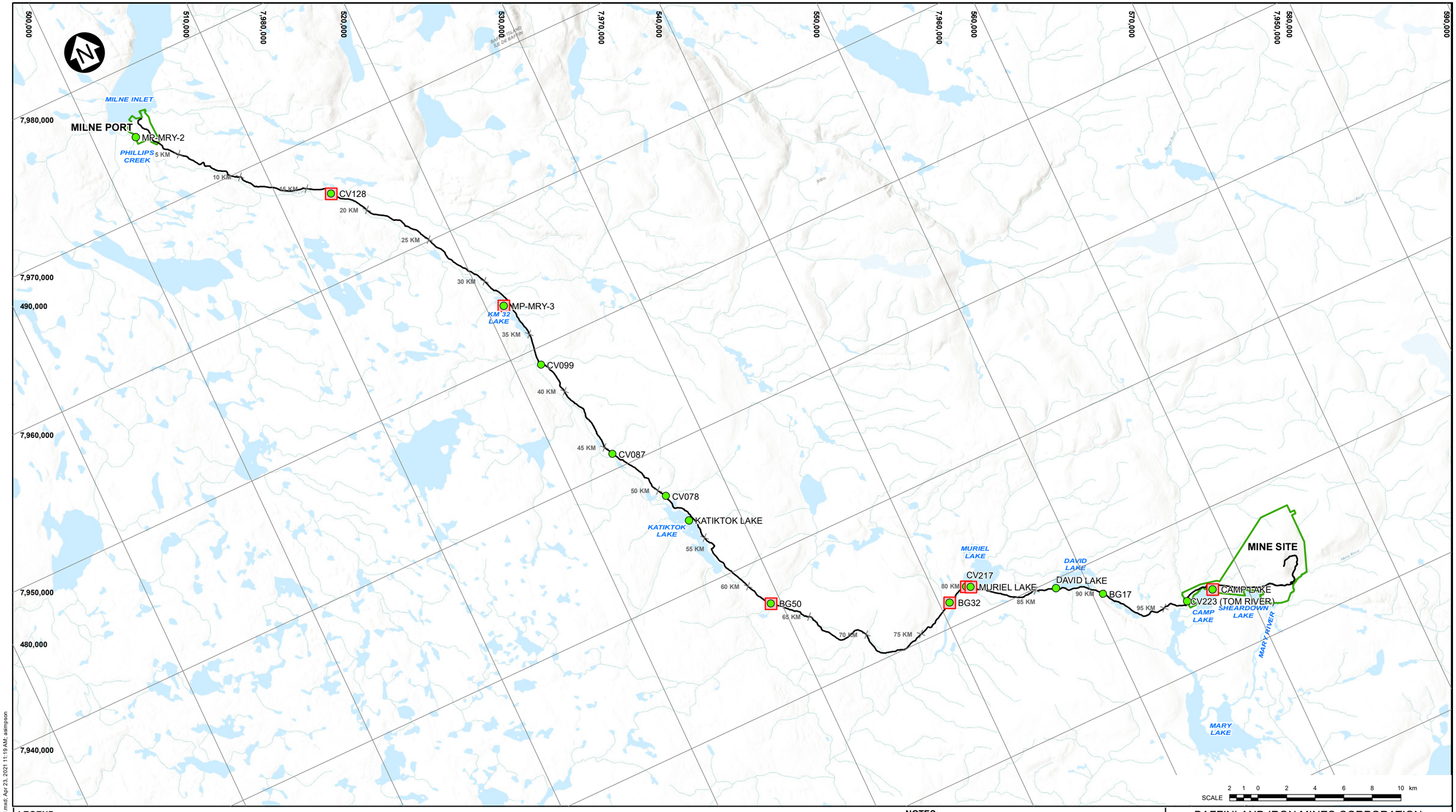
| Source | Location | Maximum Volume ($m^3$/day) | Restriction |
|---|---|---|---|
| Phillip's Creek | Milne Port | 212 | None |
| CV128 | Km 17 | 579.5 | |
| Km 32 Lake | Km 32 | 364 | |
| CV099 | | 110 | Yes, see Note 1 |
| CV087 | | 90 | |
| CV078 | | 75 | |
| Katiktok Lake | KM 52-58 | 318 | None |
| BG50 | KM 62 Bridge | 150 | |
| BG32 | | 120 | Yes, see Note 1 |
| CV217 | KM 80 Bridge | 130 | None |
| Muriel Lake | Km 81 | 212 | |
| David Lake | | 132 | Yes, see Note 1 |
| BG17 | | 75 | |
| CV233 (Tom River) | KM 97 Bridge | 135 | None |
| Camp Lake | Mine | 86 | |

**NOTES:**

1. USE IN JUNE -JULY ONLY DURING LOW FLOW (LESS THAN MEAN FLOW) YEARS.
2. SHADED STATIONS ARE CURRENTLY UTILIZED.

## 3.0 CURRENT OPERATIONS

15 water stations are identified in the water licence but only seven stations (shaded in Table 1) are currently being utilized, as these are stations that have an appropriate place for the water truck to safely park and for operators to safely access the water body. This has resulted in operators taking considerably greater quantities of water than specified in the water licence at these seven stations. The daily volumes of water extracted from these stations in 2020 is presented in Table A.1 in Appendix A.




**LEGEND:**

- APPROVED WATER WITHDRAWAL STATION
- CURRENTLY UTILIZED STATION
- MILNE INLET TOTE ROAD
- WATER
- PROJECT DEVELOPMENT AREA

**NOTES:**

1. BASE MAP/IMAGERY: © ESRI AND DATA (ONLINE) SERVICE LAYERS (2021). REDLANDS, CA: ENVIRONMENTAL SYSTEM RESEARCH INSTITUTE. ALL RIGHTS RESERVED.
2. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**APPROVED DUST SUPPRESSION WATER STATIONS ALONG TOTE ROAD**

Knight Piésold CONSULTING

| P/A NO. | REF NO. |
|---|---|
| NB102-181/65 | NB21-00234 |

**FIGURE 1** REV 0

## 4.0 EVALUATION OF 2020 WATER WITHDRAWALS

Exceedances of the daily withdrawal limit occurred in 2020 at four stations as follows:

- **KM32 Lake** - KM32 Lake is the source of domestic and industrial water for Milne Port, in addition to being a source of water for dust suppression. Two exceedances of the maximum daily water volume (364 $m^3$/day for dust suppression) occurred in 2020: 454 $m^3$ and 545 $m^3$ were withdrawn from the lake for dust suppression on June 5 and June 11, respectively.
- **BG50** - BG50 is located on a headwater tributary of the Ravn River. Eight exceedances of the daily limit of 150 $m^3$/day occurred in 2020, ranging from 182 to 454 $m^3$/day.
- **CV217** - CV217 is located where the Tote Road crosses the outlet of Muriel Lake. This is the most heavily used water station along the Tote Road, and so water withdrawals consistently exceeded the limit 30 days out of 79 days for dust suppression. The maximum volume of water withdrawn from this location was 727 $m^3$ on June 5.
- **Camp Lake** - Camp Lake has an established water intake jetty and is the source of domestic and industrial water at the Mine Site, in addition to being a source of water for dust suppression. A single exceedance of the maximum daily water volume (86 $m^3$/day) occurred in 2020: 91 $m^3$ was withdrawn from the lake for dust suppression on May 28.

Considering the original assessment and the water withdrawals described above, we conclude the following:

- The main concern with respect to water withdrawals from streams is the instantaneous water withdrawal (pumping) rate relative to streamflow. Each of the streams are sufficiently large to support the instantaneous water withdrawals without adversely affecting streamflow and thus fish habitat (KP, 2014).
- Two of these stations (KM32 Lake and Camp Lake) are lakes, and CV217 is at the outlet of Muriel Lake. Short term water withdrawals from these stations over the scale of hours or days typically do not result in measurable changes in the water levels of the lakes and therefore should not impact fish and fish habitat.
- The daily limits were set based on expected water requirements assuming all 15 stations would be used and are not environmental thresholds.

As such, the additional short-term water takes exceeding the maximum daily limit do not present an increased risk to fish or fish habitat.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

While daily limits specified in the Type A Water Licence occurred at four water stations over the 2020 open water period, these exceedances were not environmentally consequential for the reasons outlined above.

As part of the Phase 2 Proposal, Baffinland is seeking approval from NWB for additional stations and increased water extraction volumes. In the short-term, we advise Baffinland to request increases to the daily water withdrawal volumes at the stations that are used, or request that the monthly limits on water use be used to reflect the sporadic nature of water withdrawals.

## 6.0 REFERENCES

Knight Piésold Ltd. (KP), 2014. *Hydrology Assessment of Water Sources for Dust Suppression along the Tote Road - Mary River Project - Early Revenue Phase*. July 14. Ref. No. NB14-00376 (NB102-181/35).

Nunavut Water Board (NWB), 2015. *Type A Water Licence 2AM-MRY1325 - Amendment No. 1*. July 30.

## 7.0 CLOSING

We trust this meets with your present requirements. Please do not hesitate to contact the undersigned with any questions.

Yours truly,
**Knight Piésold Ltd.**

| Prepared: | Reviewed: |
|---|---|
| Richard Cook, P.Geo. (Ltd.)<br>Specialist Environmental Scientist \| Associate | Oscar Gustafson, R.P.Bio.<br>Specialist Environmental Scientist \| Associate |

Approval that this document adheres to the Knight Piésold Quality System:

**Attachments:**
Appendix A 2020 Daily Dust Suppression Water Withdrawals

/rc

# APPENDIX A

## 2020 Daily Dust Suppression Water Withdrawals

(Pages A-1 to A-2)

Knight Piésold CONSULTING

**TABLE A.1**

**BAFFINLAND IRON MINES CORPORATION**
**MARY RIVER PROJECT**

**REVIEW OF 2020 DUST SUPPRESSION WATER WITHDRAWALS**
**QUANTITIES OF WATER USED FOR DUST SUPPRESSION PURPOSES IN 2020**

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| Date[2] | Approved Water Sources for Dust Suppression [3] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Camp Lake | CV128 (Km 17) | Km 32 Lake | CV099 (Km 37) | Katiktok Lake (Km 52 - 58) | BG50 (Km 62) | BG32 (Km 78) | CV217 (Km 80) | Muriel Lake (Km 81) | BG17 (Km 90) | CV233 (Tom River Km 97) | Daily Total |
| **Daily Limit ($m^3$):** | **86** | **579.5** | **364** | **110** | **318** | **150** | **120** | **130** | **212** | **75** | **135** | **1,500** |
| 28-May-20 | 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 53 |
| 29-May-20 | **91** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 91 |
| 30-May-20 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| 02-Jun-20 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 91 |
| 03-Jun-20 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| 04-Jun-20 | 61 | 0 | 242 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 303 |
| 05-Jun-20 | 0 | 0 | **454** | 0 | 0 | 0 | 0 | **727** | 0 | 0 | 0 | 1,181 |
| 06-Jun-20 | 0 | 0 | 242 | 0 | 0 | 0 | 0 | **697** | 0 | 0 | 0 | 939 |
| 07-Jun-20 | 0 | 0 | 318 | 0 | 0 | 0 | 0 | **454** | 0 | 0 | 0 | 772 |
| 08-Jun-20 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | **151** | 0 | 0 | 0 | 159 |
| 09-Jun-20 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | **363** | 0 | 0 | 0 | 379 |
| 10-Jun-20 | 0 | 0 | 182 | 0 | 0 | 0 | 0 | **273** | 0 | 0 | 0 | 454 |
| 11-Jun-20 | 0 | 0 | **545** | 0 | 0 | 0 | 0 | **242** | 0 | 0 | 0 | 787 |
| 12-Jun-20 | 0 | 0 | 333 | 0 | 0 | 0 | 0 | **212** | 0 | 0 | 0 | 545 |
| 13-Jun-20 | 0 | 0 | 242 | 0 | 0 | 0 | 0 | **394** | 0 | 0 | 0 | 636 |
| 14-Jun-20 | 0 | 0 | 242 | 0 | 0 | 0 | 0 | **242** | 0 | 0 | 0 | 485 |
| 15-Jun-20 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | **333** | 0 | 0 | 0 | 424 |
| 16-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **212** | 0 | 0 | 0 | 212 |
| 17-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **273** | 0 | 0 | 0 | 273 |
| 18-Jun-20 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | **182** | 0 | 0 | 0 | 212 |
| 19-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **182** | 0 | 0 | 0 | 182 |
| 22-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 0 | 0 | 61 |
| 23-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **151** | 0 | 0 | 0 | 151 |
| 25-Jun-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 121 | 0 | 0 | 0 | 121 |
| 03-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04-Jul-20 | 0 | 0 | 61 | 0 | 0 | **454** | 0 | 0 | 0 | 0 | 0 | 515 |
| 05-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **151** | 0 | 0 | 0 | 151 |
| 07-Jul-20 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | **151** | 0 | 0 | 0 | 182 |
| 08-Jul-20 | 0 | 0 | 0 | 0 | 0 | **273** | 0 | 0 | 0 | 0 | 0 | 273 |
| 09-Jul-20 | 0 | 0 | 0 | 0 | 0 | **242** | 0 | 0 | 0 | 0 | 0 | 242 |
| 10-Jul-20 | 0 | 0 | 0 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 91 |
| 12-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13-Jul-20 | 0 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 121 |
| 16-Jul-20 | 0 | 151 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 151 |
| 20-Jul-20 | 0 | 182 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 212 |
| 21-Jul-20 | 0 | 182 | 212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 394 |
| 22-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24-Jul-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25-Jul-20 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| 26-Jul-20 | 0 | 89 | 61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 150 |
| 27-Jul-20 | 0 | 184 | 123 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 307 |
| 28-Jul-20 | 0 | 151 | 153 | 0 | 0 | 93 | 0 | 121 | 0 | 0 | 0 | 519 |
| 29-Jul-20 | 68 | 309 | 309 | 0 | 0 | **184** | 91 | 91 | 0 | 0 | 0 | 1,050 |
| 30-Jul-20 | 0 | 61 | 61 | 0 | 0 | 91 | 0 | 30 | 0 | 0 | 0 | 242 |
| 31-Jul-20 | 0 | 0 | 121 | 0 | 0 | 61 | 0 | 0 | 0 | 0 | 0 | 182 |
| 01-Aug-20 | 0 | 0 | 218 | 0 | 0 | 95 | 0 | 0 | 0 | 0 | 0 | 312 |
| 02-Aug-20 | 51 | 0 | 191 | 0 | 0 | 97 | 0 | 0 | 0 | 0 | 0 | 339 |
| 03-Aug-20 | 0 | 0 | 129 | 0 | 0 | 64 | 0 | 30 | 0 | 0 | 0 | 223 |
| 04-Aug-20 | 0 | 0 | 32 | 0 | 0 | 64 | 0 | 0 | 0 | 0 | 0 | 97 |
| 05-Aug-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06-Aug-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07-Aug-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08-Aug-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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**TABLE A.1**

**BAFFINLAND IRON MINES CORPORATION**
**MARY RIVER PROJECT**

**REVIEW OF 2020 DUST SUPPRESSION WATER WITHDRAWALS**
**QUANTITIES OF WATER USED FOR DUST SUPPRESSION PURPOSES IN 2020**

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| Date[2] | Approved Water Sources for Dust Suppression [3] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Camp Lake | CV128 (Km 17) | Km 32 Lake | CV099 (Km 37) | Katiktok Lake (Km 52 - 58) | BG50 (Km 62) | BG32 (Km 78) | CV217 (Km 80) | Muriel Lake (Km 81) | BG17 (Km 90) | CV233 (Tom River Km 97) | Daily Total |
| **Daily Limit ($m^3$):** | **86** | **579.5** | **364** | **110** | **318** | **150** | **120** | **130** | **212** | **75** | **135** | **1,500** |
| 09-Aug-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-Aug-20 | 0 | 32 | 64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 97 |
| 11-Aug-20 | 0 | 61 | 218 | 0 | 0 | **312** | 0 | 64 | 61 | 0 | 0 | 715 |
| 12-Aug-20 | 0 | 61 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 182 |
| 14-Aug-20 | 0 | 91 | 157 | 0 | 0 | 129 | 0 | 0 | 0 | 0 | 0 | 377 |
| 15-Aug-20 | 0 | 61 | 212 | 0 | 0 | 150 | 0 | 0 | 0 | 0 | 0 | 423 |
| 16-Aug-20 | 0 | 0 | 242 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 273 |
| 19-Aug-20 | 0 | 61 | 30 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 121 |
| 20-Aug-20 | 0 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 61 |
| 21-Aug-20 | 0 | 0 | 182 | 0 | 0 | **333** | 0 | 0 | 0 | 0 | 0 | 515 |
| 22-Aug-20 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| 24-Aug-20 | 0 | 91 | 30 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 212 |
| 25-Aug-20 | 0 | 61 | 91 | 0 | 0 | 150 | 0 | 61 | 0 | 0 | 0 | 362 |
| 26-Aug-20 | 0 | 61 | 91 | 0 | 0 | **182** | 0 | 0 | 61 | 0 | 0 | 394 |
| 28-Aug-20 | 0 | 61 | 30 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 121 |
| 29-Aug-20 | 0 | 91 | 61 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 242 |
| 30-Aug-20 | 0 | 0 | 0 | 0 | 0 | 150 | 0 | 0 | 0 | 0 | 0 | 150 |
| 03-Sep-20 | 0 | 182 | 121 | 0 | 0 | 121 | 0 | 0 | 0 | 0 | 0 | 424 |
| 04-Sep-20 | 0 | 61 | 91 | 0 | 0 | **212** | 0 | 0 | 0 | 0 | 0 | 363 |
| 05-Sep-20 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 30 |
| 06-Sep-20 | 0 | 0 | 0 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 91 |
| 07-Sep-20 | 0 | 0 | 0 | 0 | 0 | 61 | 0 | 30 | 0 | 0 | 0 | 91 |
| 08-Sep-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **182** | 0 | 0 | 0 | 182 |
| 09-Sep-20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **182** | 0 | 0 | 0 | 182 |
| **Monthly Total ($m^3$):** | | | | | | | | | | | | **Monthly Total ($m^3$)** |
| May 2020 | 144 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 174 |
| June 2020 | 61 | 0 | 3,036 | 0 | 0 | 30 | 0 | 5,269 | 0 | 0 | 0 | 8,396 |
| July 2020 | 68 | 1,429 | 1,160 | 0 | 0 | 1,518 | 91 | 545 | 0 | 0 | 0 | 4,812 |
| August 2020 | 51 | 759 | 2,129 | 0 | 0 | 2,029 | 0 | 155 | 121 | 0 | 0 | 5,244 |
| September 2020 | 0 | 242 | 212 | 0 | 0 | 515 | 0 | 394 | 0 | 0 | 0 | 1,363 |
| **Annual Totals ($m^3$):** | **324** | **2,431** | **6,568** | **0** | **0** | **4,092** | **91** | **6,363** | **121** | **0** | **0** | **19,989** |

I:\1\02\00181\65\A\Correspondence\NB21-00234 - Memo - 2020 Water Withdrawal Exceedances\[Table A.1 - Vols of Water Used for Dust Suppression.xlsx]Table A.1

**NOTES:**

1. ALL VOLUMES IN CUBIC METRES ($m^3$).
2. NO VOLUMES WITHDRAWN DURING DATES NOT LISTED.
3. DUST SUPPRESSION WATER SOURCES AS SHOWN IN TABLE 2-3 OF THE TYPE A WATER LICENCE.
4. POOLING ROAD RUNOFF ALONG LENGTH OF THE TOTE ROAD.
5. BOLD AND HIGHLIGHTED VALUES INDICATE DAILY VOLUMES THAT EXCEEDED THE SOURCE SPECIFIC DAILY WITHDRAWAL LIMIT STIPULATED IN THE TYPE A WATER LICENCE.

| REV | DATE | DESCRIPTION | PREP'D | RVW'D |
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