

**RAINY RIVER MINE**

**OPERATION, MAINTENANCE AND SURVEILLANCE  
MANUAL**

**PART IV – MINE ROCK POND**

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Rainy River Project  
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**September 2022**







**Version 2022-1**

## REVIEW AND REVISION HISTORY

The OMS Manual shall be reviewed annually and following any significant changes at the site to assess if the document is representative of the current condition and operation of the dam at the time of the review. Revisions to the manual should be undertaken within six months of changes. It is the responsibility of the Tailings Dam Engineer to initiate the OMS review.

The review team and approval record are given in **Table 1**. The version history of the OMS Manual is shown in **Table 2**.

**Table 1 - Review Team**

	Name	Company /Department	Position	Signature	Date
Prepared by	Winston Ding	NG Capital Projects	Tailings Dam Engineer		Oct 14, 2022
Reviewed by	Travis Pastachak	NG Capital Projects	Capital Projects Manager	 <small>Travis Pastachak (Oct 14, 2022 11:42 CDT)</small>	Oct 14, 2022
	Gord Simms	NG Mine Operations	Mining Manager	 <small>Gord Simms (Oct 17, 2022 12:16 CDT)</small>	Oct 17, 2022
	Garnet Cornell	NG Environment	Environmental Superintendent		Oct 25, 2022
	Derek McKinnon	NG Maintenance	Maintenance Superintendent	 <small>Derek McKinnon (Oct 25, 2022 16:50 CDT)</small>	Oct 25, 2022
	Michael Dabiri	SRK	Interim EOR	<small>This signature has been scanned. The original signature is held on file.</small>	Oct 31, 2022
Approved by	Mohammad Taghimohammadi	NG	Mill Manager		Oct 31, 2022

**Table 2 - Revision Summary**

Revision Number	Details of Revision	Date of Issue	Comment
Rev. A	Issued for EOR review	August 15, 2022	Review received on Sept. 2, 2022
Rev. B	Addressed review comments		
Rev. 0	Issued for use	Sept. 30, 2022	

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## 1.0 OBJECTIVE

The operation, maintenance, and surveillance manual (OMS Manual, the Manual) provides procedures and reference for the safe operation of the structures related to tailings, and water management structures at the New Gold Inc. (NGI) Rainy River Mine (RRM), located near Emo, Ontario. For readability, the OMS Manual has been separated into “Parts” as listed below. This is Part 4 for Mine Rock Pond and its dam (MRP).

- Part 1: General
- Part 2: TMA
- Part 3: MRP
- **Part 4: MRP**
- Part 5: SEDIMENT CONTROLS
- Part 6: FRESHWATER DIVERSIONS
- Part 7: WATER DISCHARGE
- Part 8: EPRP

To simplify and condense the OMS Manual, the overall site conditions were removed from the individual structure parts and covered in Part 1 of the OMS Manual. This part is only about the operation, maintenance, and surveillance of the MRP and its dam.

## 2.0 FACILITIES DESCRIPTION

### 2.1 Overview

The Mine Rock Pond Dam (MRP) is in the remnant lower Clark Creek and designed to collect runoff and seepage from the East Mine Rock Stockpile (EMRS), Low Grade Ore Stockpile (LGOS), and dewatering from the Open Pit and underground mine. There is no direct discharge to the environment from the MRP.

The MRP is intended to be operated at the minimal pond volume to reduce seepage and improve dam safety. Water collected in the MRP is used for process water in the mill. Excess water from the MRP may also be transferred by pipeline to the TMA, or BCR 2 and then WMP for discharge to environment depending on the water quality.

### 2.2 Design and Construction History

The MRP design documents are summarized in Table .

**Table 2-1: Design Document Summary**

Document Title	Reference
Design Brief – Water Management Dams	3098004-004400-A1-ETR-0004-00
Mine Rock Pond Dam – Design Revision and Operating Guidelines	RRP-GEO-REP-007-R0
MRP As-built Report	RRP-GEO-REP-033 R1
Drawing Title	New Gold Document Number
Mine Rock Pond Dam General Arrangement Plan	3098004-002590-A1-D70-0002
Mine Rock Pond Dam Profile	3908004-002590-A1-D70-0003
Mine Rock Pond Dam – Typical Cross Section	3098004-002590-A1-D70-0004
Mine Rock Pond Dam Emergency Spillway Plan and Sections	3098004-002590-a1-d70-0005
Interim Mine Rock Pond – Plan, Cross Sections, and Details	3098004-002590-A1-D50-0006

Construction of the MRP commenced in 2015 and was completed in the fall of 2017. Construction of the MRP dams was slowed in July and August of 2017 to allocate resources to the completion of TMA Cell 1.

### 2.3 Pumps and Pipelines

The MRP pumps and pipelines are owned by Mill and operated by Site Service. The MRP pipelines include:

- A wastewater line from open pit to MRP
- A wastewater line from MRP along the south ring road to TMA.
- A reclaim water line from MRP to Mill
- A wastewater line from MRP to BCR 2 and onward to WMP.

A fixed pump station at SW corner of the dam can supply 600 m<sup>3</sup>/hr to the mill, which is able to supply the mill with up to 59% of the total mill make-up water demand. It is planned to provide 45% of mill make-up water annually. Prior to winter, the MRP will be drawn down to the minimum pond volume to reduce ice losses. The MRP has the capacity to pump 980 m<sup>3</sup>/hr to the mill.

This section will be better delineated after SRK completes its side-wide management review.

## **2.4 Seepage Collection**

MRP is located at a topographic low and is the part of seepage collection system for the EMRS. The spillway and its discharge are in the old Clark Creek. No specific seepage collection system was designed for MRP, however, the natural low between the dam toe and Highway 600 becomes a ditch which collects dam seepage and surface runoff which can be pumped back to MRP. Two culverts between the Highway 600 could drain water in the ditch.

## **2.5 MRP Closure**

At closure, the MRP will remain in place to collect runoff and seepage from the EMRS. This will then be directed to the Open Pit for flooding. The water level in all water management structures is to remain within the respective NOWL. Should the NOWL be exceeded, the owner is required to notify the appropriate authority and submit a plan to return to the NOWL within an agreed upon timeframe. At this time, it is undetermined whether the transfer of water to the pit will occur via ditching or pumping.

### 3.0 OPERATIONS

#### 3.1 Pond Storage Capacity

The MRP has a maximum water storage of 1.3 Mm<sup>3</sup> and minimum of 0.1 Mm<sup>3</sup> (required to ensure underground has sufficient water for operations). The water volume at NOWL is 0.6 Mm<sup>3</sup>. The stage storage relationship is provided in Table 3-1.

**Table 3-1 - Stage Storage Relationship**

Elevation (m)	Storage Volume (m <sup>3</sup> )	Elevation (m)	Storage Volume (m <sup>3</sup> )
351	663	355.5	292,193
351.25	2,027	355.75	339,376
351.5	4,036	356	394,474
351.75	6,645	356.25	454,128
352	10,586	356.5	518,391
352.25	16,219	356.75	587,302
352.5	23,491	357	667,637
352.75	32,092	357.25	753,054
353	42,784	357.5	843,452
353.25	55,468	357.75	938,810
353.5	70,008	358	1,041,849
353.75	86,289	358.25	1,149,976
354	105,271	358.5	1,263,263
354.25	126,800	358.9	1,300,000
354.5	150,890	359	1,382,836
354.75	177,556	360	1,930,022
355	211,522	360.2	2,048,496
355.25	249,662		

#### 3.2 Flood Capacity

The design of the MRP spillway invert elevation is based on 24-hr Probable Maximum Flood (PMF) event. The Probable Maximum Precipitation (PMP) event depth is 586 mm.

Overtopping of the Clark Creek Dam was considered in the design of the MRP. The Clark Creek Dam and Pond are designed for a 1:100-year 24-hour event. If this is exceeded, then water will spill from the dam and flow toward the EMRS. Water on the eastern side of the EMRS reports to a sump and flows through a NAG rock French-drain under the EMRS to the MRP. Given this flow path the contribution of this flow is not significant on the peak inflows to the MRP.

#### 3.3 Flood, Pond and Dam Operation Criteria

See Section 3.1 of Part 2 for TMA of this Manual for definition of ENL, EIL, DSN and DSI.



- ENL (Environment Notice Level) is assigned to be the same as NOWL which is Elev. 356.8. If reached and the water quality doesn't meet discharge criteria, RRM need to initiate Environment Contingency Plan to bring down the pond level.
- EIL (Environment Incident Level) is assigned to be the same as the MOWL (EDF event), i.e., the invert of spillway which is Elev. 358.9. If reached and the water quality doesn't meet discharge criteria, RRM need to continue the Environment Contingency Plan to bring down the pond level and report to the regulator.
- DSN (Dam Safety Notice Level) for MRP dams is assigned to be the same as EIL which is Elev. 358.9. If reached, RRM needs to initiate Enhanced Surveillance.
- DSI (Dam Safety Incident Level) for MRP dams is not assigned because MRP Dam was designed to overtopped. If overtopped, it is not necessarily a DSI, but RRM need to report to the regulator and initiate EPRP if IDF occurs, just as other dams.

Summary of MRP operation elevation data is shown in Table 3- 1.

**Table 3- 1: MRP Operation Criteria**

Description	Elevation (m)
Dam Crest	360.2
IDF (Inflow Design Flood, Maximum Flood Level)	359.0
Sill / Invert of Emergency Spillway	358.9
DSN (Dam Safety Notice Level)	
EIL (Environment Incident Level)	
Pond Level for the Increased Surveillance (High Pond)	
MOWL (Max. Operation Water Level)	
NOWL (Normal Operation Water Level)	356.8
ENL (Environment Notice Level)	352.0
Min. Operation Water Level	

### 3.4 Environmental Protection

The MRP as part of RRM facilities is surrounded by a wildlife fence installed to reduce wildlife contact. The wildlife fence is inspected for any damage at least once per month.

Water quality monitoring has been carried out by RRM Environment as part of environment protection plan.

#### 3.4.1 MRP Water to WMP

MRP water was used to pump to TMA. Excessive water reported to TMA during 2022 spring freshet generated a need to treat MRP water, store in WMP before discharge to environment. A pilot project conducted by contractor involving pumping MRP water to BCR2 for treatment at max. 10,000 m<sup>3</sup>/day before sending to WMP was successful and accepted by MCEP in August 2022. NG Environment plans to amend ECA (2290) in winter 2022 to allow this change permanently.

## **4.0 MAINTENANCE**

### **4.1 Type and Procedure**

Refer to Section 4.1 of Part 2 for TMA of the Manual.

### **4.2 Preventative and Predictive Maintenance**

#### **4.2.1 Roads and Gates**

Roads and gates are maintained by Site Service Department as required.

#### **4.2.2 Pipelines and Pumps**

Refer to Section 4.2.2 of Part 2 for TMA of the Manual.

#### **4.2.3 Mobile Equipment**

Refer to Section 4.2.3 of Part 2 for TMA of the Manual.

#### **4.2.4 Geotechnical Instruments and Water Monitoring Instruments**

Refer to Section 4.2.4 of Part 2 for TMA of the Manual.

#### **4.2.5 Dam Inspection and Predictive Maintenance**

Refer to Section 4.2.5 of Part 2 for TMA of the Manual.

Accumulation of sediments in the MRP over time reduces its storage capacity. NG is to develop a maintenance plan together with EOR to properly maintain the pond performance.

### **4.3 Event-Driven Maintenance**

Refer to Section 4.3 of Part 2 for TMA of the Manual.

#### **4.3.1 Pipeline Leaks or Breaks**

Refer to Section 4.3.1 of Part 2 for TMA of the Manual.

#### **4.3.2 Earthquake Occurrence**

Refer to Section 4.3.2 of Part 2 for TMA of the Manual.

#### **4.3.3 Flood Event**

Refer to Section 4.3.3 of Part 2 for TMA of the Manual.

#### **4.4 Reporting Requirements**

Refer to Section 4.4 of Part 2 for TMA of the Manual.

## **5.0 SURVEILLANCE**

### **5.1 General**

The objective of the surveillance program is to provide confirmation of the adequate performance of the facility, including containment, stability, and operational function by observing, measuring, and recording data relative to potential failure modes and specific operational controls.

The surveillance at MRP dam involves:

- Visual Inspections
  - Daily pipeline inspection
  - Monthly dam inspection
  - Drone inspection when needed
- Annual Dam Safety Inspections
- ITRB
- Dam Safety Reviews
- Special Inspections and Increased Levels of Surveillance
- Instrumentation

### **5.2 Visual Inspection**

#### **5.2.1 Pipeline Inspection**

Part of site-wide pipeline inspection conducted twice per 12-hour shift by the Mill. Refer to Section 5.2.1, Part 2 for TMA of this Manual.

#### **5.2.2 Dam Inspection**

Part of site-wide monthly inspections. See Appendix A: MRP Dam Monthly Site Inspection Checklists. Refer to Section 5.2.2, Part 2 for TMA of this Manual.

### **5.3 Dam Safety Inspections**

Part of annual site-wide dam safety inspections carried out by the EOR. Refer to Section 5.3, Part 2 for TMA of this Manual.

### **5.4 ITRB**

Part of site-wide water management review in ITRB meeting. Refer to Section 5.4, Part 2 for TMA of this Manual.

### **5.5 Dam Safety Reviews**

Part of site-wide dam safety review. Refer to Section 5.5, Part 2 for TMA of this Manual.

## **5.6 Special Inspections and Increased Levels of Surveillance**

### **5.6.1 Pond Surcharge**

High Pond is defined as MOWL and higher. When the pond exceeds MOWL, special surveillance and increased surveillance is required.

See Appendix B – Site Inspection Checklist for MRP High Pond.

### **5.6.2 Earthquakes**

The TDE in conjunction with the Capital Project Manager and other teams will confirm the significance of the seismic event and level of response required. If the seismic event is significant, an inspection of the facilities must be conducted.

See Appendix B – Site Inspection Checklist for MRP Post-Earthquake Evaluation.

### **5.6.3 Increased Seepage through the Dams**

Unusual leakage from the dam which may indicate damage to the perimeter dams. TDE will determine a specific surveillance for the increase seepage through the dams is required.

See Appendix B – Site Inspection Checklist for the Increased Seepage at MRP.

### **5.6.4 Observed Dam Deformation**

Settlement, sinkhole formation, cracking, offsets, leaking or other signs of substantial distress of the perimeter dams. TDE together with the Capital Project Manager will determine a specific surveillance for the observed dam deformation is required.

See Appendix B – Site Inspection Checklist for Observation of Deformation at MRP.

### **5.6.5 Other Unusual Conditions**

Other conditions that may require increased surveillance, such as rapid snowmelt, heavy rainstorm, or wind, or snowpack is same as for TMA in Part 2 of the Manual.

Accumulation of sediments in the MRP over time reduce its storage capacity. Visual inspection of the pond would be carried out during the pond pump down for winter operation to observe the sediment accumulation.

## **5.7 Instrumentation**

### **5.7.1 Instrumentation Data Reading Frequency**

MRP dams are complete and no longer undergoing construction activities. Instrument data reading and report frequency following Operation condition outlined in Table 4- 3 according to the Stage 4 Instrumentation Thresholds for TMA and Water Management Dams (BGC-4910-DT00-MEM-0030).

### **5.7.2 Instrument Thresholds and Action Plan**

Refer to Section 5.7.2 of Part 2 for TMA of the Manual.

### **5.7.3 PWP Thresholds**

Refer to Section 5.7.3 of Part 2 for TMA of the Manual.

### **5.7.4 SI Thresholds**

Refer to Section 5.7.4 of Part 2 for TMA of the Manual.

### **5.7.5 Dam Settlement Threshold**

Refer to Section 5.7.5 of Part 2 for TMA of the Manual.

### **5.7.6 Action Plan for Threshold Exceedance**

Refer to Section 5.7.6 of Part 2 for TMA of the Manual.

## **5.8 Other Surveillances**

### **5.8.1 Pond Level**

Part of site-wide pond level survey. Refer to Section 5.8.1, Part 2 for TMA of this Manual.

### **5.8.2 Water License Sampling and Testing**

Part of site-wide Water License Sampling and Testing program by Environment Department. Refer to Section 5.8.2, Part 2 for TMA of this Manual.

### **5.8.3 Other Survey**

All dam crest elevations and spillway/diversion channel invert elevations will be surveyed annually to check the dam settlement threshold.

## **5.9 Summary of Surveillance Frequency**

Refer to Section 5.9 of Part 2 for TMA of the Manual.

## **5.10 Reporting**

Refer to Section 5.10 of Part 2 for TMA of the Manual.

## **6.0 EMERGENCY PREPAREDNESS AND RESPONSE PLAN**

Emergency preparedness aims to ensure that the strategic direction and required building blocks for an eventual response are in place. A detailed Emergency Response and Preparedness Plan (ERPP) is outlined in Part 8 of the OMS.



## **APPENDIX A**

### **INSPECTION CHECKLISTS**

The following inspection checklists are prepared and issued by the Tailings Dam Engineer.

- Monthly Site Inspection Checklist

## MRP DAM – MONTHLY INSPECTION CHECKLIST

Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

Weather: \_\_\_\_\_

Reservoir Water Level (m): \_\_\_\_\_

Inspect the following items for safety, general appearance, and evidence of damage or potential instability.

- Legend:
- ✓ = No change since previous inspection or normal
  - D = Defect or deterioration since previous inspection. (Add details under “Remarks”)
  - = Not inspected (explanation)

ITEM	Check	REMARKS
<b>1. ACCESS AND SECURITY</b>		
1.1 Access Road		
1.2 Security (gates and locks)		
1.3 Fence		
<b>2. DAM</b>		
<b>2.1 Dam Crest</b>		
2.1.1 Cracking		
2.1.2 Settlement		
2.1.3 Erosion		
2.1.4 Other Movement, such as Alignment		
<b>2.2 Upstream Slope</b>		
2.2.1 Angles		
2.2.2 Bulging/Cracking		
2.2.3 Erosion		
2.2.4 Non-Uniform Slope		
2.2.5 Settlement		
2.2.6 Sloughing		
<b>2.3 Downstream Slope</b>		
2.3.1 Angles		
2.3.2 Bulging/Cracking		
2.3.3 Erosion		
2.3.4 Non-Uniform Slope		
2.3.5 Settlement		
2.3.6 Sloughing		
<b>2.4 Downstream Toe</b>		
2.4.1 Vegetation		
2.4.2 Wet Spot/ Ice		
2.4.3 Bulging		
2.4.4 Piping		
<b>2.5 Spillway</b>		
2.5.1 Erosion		
2.5.2 Sill		
2.5.3 Toe		

## **APPENDIX B**

### **SURVEILLANCE RESPONSE PLANS**

The Surveillance response Plans (SRP) are intended to provide initial guidance to the first on-site inspector until the extent of the situation has been identified and further surveillance plans and/or remedial options developed.

Surveillance Response Plans for the following scenarios are included in this Appendix:

- High Pond
- Post-Earthquake
- Increased Seepage through the Earth Dam
- Observation of Dam Deformation

The failure mode, duties, and actions are like those developed for TMA dams. Only site inspection checklist has been developed specific for MRP dams.

### SITE INSPECTOR CHECKLIST for MRP High Pond

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Time of arrival: \_\_\_\_\_

#### Inspect the condition of the dams and Spillway

1. From a safe vantage point check that it is safe to approach the dam. Call the Capital Project Manager if the dam is not considered safe to approach.
2. Record weather conditions: \_\_\_\_\_
3. Record Pond level \_\_\_\_\_
4. Is there any sign of new deformation such as: cracking, slumping, change of alignment and depressions?                      YES      NO
  - a. If yes use deformation checklist to record details of the observations.
5. Is there any sign of new or increased seepage?                      YES      NO
  - a. If yes use seepage checklist to record the details of the observations.
6. Is there damage to the spillway?                      YES      NO
  - a. If yes use seepage checklist to record the details of the observations



Fig 1. Plan View of MRP Dams

## SITE INSPECTOR CHECKLIST For MRP Post-EQ Evaluation

Name: \_\_\_\_\_ Date: \_\_\_\_

Time of arrival: \_\_\_\_\_

**Inspect the condition of the dam:**

1. From a safe vantage point check that it is safe to approach the dam(s). Call the Capital Project Manager if the dam is not safe to approach.
2. Record weather conditions: \_\_\_\_\_
3. Record Pond level \_\_\_\_\_
4. Is there any sign of new deformation such as: cracking, slumping, change of alignment (roads, no-post barrier, and fences) and depressions? YES NO  
 • If yes use deformation checklist to record details of the observations.
5. Is there any sign of new or increased seepage? YES NO  
 • If yes use seepage checklist to record the details of the observations

**Inspect the condition of the Spillway:**

6. Is there damage to the Sill? YES NO
7. Is there damaged to the toe? YES NO
8. Is there damaged to the side walls? YES NO



Fig 1. Plan View of MRP Dams

### **SITE INSPECTOR CHECKLIST For Increased Seepage at MRP**

Name: \_\_\_\_\_ Date: \_\_\_\_

Time of arrival: \_\_\_\_\_

1. Check that it is safe to approach the seepage area.
2. Record location of seepage below and mark on attached plan drawing.
3. Measure / estimate rate of seepage.
4. Check to see if the seepage water is “dirty”.
5. Stake out and measure area where seepage is exiting the dam.
6. Dimensions of Seepage Zone
7. Check for any erosion or sloughing in area where seepage is exiting the dam.
8. Record weather conditions: \_\_\_\_\_
9. Record pond level \_\_\_\_\_
10. Photograph seepage area
11. Call details back to Capital Project Manager.

If no further direction given by Capital Project Manager/ TDE, continue with the following:

12. Inspect the rest of the dam using the Routine Weekly Inspection Checklist. Look for signs of deformation such as:
  - Depressions
  - Cracking
  - Sinkholes
  - Changes in the alignment along the crest
13. If anything looks unusual report back to Capital Project Manager immediately.
14. Continue to monitor and record seepage at least every hour and check that there are no changes in the flow or turbidity. Report any changes in the seepage flows to the Capital Project Manager immediately.
15. Continue to inspect the entire dam every two hours following the Routine Weekly Inspection Checklist.
16. Do not leave site until Capital Project Manager instructs you to do so.

Record of Seepage

Time	Flow (L/min)	Dirty (Y or N)	Time	Flow (L/min)	Dirty (Y or N)



Fig 1. Plan View of MRP Dams



**SITE INSPECTOR CHECKLIST  
for MRP Dam Deformation**

Name: \_\_\_\_\_ Date: \_\_\_\_

Time of arrival: \_\_\_\_\_

1. Check that it is safe to approach the deformed area.
2. Record Pond level \_\_\_\_\_
3. Estimate Freeboard \_\_\_\_\_
4. Record location of deformed area below and mark on attached plan drawing.
5. Deformation Type
  - a. Cracking or Offset
    - i. Along the crest or across the crest
    - ii. Length \_\_\_\_\_ Width \_\_\_\_\_ of crack
    - iii. Vertical offset \_\_\_\_\_
    - iv. Depth of crack \_\_\_\_\_
  - b. Slumping or Slide
    - i. Length \_\_\_\_\_ Width \_\_\_\_\_ of slumped area
    - ii. Vertical offset at top of slump \_\_\_\_\_
    - iii. Estimated Volume
  - c. Sinkhole
    - i. Length \_\_\_\_\_ Width \_\_\_\_\_
    - ii. Depth \_\_\_\_\_
  - d. Other types of deformations describe below:

\_\_\_\_\_  
\_\_\_\_\_

6. Photograph deformed area.
  7. Call details back to Capital Project Manager.
  8. Once measurements are completed stake area and monitor for further movements.
- If no further direction given by Capital Project Manager continue with the following:
9. Inspect the rest of the dam using the Routine Weekly Inspection

Checklist. Look for signs of deformation such as:

- New or increased seepage (If observed go to the Increased Seepage SRP)
- Other areas of deformation

10. If anything looks unusual report back to Capital Project Manager immediately.
11. Continue to measure and record the Length, Width etc. every hour and check that there are no changes. Report any changes in the measurements to the Capital Project Manager immediately.
12. Continue to inspect the entire dam every two hours following the Routine Weekly Inspection Checklist.
13. Do not leave site until manager instructs you to do so.



Fig 1. Plan View of MRP Dams