GOLDER
MEMBER OF WSP

TECHNICAL MEMORANDUM

DATE December 23, 2021 **Project No.** 20141194A (900)-Rev 1

TO Tara Oak, James Powell
Marathon Gold Corporation

CC Paolo Toscano

FROM Adwoa Cobbina, Peter Merry **EMAIL acobbina@golder.com**

DAM BREACH ASSESSMENT AND INUNDATION STUDY VALENTINE GOLD TAILINGS MANAGEMENT FACILITY - ADDENDUM

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Marathon Gold Corp. (Marathon) to complete a dam breach and inundation assessment for the proposed Tailings Management Facility (TMF) for the Valentine Gold Project. The TMF perimeter dam, if breached, has the potential to affect the downstream environment. In May 2021, a dam breach assessment (DBA) was performed on the TMF design (Golder 2021). At that time, information on the operation of the Victoria Dam spillway was unknown. Flow from Victoria Lake was therefore not considered in the assessment. Since then, Newfoundland (NL) Water Resources Management Division has issued comments on the lack of consideration of the flows from Victoria Lake. For this reason, the DBA has been updated (by way of this Addendum) to consider these flows.

2.0 VICTORIA DAM BACKGROUND

Prior to the construction of the Victoria Dam (1970), Victoria Lake discharged to the Exploits River system via Victoria River. Currently, under normal conditions, Victoria Lake discharges through the Victoria Control Structure (VCS) towards Burnt Pond, on the opposite side of the lake from its original outlet. The Victoria Dam contains a two-gate spillway structure which, until 1993, was the main flood control device for the Lake. However, in 1993, the use of these gates was discontinued and they are now designed for overtopping. Now, Victoria Lake handles floods principally by storage, with the VCS as the primary discharge point (NL Hydro, 2021). However, in times of high flow, occasional overtopping of the Victoria Dam Spillway can occur.

Based on the information provided from NL Hydro (2021 and also provided in Attachment 2), the maximum design flow for the Victoria Dam Spillway is 90 m^3/s (at a maximum water level of 328.01 m) under the probable maximum flood (PMF) conditions. This and other design information is summarized in Table 1 below.

Table 1: Select Victoria Lake Data - NL Hydro (2021)

Reservoir Storage Data		
Drainage Area	1,058 km^2	
Maximum Operating Level	326.05 m to 326.41 m	Varies with season. Spill occurs at 326.05 m

Reservoir Storage Data		
Storage at Maximum Operating Level	1,062 Mm^3 1,122 Mm^3	At 326.41 m At 326.05 m
Maximum Flood Level	328.01 m	
Storage at Maximum Flood Level	1,406 Mm^3	
Control Structure Data		
Number of Gates	4	
Sill Elevation	317.03	
Maximum Flow Capacity at Maximum Operating Level	193 m^3/s	
Spillway Data		
Number of Gates	2	No longer operational
Top of Gates Elevation	326.05 m	Spilling begins at this level
Maximum Flow at Maximum Operating Level	90 m^3/s	

3.0 DBA UPDATES

The Golder (2021) DBA assessed both fair-weather and flood induced conditions. Under the fair-weather scenario, it is assumed there would be no overflow from the Victoria Dam; the inundation results remain unchanged and are not assessed as a part of this technical memorandum.

Under a flood-induced scenario, the additional flows from the VLD will result in a larger inundated area under the PMF scenario previously modelled, with or without a TMF dam breach. The hydraulic model was therefore re-run for the flood induced scenario.

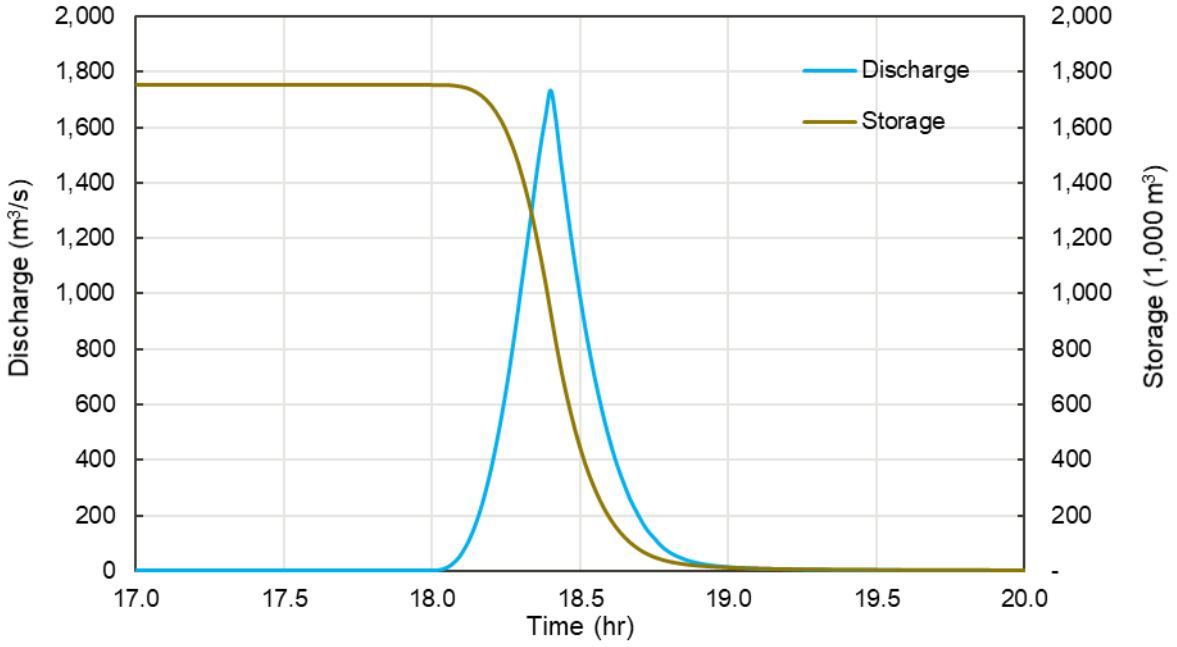
The Golder (2021) DBA looked at breaches at three potential locations (A, B and C) as shown in Figure 1. gl;gAs explained in the report, breaches in locations B and C would result in tailings release only. Only a breach at location A would result in a tailings/ water release that would flow downstream. Location A is therefore the only breach location to be revisited as it is the only one to be potentially impacted by Victoria Dam overflow. For this analysis, the tailings breach outflow remains unchanged from the Golder 2021 assessment; only the receiver flows were updated for this study.

No hydrologic assessment of the Victoria Lake flows under the PMF were conducted as a part of this study. The spillway discharge used is based on the data provided from NL Hydro (Attachment 2); No validation of this data was performed. As the spillway discharge hydrograph was not provided, it is assumed that the peak discharge from the spillway is constant throughout our simulation period.

3.1 Dam Breach Outflow

For details on the TMF dam breach parameter estimations and the calculation of the volume released, refer to Golder 2021. A summary is provided here.

The piping failure mode was considered as the most plausible mechanism of failure for Location A under flooding conditions. The peak water level in the TMF was 391.0 masl (obtained by routing the PMF). Assuming the breach occurs when water levels are at their peak, an estimated 1,750,000 m^3 of water and tailings would be released from a breach at Location A, with a peak outflow of 1,735 m^3/s. The generated outflow hydrograph is presented on Graph 1.



Graph 1: HEC-HMS TMF Location A Dam Breach Outflow Under PMF Conditions – Piping Failure

3.2 Baseline Flows in Downstream Watersheds

The baseline hydrological conditions of the downstream watersheds refer to the downstream water levels and flows along the flood path prior to dam failure. The hydrological conditions are dependent on the proposed initial conditions (i.e., flood events including PMF weather conditions). Canadian Dam Association (CDA) recommends evaluating incremental dam breach failure consequences taking into consideration initial conditions that are most likely to occur coincident with the breach event (CDA 2019).

A HEC-HMS model was developed for the Victoria River watershed, downstream the TMF dam. Subwatershed delineation was conducted using 2 m topographic contour data assisted by available online cartographic resources (NHN 2020). For modelling purposes, the watershed was divided into the following subwatershed areas:

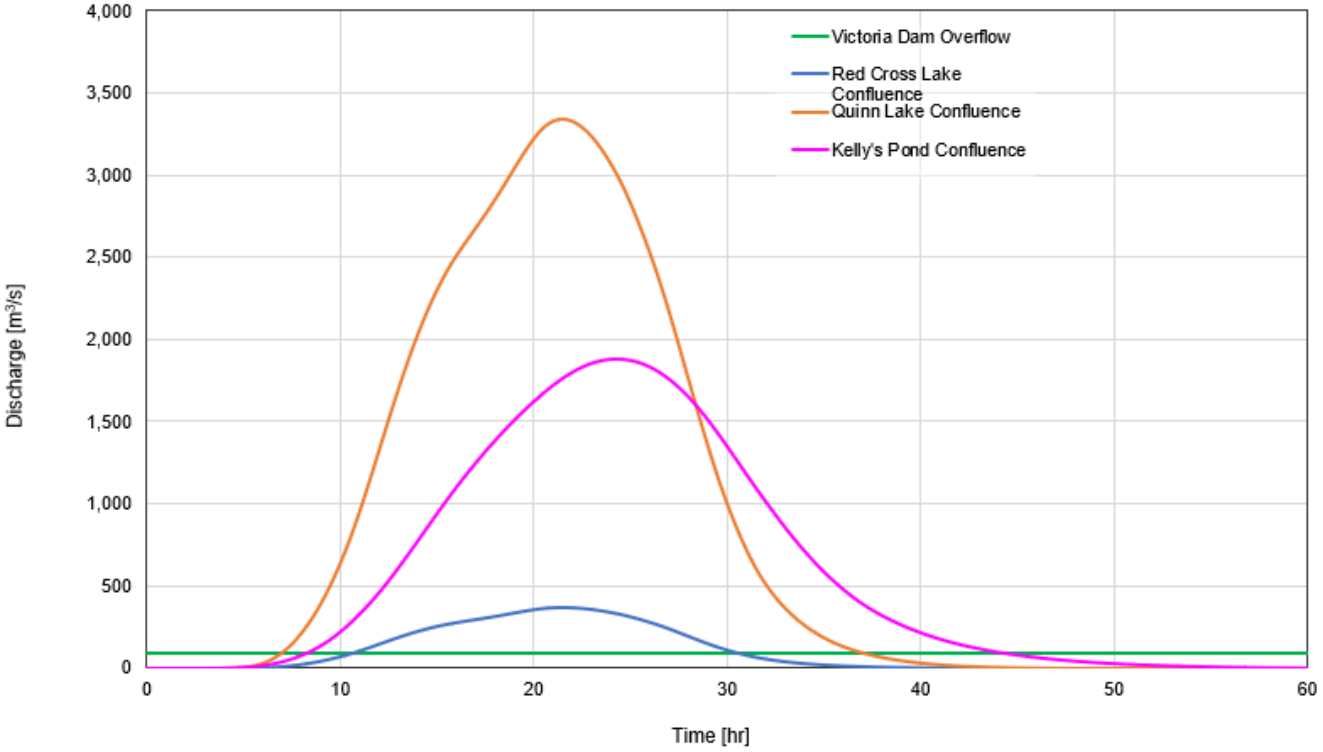
1) From the Victoria Lake catchment area (1,058 km^2).

2) From the headwaters at Victoria Lake Dam up to the confluence of Quinn Lake with an area of 580 km^2, including approximately 84 km^2 of lake surface.

3) From the confluence of Quinn Lake up to the inlet of Red Indian Lake with an area of 314 km^2, including approximately 15 km^2 of lake surface.

Figure 2 shows a map of the delineated sub-watersheds as well as the encompassing watershed of Red Indian Lake.

The generated PMF hydrographs, as shown in Graph 2, were used as inflows (i.e., natural watershed inflows to the waterways) in conjunction with the simulated TMF dam breach flood wave to assess incremental consequences of a TMF dam breach. Also included in Graph 2 is the peak discharge from Victoria Lake Dam (provided by NL Hydro – see Attachment 2), which was input as a constant flow hydrograph. The locations where the hydrographs were input in the model are shown in Figure 2.



Graph 2: PMF Lateral Inflow Hydrographs Routed at Downstream Locations Along Victoria River

3.3 Simulation Results

Maximum flood wave depth, peak flow, maximum flow velocity, maximum of the product of flood wave depth and flow velocity and peak flood wave travel time since initiation of the breach were estimated using the HEC-RAS software for the following simulations:

- Victoria River flows under a PMF event (no TMF dam breach).
- Dam breach at the TMF Location A under flood-induced conditions (Scenario A-PMF)

Tables summarizing the results at specific stations of interest are shown on the Flood Inundation Map (Figure 3). The critical points of interest within the model boundary are the Victoria Lake Dam, the dwellings and hunting lodge upstream of Station 6 and the forestry access road immediately upstream of the inlet to Red Indian Lake

(i.e., Crossing 2). These points have been identified as critical infrastructure as they hold a strong potential for loss of life if they are inundated with a high enough velocity.

Maximum depths and velocities along the flow path are shown in Figure 4 to Figure 7.

The result maps also include iterations of hazard maps (Figure 8 to Figure 14). According to the Ontario Ministry of Natural Resources (OMNR 2002), there is a risk to human life if the following are criteria are exceeded:

- Maximum water depth (threshold value = 0.8 m)
- Maximum flow velocity (threshold value = 1.7 m/s)
- Maximum depth multiplied by flow velocity (threshold value = 0.37 m^2/s)

Results Summary

The following is interpreted from the DBA results:

- The initial release volume for the PMF-induced dam breach is 1.75 Mm^3, which represents approximately 0.5% of the PMF baseline no-dam failure runoff volume (351 Mm^3) at the Red Indian Lake inlet.
- The peak water flow at the inlet of Red Indian Lake under a PMF-induced TMF dam breach is about 4,345 m^3/s compared to a no-dam failure flow of 4,319 m^3/s (an incremental increase of 25 m^3/s).
- The peak outflow from the PMF breach scenario will attenuate by 56% after having travelled a distance of 1.6 km (TMF dam breach peak discharge of 1,735 m^3/s compared with an incremental peak flow of 769 m^3/s at Station 1).
- With the addition of the Victoria Lake Dam spillway overflow under the PMF event, there is now temporary ponding at the downstream toe of the Victoria Lake Dam under both the TMF breach and no breach scenarios. The incremental increase in maximum water depth at the toe of the dam is less than 0.01 m.
- Crossings 1 and 2, as well as the dwellings and hunting lodge will be inundated under the PMF event with or without a dam breach.
- The arrival time of the flood wave at the Victoria Dam is 0 hours from the time of the breach (i.e., no perceptible increase in depth). The arrival time of the flood wave at the dwellings and hunting lodge is just under 10 hours from the time of the breach. The arrival time of the flood wave at the Red Indian Lake is approximately 11 hours from the time of the breach.
- Under the PMF scenario with a TMF dam breach, the incremental risk to human life does not exceed the threshold value of 0.37 m^2/s at locations outside riverbanks; the breach has no incremental impact on critical points of interest.

4.0 SUMMARY

The Valentine DBA and this update provide useful information to identify hazards and consequences from a hypothetical failure and release of water and tailings from the proposed TMF dam. The present study will support the emergency response planning and verify the Failure Consequence Classification of the dam following CDA guidelines.

The conclusions of this update are as follows:

- The downstream toe of Victoria Lake Dam, Crossings 1 and 2, as well as the dwellings and hunting lodge will be inundated under the PMF event with or without a dam breach.
- Incremental risk to human life does not exceed the threshold value of 0.37 m^2/s at locations outside riverbanks; the breach has no incremental impact on critical points of interest.
- Downstream of the TMF, no potential loss of life or critical infrastructure is anticipated due to the breach failure of Location A incrementally under the PMF scenario.

5.0 UPDATES TO THE HAZARD POTENTIAL CLASSIFICATION

Based on the results of the May DBA (Golder 2021), a VERY HIGH Hazard Potential Classification (HPC) was selected for the proposed Valentine Gold Project TMF dam. This was based on anticipated impacts of hypothetical dam failure in terms of loss of life, financial loss, and environmental and cultural damage in accordance with CDA Dam Safety Guidelines (CDA 2019). Table 2 serves as the basis for establishing the classification of dams according to the CDA Dam Safety Guidelines.

Table 2: Dam Classification (CDA 2013)

Dam Class	Population at Risk	Incremental Losses		
		Loss of Life	Environmental and Cultural Values	Infrastructure and Economics
Low	None	Nil	Minimal short-term No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss of marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of important fish or wildlife habitat Restoration or compensation in kind is highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very High	Permanent	100 or fewer	Significant loss or deterioration of critical fish or wildlife habitat Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities, for dangerous substances)

Dam Class	Population at Risk	Incremental Losses		
		Loss of Life	Environmental and Cultural Values	Infrastructure and Economics
Extreme	Permanent	More than 100	Major loss of critical fish or wildlife habitat Restoration or in kind impossible	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances)

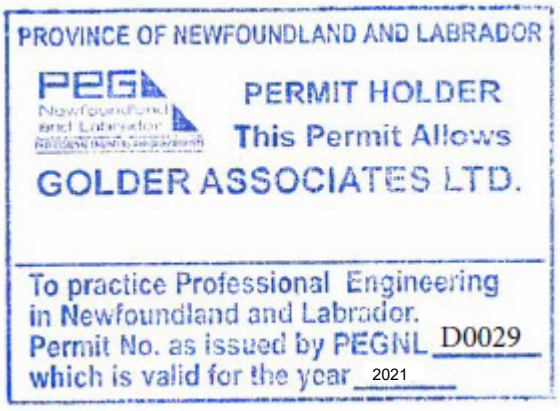
The analyse herein indicates no additional increase in risk to human life, the environment or infrastructure. Therefore, the HPC remains unchanged.

6.0 CLOSING

We trust this memorandum meets your needs at this time. Please do not hesitate to contact the undersigned for any questions or concerns.

Adwoa Cobbina, M.A. Sc.
Water Resources Specialist
AC/WPM/ms

Peter Merry, P.Eng. NL
Principal, Project Director



Attachment 1:Figures 1-14
Attachment 2:Victoria Lake and Victoria Dam Information

REFERENCES

CDA (2019). Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams, 2019.

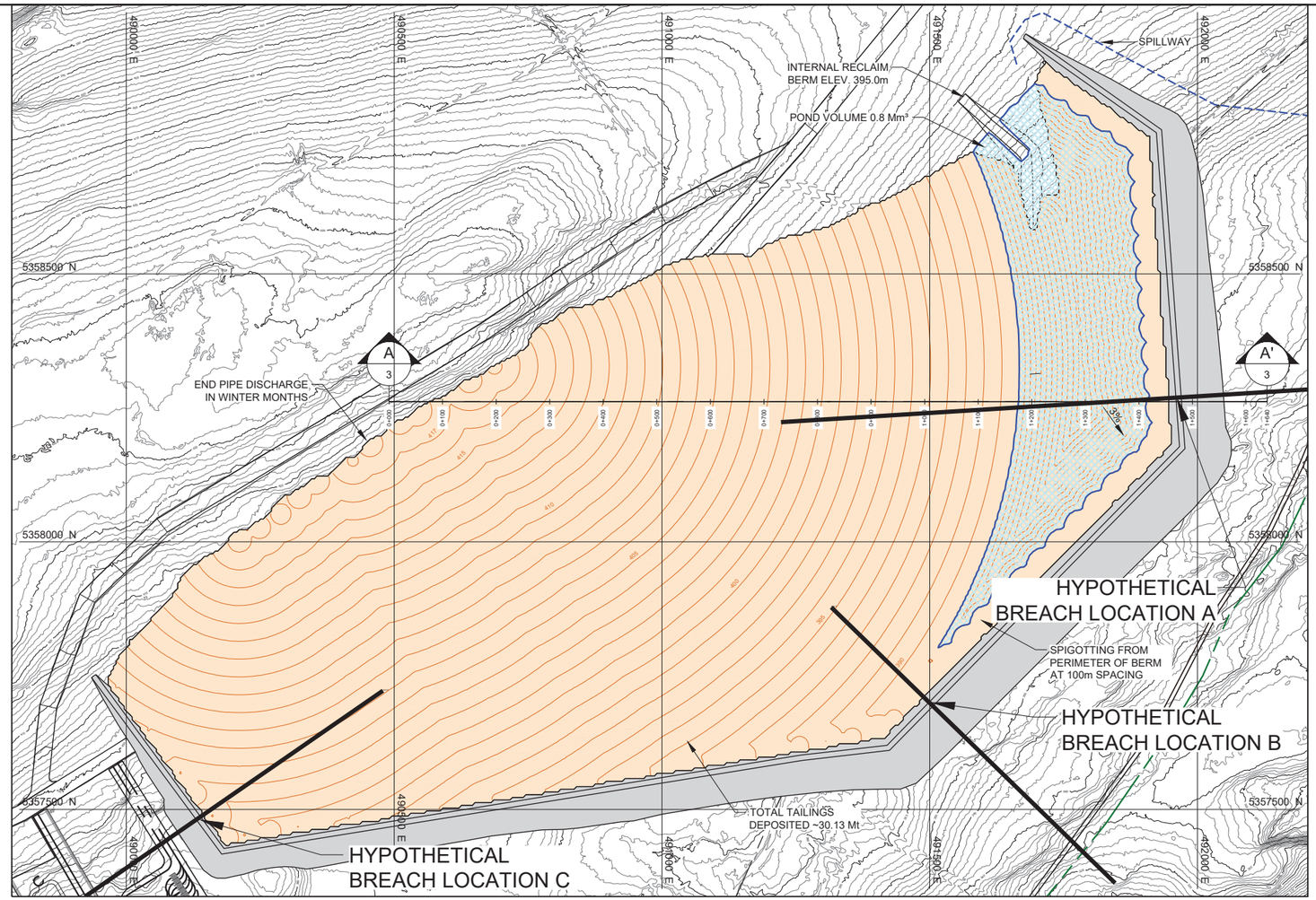
Golder Associates Ltd. (2021). Dam Breach Assessment and Inundation Study – Valentine Gold Project. Rev B. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. May 2021. Re-issued as Rev 0 on December 23, 2021.

NL Hydro (2021). Background data Victoria Lake and Victoria Dam design and operating data. Provided by email on November 19, 2021.

OMNR (2002). Ontario Ministry of Natural Resources, Technical Guide – River and Stream Systems: Flooding Hazard Limit 2002.

ATTACHMENT 1

Figures 1 -14



PLAN VIEW - DEPOSITION PLAN - END OF STAGE 6

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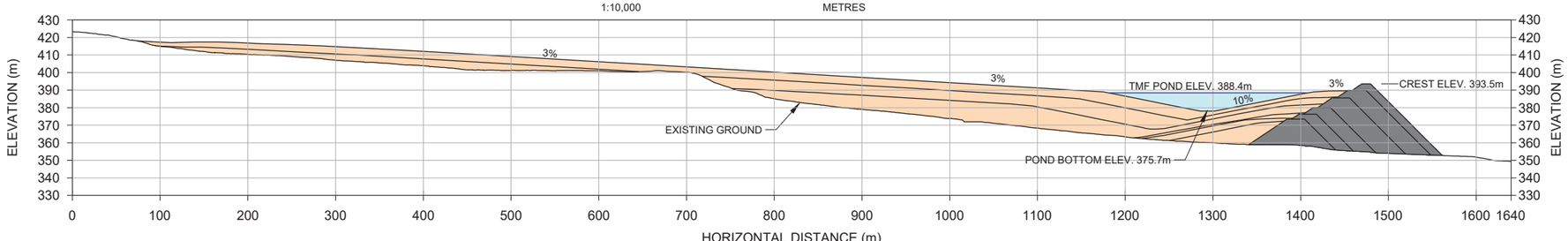

SCALE 1:6,000 m
VERT. SCALE 1:3,000m

A
3

PROFILE B - B' - END OF STAGE 6

NOTE:

1. TYPICAL TMF POND VOLUMES AND CHARACTERISTICS WERE SELECTED FOR THE DEPOSITION MODELLING. TMF POND VOLUMES WILL FLUCTUATE SEASONALLY UP TO A MAXIMUM OF 388.4m DEPENDING ON THE OPERATIONAL MONTH.

REFERENCE

1. GROUND CONTOURS WERE PROVIDED BY CLIENT. FILENAME MRG_01_Valentine_Mine_Survey_Data_ Delievery.ZIP, DATED 11/6/2019.

CLIENT
MARATHON GOLD

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2020-03-30
DESIGNED	MS
PREPARED	TDR
REVIEWED	AC
APPROVED	WPM

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
GENERAL ARRANGEMENT - TMF ULTIMATE STAGE

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0001	0	1

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5400000 5390000 5380000 5370000 5360000 5350000 5340000

Red Indian Lake Inlet

Confluence - Bobbys Pond

Confluence - Kellys Pond

Red Indian Lake

Confluence - Quinn Lake

Confluence - Valentine Lake and Long Lake

Confluence - Red Cross Lake

Victoria Lake Dam

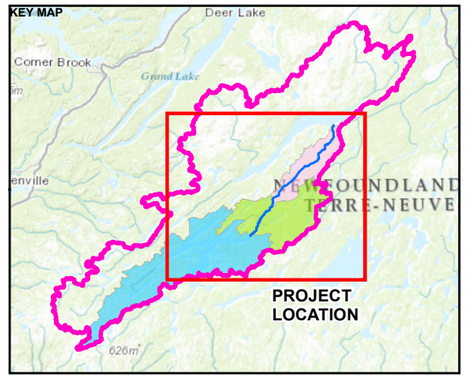
Victoria Lake

LEGEND

HYDROGRAPH INPUT LOCATIONS

- CONFLUENCE - KELLY'S POND
- CONFLUENCE - QUINN LAKE
- CONFLUENCE - RED CROSS LAKE
- VICTORIA LAKE DAM
- VICTORIA RIVER
- TAILINGS MANAGEMENT FACILITY
- VICTORIA LAKE SUBCATCHMENT
- VICTORIA RIVER - DOWNSTREAM QUINN LAKE, LONG LAKE AND VALENTINE LAKE CONFLUENCE
- VICTIRIA RIVER - QUINN LAKE, LONG LAKE AND VALENTINE LAKE CONFLUENCE
- RED INDIAN LAKE WATERSHED

KEY MAP



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REFERENCE(S)

1. BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

MODELLED VICTORIA RIVER SUBWATERSHED AREAS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
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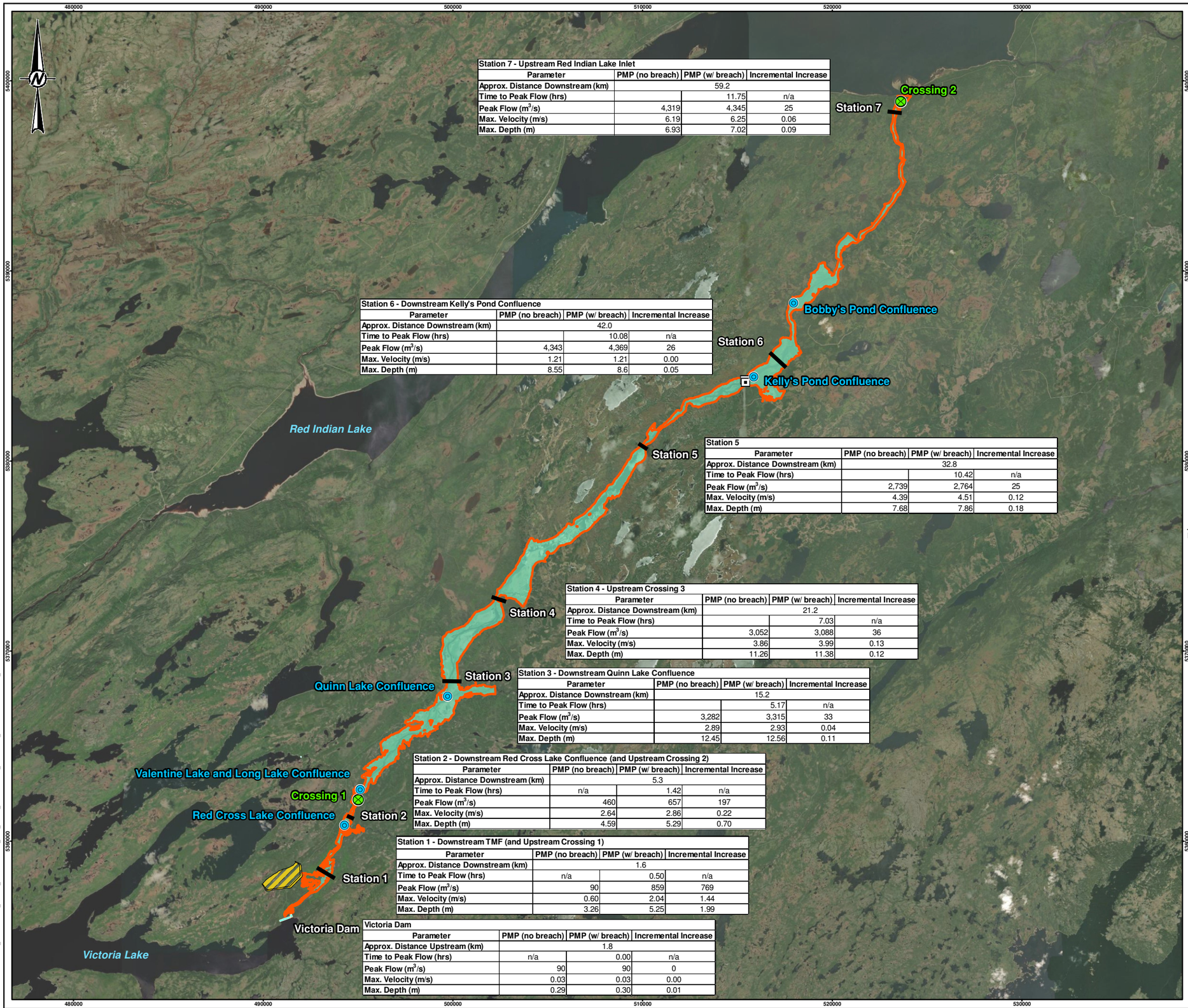

Station 7 - Upstream Red Indian Lake Inlet			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		59.2	
Time to Peak Flow (hrs)		11.75	n/a
Peak Flow (m^3/s)	4,319	4,345	25
Max. Velocity (m/s)	6.19	6.25	0.06
Max. Depth (m)	6.93	7.02	0.09

Station 6 - Downstream Kelly's Pond Confluence			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		42.0	
Time to Peak Flow (hrs)		10.08	n/a
Peak Flow (m^3/s)	4,343	4,369	26
Max. Velocity (m/s)	1.21	1.21	0.00
Max. Depth (m)	8.55	8.6	0.05

Station 5			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		32.8	
Time to Peak Flow (hrs)		10.42	n/a
Peak Flow (m^3/s)	2,739	2,764	25
Max. Velocity (m/s)	4.39	4.51	0.12
Max. Depth (m)	7.68	7.86	0.18

Station 4 - Upstream Crossing 3			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		21.2	
Time to Peak Flow (hrs)		7.03	n/a
Peak Flow (m^3/s)	3,052	3,088	36
Max. Velocity (m/s)	3.86	3.99	0.13
Max. Depth (m)	11.26	11.38	0.12

Station 3 - Downstream Quinn Lake Confluence			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		15.2	
Time to Peak Flow (hrs)		5.17	n/a
Peak Flow (m^3/s)	3,282	3,315	33
Max. Velocity (m/s)	2.89	2.93	0.04
Max. Depth (m)	12.45	12.56	0.11

Station 2 - Downstream Red Cross Lake Confluence (and Upstream Crossing 2)			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		5.3	
Time to Peak Flow (hrs)	n/a	1.42	n/a
Peak Flow (m^3/s)	460	657	197
Max. Velocity (m/s)	2.64	2.86	0.22
Max. Depth (m)	4.59	5.29	0.70

Station 1 - Downstream TMF (and Upstream Crossing 1)			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Downstream (km)		1.6	
Time to Peak Flow (hrs)	n/a	0.50	n/a
Peak Flow (m^3/s)	90	859	769
Max. Velocity (m/s)	0.60	2.04	1.44
Max. Depth (m)	3.26	5.25	1.99

Victoria Dam			
Parameter	PMP (no breach)	PMP (w/ breach)	Incremental Increase
Approx. Distance Upstream (km)		1.8	
Time to Peak Flow (hrs)	n/a	0.00	n/a
Peak Flow (m^3/s)	90	90	0
Max. Velocity (m/s)	0.03	0.03	0.00
Max. Depth (m)	0.29	0.30	0.01

LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY
- INUNDATION BOUNDARY (PMF BREACH)
- INUNDATION BOUNDARY (PMF NO BREACH)

0 5,000 10,000

1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
3. THE DAM BREACH ANALYSIS AND INUNDATION MAPS ARE BASED ON THE DIGITAL ELEVATION MODEL (DEM) GENERATES USING THE 10 M CONTOURS DEVELOPED BY THE GOVERNMENT OF NEWFOUNDLAND AND 1 M CONTOURS DEVELOPED BY AETHON AERIAL SOLUTIONS (2019). THE INUNDATION MAPS ARE INTENDED TO GUIDE THE DEVELOPMENT OF OVERALL EMERGENCY RESPONSE PLANS AND THE ASSESSMENT OF THE CONSEQUENCE OF DAM FAILURE; THE ACCURACY OF THE PREDICTED INUNDATION ZONES REFLECTS THIS PURPOSE.
4. UNCERTAINTY IN THE MOBILIZED FLUID VOLUMES AND THEIR RHEOLOGICAL PROPERTIES LEADS TO UNCERTAINTY IN THE DELINEATION OF INUNDATED AREAS AND FLOW PROPERTIES AT ANY GIVEN LOCATION; GOLDER HAS FOLLOWED ACCEPTED PRACTICES TO ADDRESS UNCERTAINTY, HOWEVER, RESIDUAL UNCERTAINTY REMAINS.

REFERENCE(S)

1. BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

INUNDATION AREA OF SIMULATED PMF BREACH AND NO BREACH SCENARIOS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
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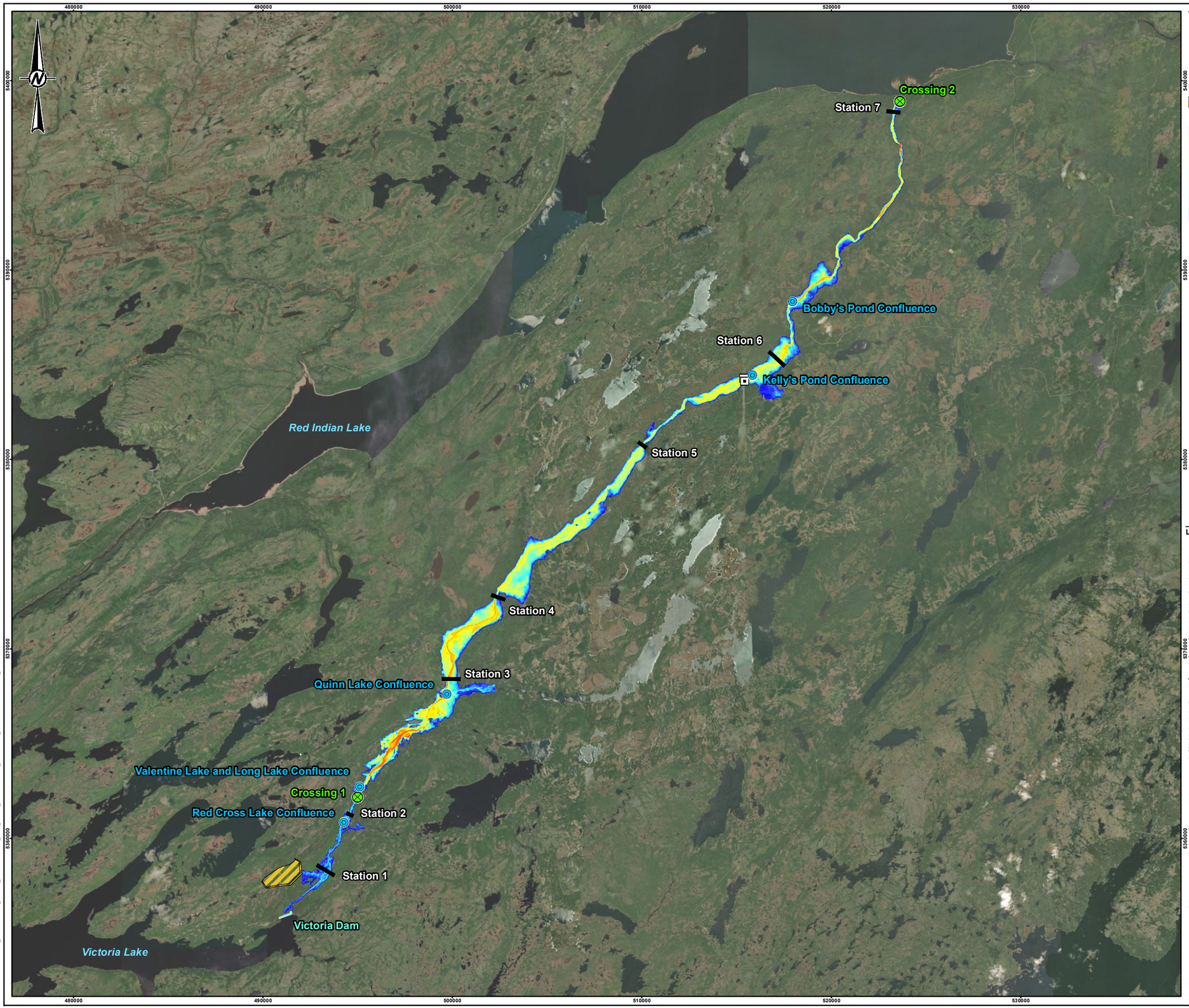

LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

MAXIMUM DEPTH (m)
HIGH : 14
LOW : 0

0 5,000 10,000
1:200,000 METRES

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REFERENCE(S)

1. BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
MAXIMUM DEPTH FOR PMF BREACH SCENARIO

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	4

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-DM-0003.mxd PRINTED ON: 2021-12-17 AT 12:24:59 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

480000
490000
500000
510000
520000
530000
5400000
5390000
5380000
5370000
5360000

Crossing 2
Station 7
Bobby's Pond Confluence
Station 6
Kelly's Pond Confluence
Red Indian Lake
Station 5
Station 4
Station 3
Quinn Lake Confluence
Valentine Lake and Long Lake Confluence
Crossing 1
Red Cross Lake Confluence
Station 2
SEE TAILINGS MANAGEMENT FACILITY INSET
Station 1
Victoria Dam
Victoria Lake

TAILINGS MANAGEMENT FACILITY INSET

Station 1
Victoria Dam

INCREMENTAL DIFFERENCE, MAXIMUM DEPTH (m)
High : 6.2
Low : 0
0
500
1,000
METRES

LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

INCREMENTAL DIFFERENCE, MAXIMUM DEPTH (m)
HIGH : 6.2
LOW : 0

0 5,000 10,000
1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
3. THE DAM BREACH ANALYSIS AND INUNDATION MAPS ARE BASED ON THE DIGITAL ELEVATION MODEL (DEM) GENERATES USING THE 10 M CONTOURS DEVELOPED BY THE GOVERNMENT OF NEWFOUNDLAND AND 1 M CONTOURS DEVELOPED BY AETHON AERIAL SOLUTIONS (2019). THE INUNDATION MAPS ARE INTENDED TO GUIDE THE DEVELOPMENT OF OVERALL EMERGENCY RESPONSE PLANS AND THE ASSESSMENT OF THE CONSEQUENCE OF DAM FAILURE; THE ACCURACY OF THE PREDICTED INUNDATION ZONES REFLECTS THIS PURPOSE.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
INCREMENTAL DIFFERENCE IN MAXIMUM INUNDATION DEPTH BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	5

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CM-4004.mxd PRINTED ON: 2021-12-17 AT 12:25:09 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

480000 490000 500000 510000 520000 530000

5400000 5390000 5380000

Crossing 2
Station 7
Bobby's Pond Confluence
Station 6
Kelly's Pond Confluence
Red Indian Lake
Station 5
Station 4
Station 3
Quinn Lake Confluence
Valentine Lake and Long Lake Confluence
Crossing 1
Red Cross Lake Confluence
Station 2
SEE TAILINGS MANAGEMENT FACILITY INSET
Station 1
Victoria Dam
Victoria Lake

TAILINGS MANAGEMENT FACILITY INSET

Station 1
Victoria Dam

MAXIMUM VELOCITY
HIGH : 40
LOW : 2

0 500 1,000
METRES

LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

MAXIMUM VELOCITY (m/s)
HIGH :>40
LOW : 0

0 5,000 10,000
1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
MAXIMUM VELOCITY FOR PMF BREACH SCENARIO

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	6

PATH: S:\Clients\Marathon_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CM-6005.mxd PRINTED ON: 2021-12-17 AT 12:25:28 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

480000 490000 500000 510000 520000 530000

5400000 5390000 5380000 5370000 5360000

Crossing 2
Station 7
Bobby's Pond Confluence
Station 6
Kelly's Pond Confluence
Red Indian Lake
Station 5
Station 4
Station 3
Quinn Lake Confluence
Valentine Lake and Long Lake Confluence
Crossing 1
Red Cross Lake Confluence
Station 2
SEE TAILINGS MANAGEMENT FACILITY INSET
Station 1
Victoria Dam
Victoria Lake

TAILINGS MANAGEMENT FACILITY INSET

Red Cross Lake Confluence
Station 1
Victoria Dam

INCREMENTAL DIFFERENCE, MAXIMUM VELOCITY (m/s)
High : 40
Low : 0
0 1,000 2,000
METRES

LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

INCREMENTAL DIFFERENCE, MAXIMUM VELOCITY (m/s)

High : 40

Low : 0

0 5,000 10,000

1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
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REFERENCE(S)

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

INCREMENTAL DIFFERENCE IN MAXIMUM VELOCITY BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

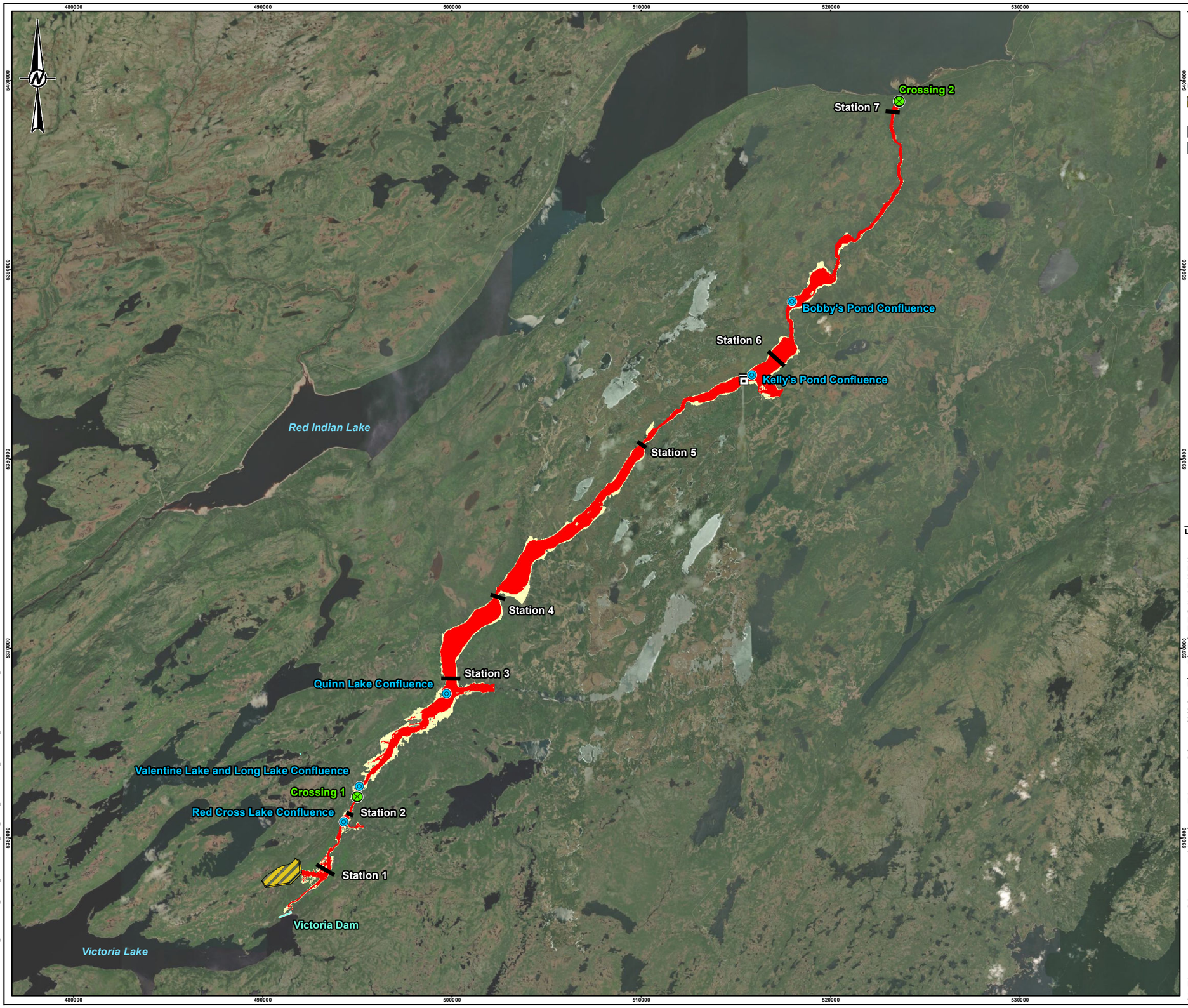
PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PRINTED ON: 2021-12-17 AT: 12:27:29 PM

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CIM-0006.mxd



LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

MAXIMUM DEPTH * VELOCITY m^2/s

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 5,000 10,000

1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

HAZARD MAP FOR PMF BREACH SCENARIO

CONSULTANT

GOLDER
MEMBER OF WSP

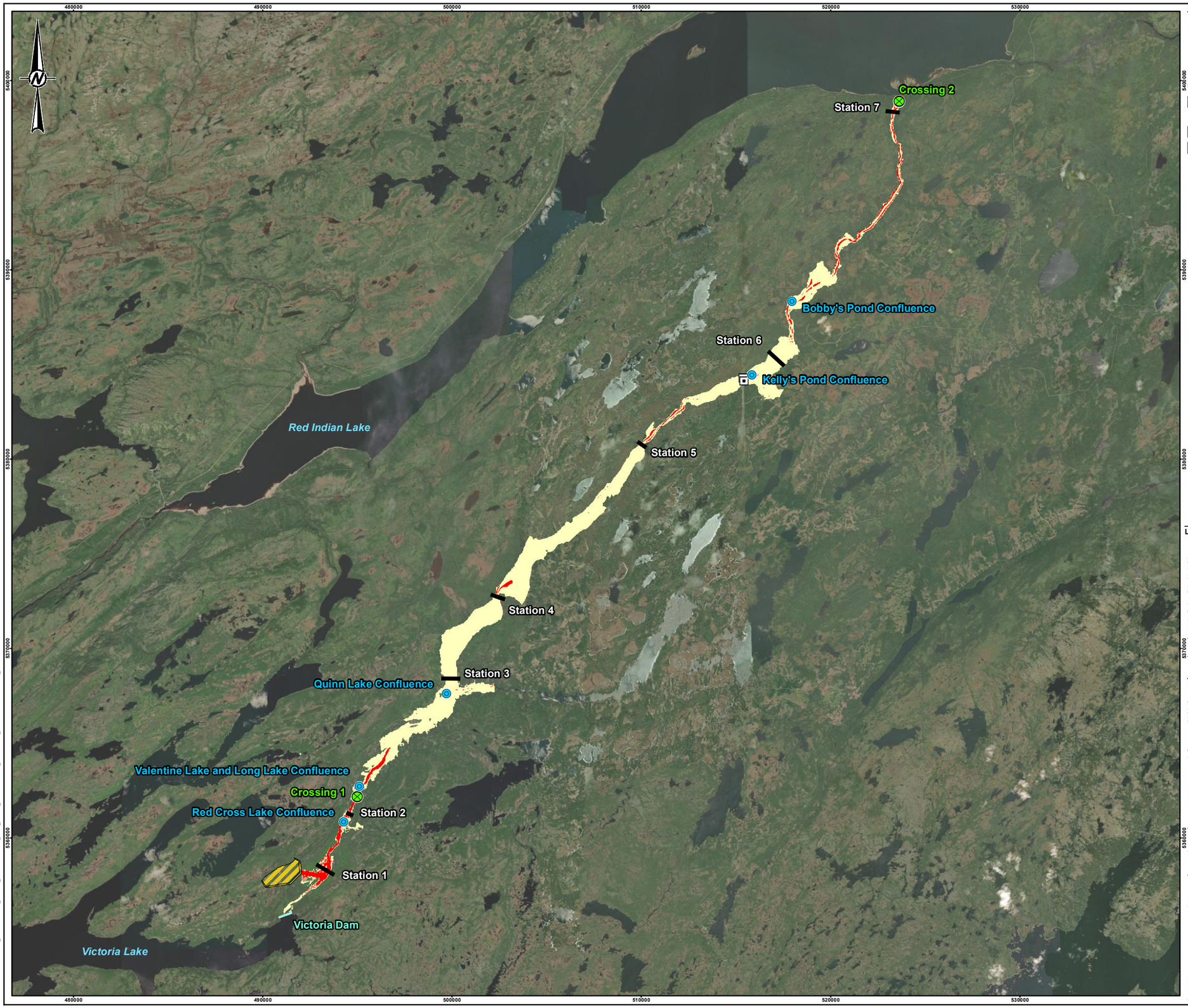
YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	8

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CM-0007.mxd PRINTED ON: 2021-12-17 AT 12:25:57 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm



LEGEND

- DWELLING/LODGE
- CROSSING
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION
- TAILINGS MANAGEMENT FACILITY

INCREMENTAL DIFFERENCE, MAXIMUM DEPTH*VELOCITY m^2/s

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 5,000 10,000

1:200,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
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REFERENCE(S)

1. BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

INCREMENTAL DIFFERENCE IN HAZARD MAP BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	9

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CM-009.8.mxd PRINTED ON: 2021-12-17 AT 12:26:08 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

LEGEND

- POLISHING POND
- PLANT SITE INFRASTRUCTURE

MAXIMUM DEPTH * VELOCITY (m^2/s)

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 250 500

1:6,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

INCREMENTAL DIFFERENCE IN HAZARD MAP BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS NEAR VICTORIA DAM

CONSULTANT

GOLDER
MEMBER OF WSP

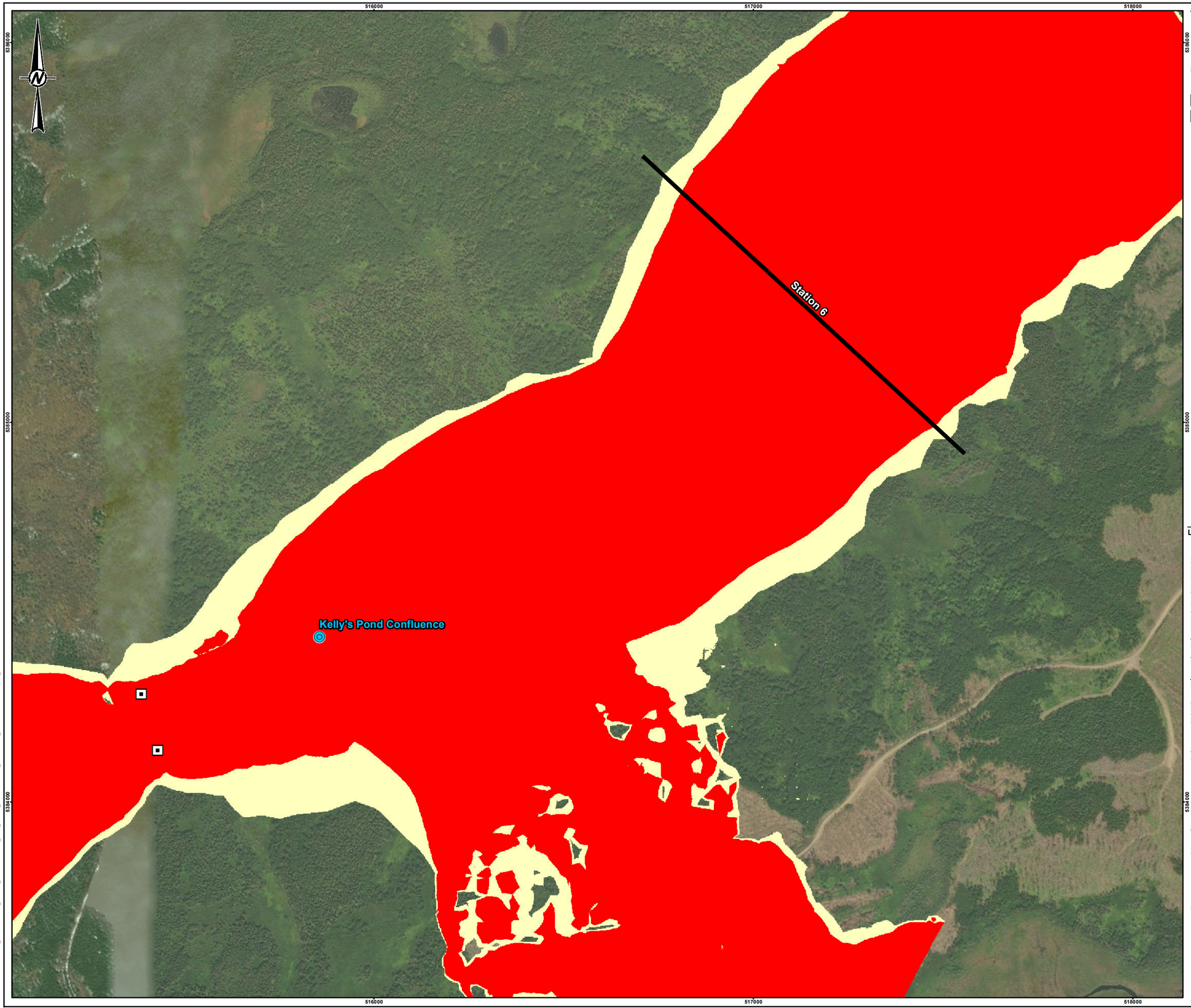
YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	10

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_Inundation\Addendum\20141194-0005-CM-0009.mxd PRINTED ON: 2021-12-17 AT: 12:26:15 PM



LEGEND

- DWELLING/LODGE
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION

MAXIMUM DEPTH * VELOCITY (m^2/s)

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 250 500

1:10,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

HAZARD MAP FOR PMF BREACH SCENARIO AROUND DWELLINGS / LODGE

CONSULTANT

GOLDER
MEMBER OF WSP

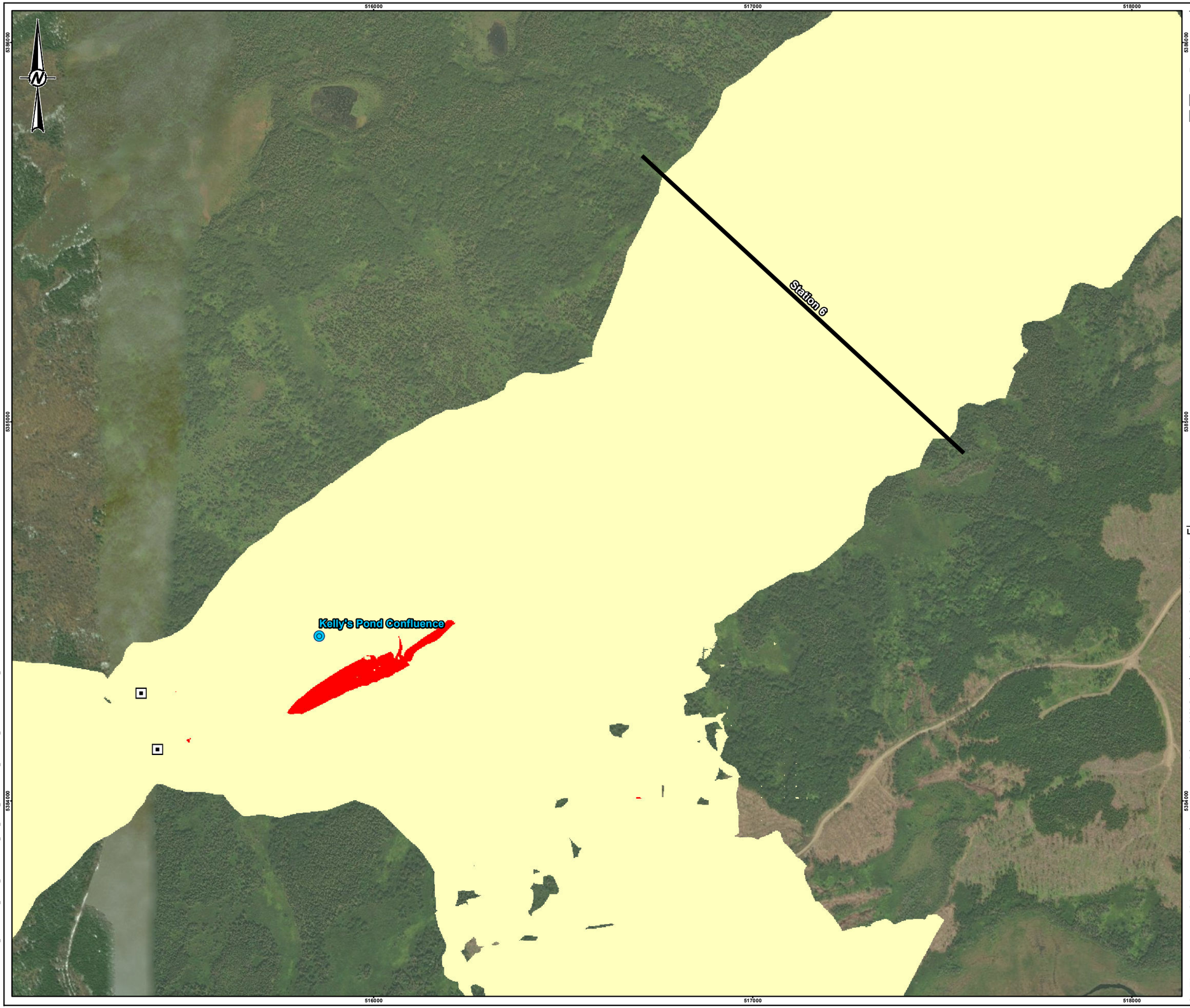
YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	11

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_Inundation\Addendum\20141194-0005-GM-0010.mxd PRINTED ON: 2021-12-17 AT 12:26:27 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm



LEGEND

- DWELLING/LODGE
- VICTORIA RIVER CONFLUENCE
- STATION PROFILE LOCATION

INCREMENTAL DIFFERENCE, MAXIMUM DEPTH*VELOCITY (m^2/s)

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 250 500

1:10,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
3. THE DAM BREACH ANALYSIS AND INUNDATION MAPS ARE BASED ON THE DIGITAL ELEVATION MODEL (DEM) GENERATES USING THE 10 M CONTOURS DEVELOPED BY THE GOVERNMENT OF NEWFOUNDLAND AND 1 M CONTOURS DEVELOPED BY AETHON AERIAL SOLUTIONS (2019). THE INUNDATION MAPS ARE INTENDED TO GUIDE THE DEVELOPMENT OF OVERALL EMERGENCY RESPONSE PLANS AND THE ASSESSMENT OF THE CONSEQUENCE OF DAM FAILURE; THE ACCURACY OF THE PREDICTED INUNDATION ZONES REFLECTS THIS PURPOSE.
4. UNCERTAINTY IN THE MOBILIZED FLUID VOLUMES AND THEIR RHEOLOGICAL PROPERTIES LEADS TO UNCERTAINTY IN THE DELINEATION OF INUNDATED AREAS AND FLOW PROPERTIES AT ANY GIVEN LOCATION; GOLDER HAS FOLLOWED ACCEPTED PRACTICES TO ADDRESS UNCERTAINTY, HOWEVER, RESIDUAL UNCERTAINTY REMAINS.

REFERENCE(S)

1. BASE IMAGERY - SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT

MARATHON GOLD CORPORATION

PROJECT

DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE

INCREMENTAL DIFFERENCE IN HAZARD MAP BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS AROUND DWELLINGS / LODGE

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	12

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: S:\Clients\Marathon_Gold\Valentine_Gold\99_PROJ\20141194_Dam_Breach_Assessment\40_PROD\0005_DamBreachAssessment_InundationAddendum\20141194-0005-CM-0011.mxd PRINTED ON: 2021-12-17 AT 12:26:36 PM

LEGEND

- CROSSING
- STATION PROFILE LOCATION
- EXPECTED INUNDATION DOWNSTREAM

MAXIMUM DEPTH * VELOCITY m^2/s

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 500 1,000

1:15,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
HAZARD MAP FOR PMF BREACH SCENARIO NEAR CROSSING NO. 2

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	13

LEGEND

- CROSSING
- STATION PROFILE LOCATION
- EXPECTED INUNDATION DOWNSTREAM

INCREMENTAL DIFFERENCE, MAXIMUM DEPTH*VELOCITY m^2/s

- 0 - 0.37 (SAFE)
- GREATER THAN OR EQUAL TO 0.37 (UNSAFE)

0 500 1,000

1:15,000 METRES

LIMITATIONS

1. THE FOLLOWING LIMITATIONS APPLY TO ALL INUNDATION FIGURES.
2. THE INUNDATION MAPS MUST BE READ AND INTERPRETED IN CONJUNCTION WITH THE DAM BREACH ASSESSMENT TECHNICAL MEMO, ASSUMPTIONS, AND LIMITATIONS.
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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 21

CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY ADDENDUM - VALENTINE GOLD TAILINGS MANAGEMENT FACILITY

TITLE
INCREMENTAL DIFFERENCE IN HAZARD MAP BETWEEN THE PMF BREACH AND PMF NO BREACH SCENARIOS NEAR CROSSING NO. 2

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-17
DESIGNED	CGE
PREPARED	RRD
REVIEWED	MAR
APPROVED	SK

PROJECT NO.	CONTROL	REV.	FIGURE
20141194A	0005	0	14

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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ATTACHMENT 2

Victoria Lake and Victoria Dam Information

(as provided by Newfoundland Hydro by email on November 19, 2021)

2.3.1.1 Overview

The spillway gates at Victoria Dam have been modified so that they can no longer be operated as they would release an unacceptable amount of water into the Exploits River System. The modifications included strengthening the skin plates and providing air pipes so that the gates can be overtopped without damage. During summer, the MOL is above the top of the spillway gates.

When System Operations sees that releases may be required over an overflow spillway or through spillway gates, notifications must be made to both internal and external stakeholders as defined *Releases of Water From Spillway Structures, Operation Standard Instruction 060*. System Operations prepares an internal notification and a draft public advisory using text suggested in Appendix C, and sends it to Corporate Communications for release. Revised notifications are made once the releases actually commence and periodically thereafter when the spill situation changes or to indicate ongoing spill conditions.

Victoria Lake handles floods principally by storage with some overflow of the gates and outflow through the Victoria Control Structure after the peak flood inflow has passed. Adequate storage capacity must be ensured in the reservoir for flood control. Figure 2.1 shows the MOLs for Victoria Reservoir during the winter (December to March) for different snow accumulations (mm of water equivalent). If Victoria is at or below these levels, it can handle the probable maximum flood (PMF).

At other times of the year, Victoria Lake can handle the PMF at higher levels. If a spring, summer or fall PMF occurs it can be handled with initial reservoir elevations at the MOLs indicated in Figure 2.2.

A fuse plug is provided in the Burnt Canal. It was designed to erode in a flow event with a return period more remote than approximately 1:10,000 years. If it erodes, water can be released from Victoria and then through the canal until the Victoria Reservoir returns to its MOL.

The Victoria Control Structure gates are normally closed at the start of a storm and kept closed until the level in Burnt Pond returns to MOL (314.76 m). As soon as possible, however, the Victoria Control Structure gates should be opened to pass the excess water from Victoria out through Burnt Spillway; Burnt Spillway is used to spill water from Victoria Lake. Burnt Spillway should remain open until Victoria Lake reaches its MOL shown in Figure 2.1 or 2.2. Small floods can be handled by a combination of storage and outflow through Burnt Canal and it will not be necessary to open Burnt Spillway.

2.3.1.2 Flood Handling Procedures

The flood handling procedures are listed below. These procedures apply at all times of the year.

1. Early in a major storm, the Victoria Control Structure gates should be closed to permit Burnt Pond to handle its inflows only. Granite Canal GS production should be increased during this period in anticipation of the flow that will enter into Granite Lake from Burnt.

   Burnt Spillway gates should be operated as required to keep Burnt Pond at or below its MOL of 314.76 m at the Burnt Bridge. Partial gate openings are only permitted until the gates are 50 percent open. Once both gates are 50 percent open, then next operation must be to open the gates to 100 percent open to prevent damage to the gate structure.

2. If Burnt Pond continues to rise above its MOL with all spillway gates open, the emergency plan must be implemented (Section 2.3.1.4). If water levels exceed 316.06 m (the trigger elevation for the fuse plug), the fuse plug will begin to erode, and loss of the plug is imminent.

3. If the water levels in Burnt Pond do not rise high enough to trigger the fuse plug, the Victoria Control Structure gates should be opened when Burnt Pond returns to its MOL. The gates should be kept open to draw Victoria down to its MOL without causing Burnt Pond to rise above its MOL.

4. Spilling should continue through Burnt spillway until Burnt Pond is back to its MOL and Victoria Reservoir is at the appropriate level of Figure 2.1 or 2.2.

2.3.1.5 Surcharging Victoria Lake Reservoir

The storage volume used in Victoria Lake Reservoir for PMF control can be used in flood control of smaller storms and during the spring runoff period provided the following guidelines are followed:

1. Victoria Lake Reservoir can be surcharged by up to 16 Mm^3 (approximately 0.10 m) above the MOL provided in Figure 2.2 which is the full release capability of four gates at the Victoria Control Structure for a one day period. When the MOL is high, surcharge is limited because water will spill over the spillway gates.

2. Careful attention shall be paid to the long range weather forecast for the Bay d'Espoir and Burgeo areas. If heavy rainfall is forecast then Victoria Control Structure must be operated to release all surcharged water prior to the start of the storm.

3. Water released from Victoria Control Structure due to an impending storm must also be released at the Burnt Dam Spillway if Burnt Pond is at or above its MOL. The net effect

January 13, 2015

of these releases must be that Burnt Pond and Victoria are not above their respective MOLs at the start of a major storm.

The Victoria Control Structure is used to release water from the reservoir through the Victoria Canal to Burnt Pond. The lag time from the control structure to Burnt Dam under normal conditions is approximately 8 hours. The control structure contains four gates with a total discharge capability of approximately 200 m^3/s at the Maximum Flood Level of 328.01 m. The gates can only be fully opened or closed; they cannot be partially opened.

2.1.1 Victoria Lake Reservoir

The Victoria Lake Reservoir is on the eastern edge of the Long Range Mountains and is the furthest upstream reservoir from the Bay d'Espoir Plant. The enclosed drawing tilted 'Newfoundland and Labrador Hydro Bay d'Espoir Development' shows a layout of the complete reservoir system. It was established in 1970 by the construction of Victoria Dam at the outlet of Victoria Lake, where Victoria Lake discharged into the Exploits River System.

The Victoria Dam contains a two gate spillway structure which up to 1993 was the main flood control device for the reservoir. However, in 1993 the use of these gates was discontinued and they are now designed for overtopping. The main flood control for the reservoir is now through use of flood storage and a small amount of discharge over the top of the gates. The detailed flood control procedures are provided in Section 2.3.1.

VICTORIA LAKE RESERVOIR*		
RESERVOIR STORAGE DATA		
Drainage Area	1058 km^2	
Low Supply Level**	318.15 m	Level at which a flow of 34 m^3/s can be maintained
Maximum Operating Level	326.05m to 326.41 m	Varies with season - refer to Figures 2.1 and 2.2 (spill occurs at 326.05 m)
Storage at Maximum Operating Level	1122 Mm^3 1062 Mm^3	At 326.41m. At 326.05 m. Varies with season
Maximum Flood Level	328.01 m	
Storage at Maximum Flood Level	1406 Mm^3	
CONTROL STRUCTURE DATA		
Number of Gates	4	
Sill Elevation	317.03 m	Upstream canal invert
Maximum Flow Capacity at Low Supply Level	34 m^3/s	
Maximum Flow Capacity at Maximum Operating Level	193 m^3s	
Canal Length	3650 m	
SPILLWAY DATA		
Number of Gates	2	Modified to no longer be operable
Top of Gates Elevation	326.05 m	Spilling begins at this level
Maximum Flow at Maximum Flood Level	90 m^3/s	

*As a result of datum changes, the elevations related to Victoria Lake as shown here and referenced within the text, are 0.65 m higher than in previous reports. Appendix B contains a list of all the datum changes.
**Low Supply Level (LSL) is lowest reservoir level at which rated flow and generation can be maintained.

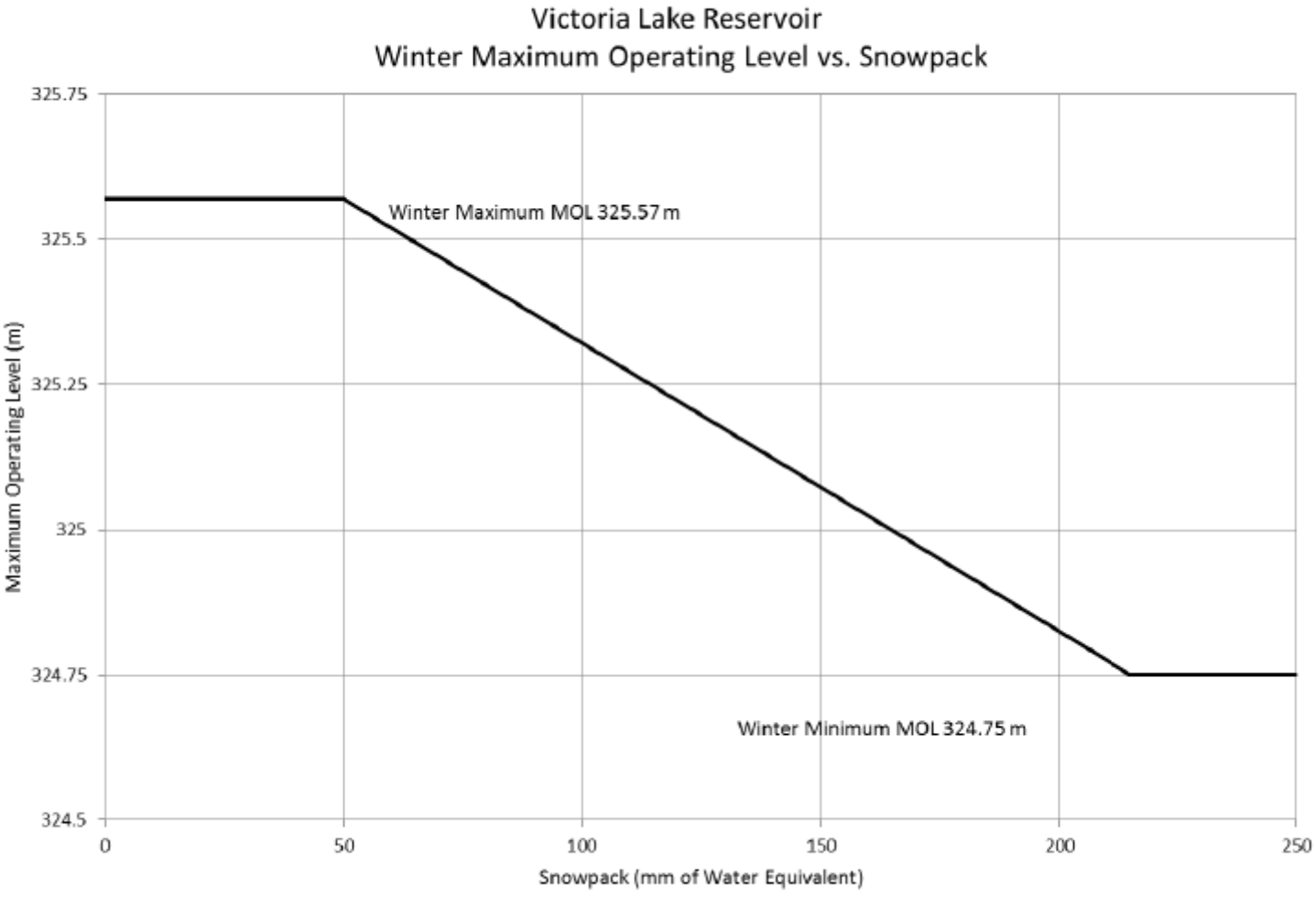
Victoria Lake Reservoir
Winter Maximum Operating Level vs. Snowpack
Maximum Operating Level (m)
325.75
325.5
325.25
325
324.75
324.5
Winter Maximum MOL 325.57 m
Winter Minimum MOL 324.75 m
0
50
100
150
200
250
Snowpack (mm of Water Equivalent)

Figure 2.1

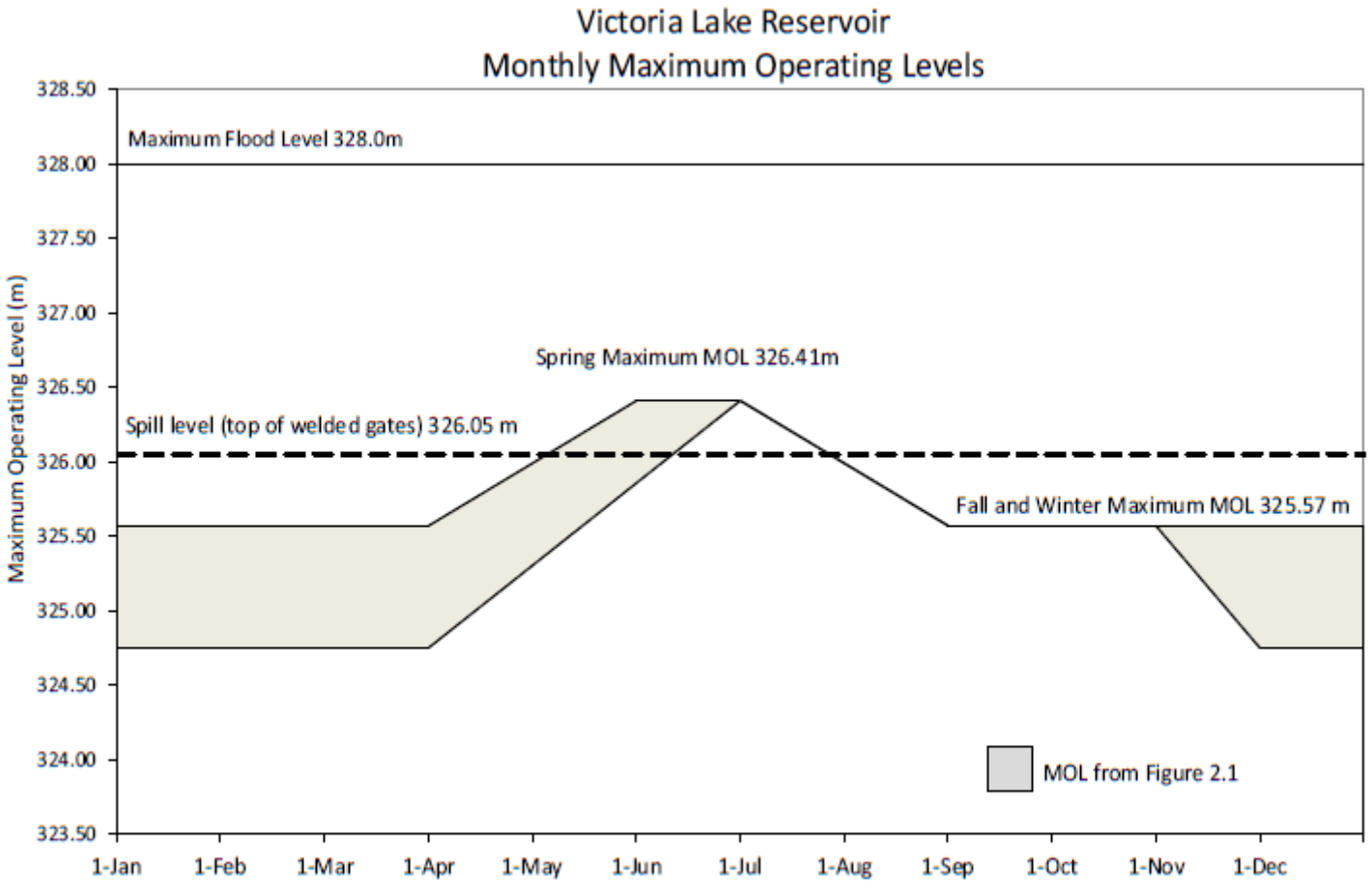
Victoria Lake Reservoir
Monthly Maximum Operating Levels
Maximum Operating Level (m)
328.50
328.00
327.50
327.00
326.50
326.00
325.50
325.00
324.50
324.00
323.50
Maximum Flood Level 328.0m
Spring Maximum MOL 326.41m
Spill level (top of welded gates) 326.05 m
Fall and Winter Maximum MOL 325.57 m
MOL from Figure 2.1
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec

Figure 2.2