RAINY RIVER MINE

OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL

PART III – WATER MANAGEMENT POND (WMP)

New Gold Inc.
Rainy River Project
5967 Highway 11/71, P.O. Box 5
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P0W 1E0

February 2021

Version 2021-1

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	Patrick Green	NG Capital Projects	Tailings Dam Engineer		
Reviewed by	Travis Pastachak	NG Capital Projects	Capital Projects Manager		
	Darrol VanDeventer	NG Mine Operations	Mining Manager		
	Sylvie St. Jean	NG Environment	Environmental Manager		
	Tony Lord	NG Maintenance	Director, Asset and Energy Management		
	Andre Zerwer	BGC Engineering Inc.	EoR		
Approved by	Tyler Buckingham	NGM	Mill Manager		

Table 2 - Revision Summary

Revision Number	Details of Revision	Date of Issue	Comment
Rev A	Issue for Review	February 9, 2021	N/A

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1.0 OBJECTIVE

The objective of this document is to provide procedures for the operation, maintenance, and surveillance (OMS) of the Water Management Pond (WMP) at the New Gold Inc. (NGI) Rainy River Mine (RRM), located near Emo, Ontario. This OMS Manual serves as a reference for the safe operation of the structures related to tailings, water management, and water diversion structures. For readability, the OMS Manual has been separated into "Parts", as listed below:

- Part 1: General
- Part 2: TMA
- **Part 3: WMP**
- Part 4: MRP
- Part 5: SEDIMENT PONDS
- Part 6: DIVERSIONS
- Part 7: WATER TREATMENT
- Part 8: EPP

To simplify and condense the OMS Manual, the site conditions were removed from the individual structure parts and covered in Part 1 of the OMS Manual. The topics discussed in Part 1 under Section 4.0 – Site Baseline Conditions are:

- Site Location and Tenure
- Temperature
- Precipitation
- Evaporation
- Hydrology
- Geology
- Hydrogeology
- Water Quality
    - Tailings
    - Biodiversity
    - Fish
- Vegetation
- Wildlife
- Natural Hazards

This document is consistent with the New Gold Tailings, Heap Leach and Waste Rock Facilities Management Policy and was prepared pursuant to the MAC guidelines for *Developing an*

Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities (MAC, 2011).

The following is a list of permits that this section of the OMS complies with:

- LRIA-FF-2015-04B: WMP Dams 1,2 and 3

- LRIA-FF-2015-04A: WMP Dams 4 and 5

2.0 SITE AND FACILITIES DESCRIPTION

The RRM site is in the Township of Chapple located 70 kilometres (km), by road, northwest of Fort Frances, in Northwestern Ontario. New Gold has 100% interest in the lands forming the RRM through direct ownership or option agreement.

2.1 WMP Overview

WMP Dams 1 through 5 (Dams) contain the WMP pond with a crest elevation of 371.5 m and NOWL of 369.7 m. Treated surplus water is transferred to the WMP before it is discharged to the environment (through the BCR 2 and outflow basin) or used as recycle water in the mill. Any effluents planned for discharge to the environment will meet discharge criteria or be pumped back to the WMP for further treatment.

Construction of the dams and ancillary structures under the original LRIA work permit No. FF-2015-04 began in September 2015. Construction of the dams, spillway, and intake channel were completed by early August 2017 followed by completion of the seepage collection system in September 2017. Works were completed in 2017 under amended LRIA work permits FF2015-04A and FF2015-04B based on revised design details.

Suspended construction periods occurred due to poor weather conditions, a stop work order issued by the MNRF for WMP Dams 4 and 5, supplemental geotechnical investigations and design updates.

Design Revisions Major design revisions at the WMP included:

- Addition of toe berms to WMP Dams 2, 3, 4 and 5 following supplemental geotechnical investigations to satisfy revised design criteria
- Revised toe drain details to suit interim 2015/early 2016 As-Built conditions and mitigate potential stability issues
- Remedial works to the interim clay fill placed in 2015/early 2016 at WMP Dam 3 which included a 14 m wide key trench through the existing crest of the dam
- Utilization of additional thickness of Zone 8 (WMP Dam 2) and Zone 3 (Dam 4) to address underbuilt or trimmed clay fill slopes to satisfy the neat line geometry
- Re-alignment of the emergency spillway to avoid in place infrastructure.

2.2 Dam Consequence Classification

The WMP Dams were classified as VERY HIGH using the Ontario Lakes and Rivers Improvement Act (LRIA) “Classification and inflow design flood criteria”. This is generally equivalent to a Canadian Dam Association (CDA) consequence of EXTREME.

SRK Consulting has completed “Dam Break Inundation Study” in February 2019 and it is available on the Document Control site.

2.3 Utilities

The following major utilities are used on site:

- Power to the plant site is provided by 230 kV transmission lines that are connected to Hydro One northwest of the site at a Switching Station;
- The 230 kV substation is located adjacent to the Process Plant to provide power to the process equipment by underground supply lines. Power to the remainder of the site is provided by a network of overhead and underground power lines fed from the substation; and
- Site telecommunications and Process Control are distributed by a network of overhead and underground fiber optic lines.

3.0 OPERATIONS

3.1 Water Management

The mill follows logic to draw process water, which is tracked and reported by the Environmental department. The Mill reclaim logic decision tree is shown in Figure 1.

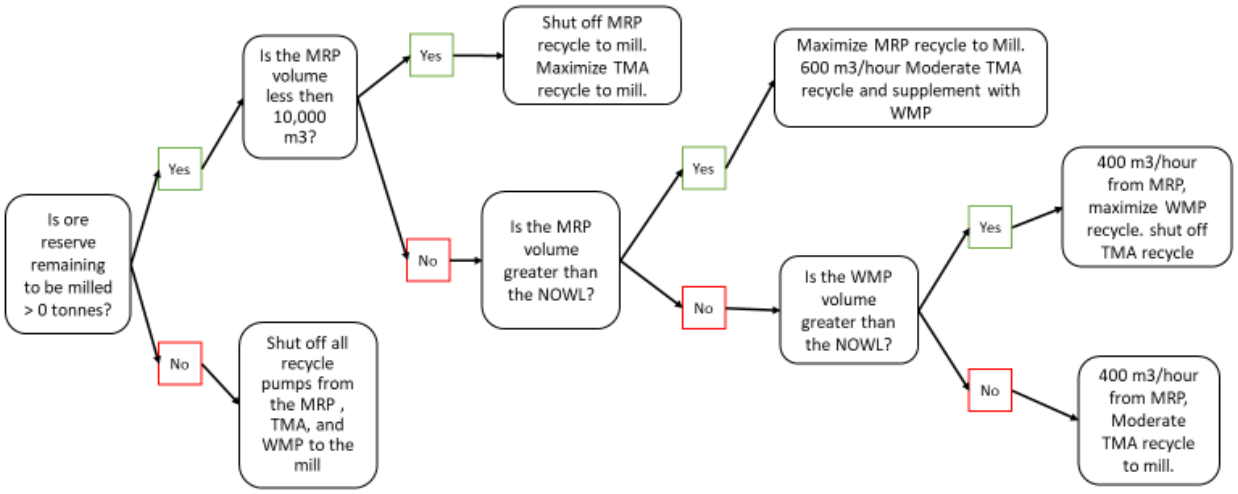

Figure 1 - Mill Reclaim Logic

Water that is meant for discharge to the environment will be either discharged to the environment via EDL1 or sent to BCR 2 and outflow basin for further treatment prior to discharge to the environment via EDL1 or EDL2.

Bleed flow and decant to Pinewood River can only occur if there is sufficient flow in the Pinewood River to achieve a minimum mixing ratio of 1:1 with the two discharges combined. A pre-winter inventory of 2.8 Mm^3 will be targeted to comply with environmental commitments to supply the bleed flow through constructed wetlands in all climatic conditions.

This volume is sufficient to maintain supply to the mill through dry winters and springs, up to the beginning of June, at which time the transfer from the TMA can replenish the WMP inventory. The mill make-up water demand is 22,605 m^3/day which will be supplied by the TMA, MRP and WMP. The make-up water will be preferentially taken from the MRP and TMA with the WMP supplying the difference. The site requires freshwater for various processes at a rate of 1,729 m^3/day which will be supplied from the WMP.

3.2 Water Treatment

The water treatment starts in the TMA and ends with treated water being discharged into the Pinewood River. Figure 2 provides an overview of the treatment process. Part 7 of the OMS Manual provides further details on the Water Treatment Train.

Bubblers (10) throughout the WMP provide sufficient aeration to treat ammonia and will keep the water over the WMP from completely freezing during the winter if required.

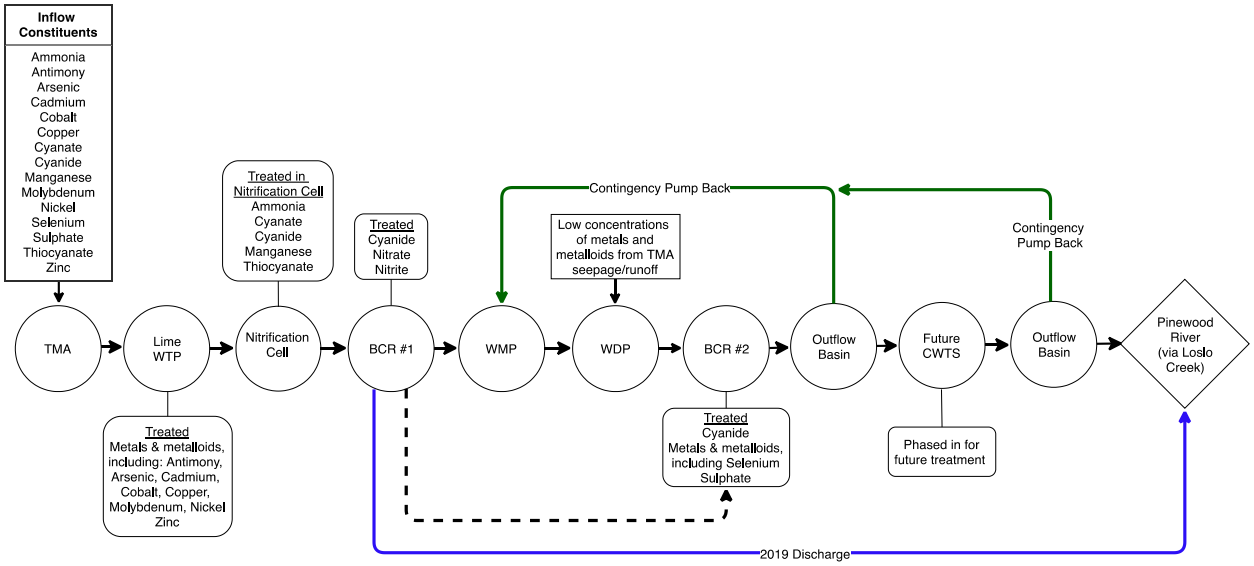

Figure 2 Water Treatment Train Overview

3.3 Pond Storage Capacity

Estimates of storage capacity with respect to elevation are based on comparison with as-built drawings.

Table 3 and Figure 3 provide the stage storage relationship for the WMP.

Table 3 - Stage Storage for WMP

Elevation (m)	Water Storage (m^3)	Elevation (m)	Water Storage (m^3)	Elevation (m)	Water Storage (m^3)
355.0	0	361.0	409,425	367.0	3,142,089
355.5	169	361.5	541,181	367.5	3,486,292
356.0	1,016	362.0	687,276	368.0	3,846,892
356.5	2,384	362.5	845,119	368.5	4,229,229
357.0	4,803	363.0	1,012,352	369.0	4,625,413
357.5	11,417	363.5	1,223,489	369.5	5,033,241
358.0	21,533	364.0	1,452,674	370.0	5,451,690
358.5	38,013	364.5	1,698,321	370.5	5,879,025
359.0	75,235	365.0	1,958,559	371.0	6,314,382
359.5	132,541	365.5	2,233,087	371.3	6,579,245
360.0	207,591	366.0	2,520,422		
360.5	299,155	366.5	2,821,561		

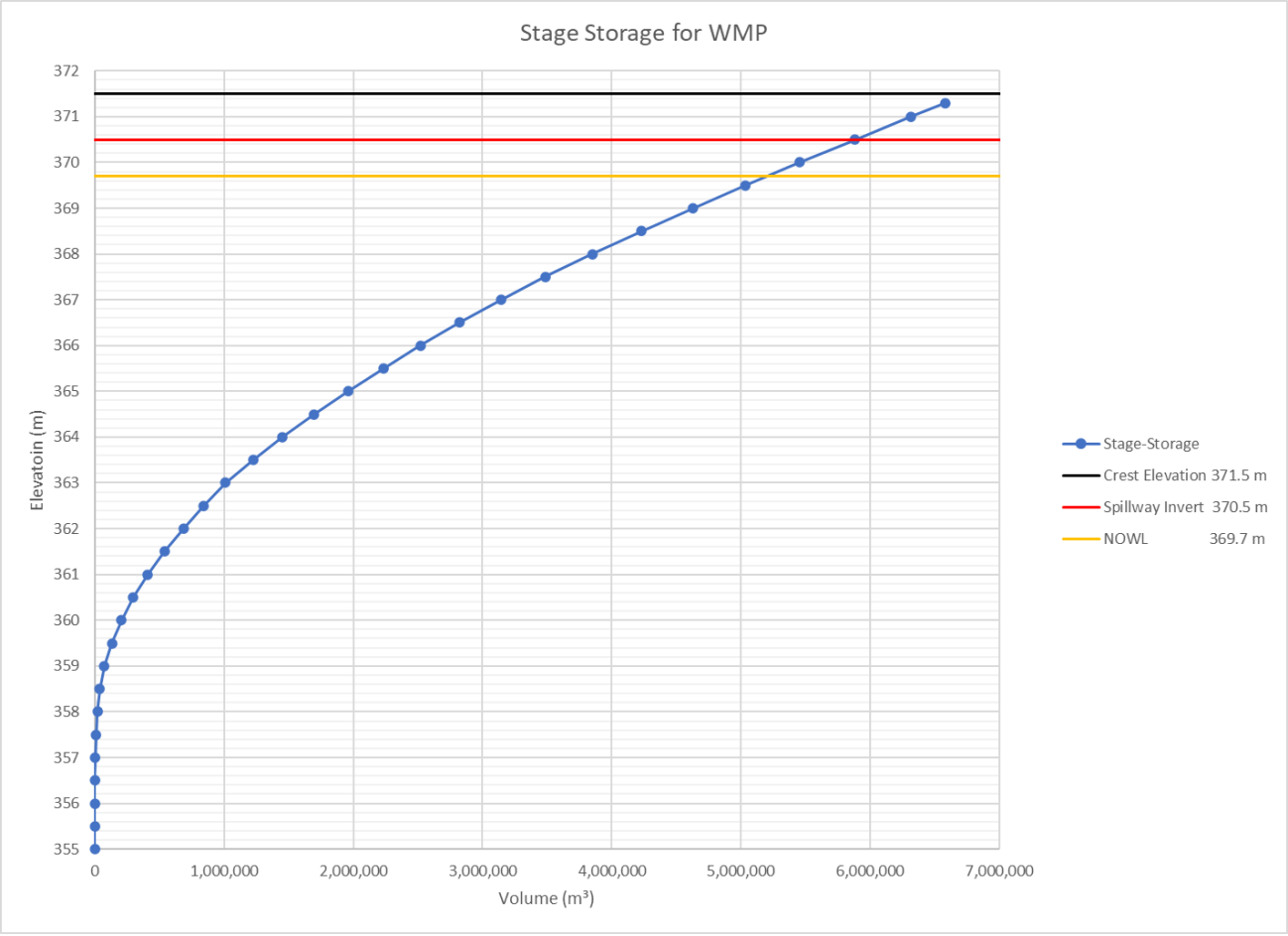

Figure 3 - Stage Storage for WMP

3.4 Flood Capacity

The design of the WMP spillway invert elevation is based on 24-hr Probable Maximum Flood (PMF) event, with the emergency spillway invert at 370.5 m. The Probable Maximum Precipitation (PMP) event of 586 mm.

Any flooding events are routed through the emergency spillway constructed in bedrock, towards the Water Discharge Pond and (when constructed) the Constructed Wetlands.

3.5 Minimum Freeboards

Freeboard is typically defined as the vertical distance between the still water level and the top of the impervious core of a dam. A freeboard between the emergency spillway sill elevation and NOWL is 0.8 m.

3.6 Pond Alert Levels

The ponds are surveyed three times per week during ice-free conditions and once per week during frozen conditions. Should the ponds exceed the EDF elevation, a plan to return water levels to below the EDF will be implemented. This plan includes options of transferring fluids or shutting down the water treatment plant. The actions implemented will be decided by the Mill Manager in consultation with the Environment Manager.

3.7 Environmental Protection

The WMP and TMA is surrounded by a wildlife fence installed to reduce wildlife contact. The wildlife fence is inspected for any damage at least once per month.

Additional monitoring, described in “Surveillance” later in this document, describes additional environmental protections. This includes surface and ground water quality, spills, etc.

3.8 Seepage Collection System

Seepage collection systems are in place and required for the WMP and TMA only. The design criterion is to manage a 1:25 year 24h rainfall. WMP seepage involves 3 sumps, including a sump shared with the north starter dam and will be pumped back to the TMA. The capacity of the sumps is 18,200, 11,800 and 20,000 m^3 for sumps 1, 2 and 3, respectively.

3.9 Closure

The WMP dams will be breached to prevent retention of water once it no longer has a water management function. Upstream dam faces that become exposed will be revegetated.

The constructed wetlands will be left in place as this system is designed to operate passively. It is expected to stabilize as a wetland complex during operations.

4.0 MAINTENANCE

The following periodic maintenance is required:

- Maintain the tailings and reclaim pumps and associated lines and containment
- Clear debris, snow and ice which may block flow through the decant facility or emergency spillways
- Maintain water management structures including spillways, ditches, and diversions
- Maintain equipment, power and water lines, and instrumentation
- Repair any deficiencies as noted in the Dam Safety Inspections (DSI); and
- Reconstruct the support for tailings discharge pipelines wherever washouts occur.

Maintenance records are retained by maintenance personnel performing the work in accordance with the procedures described in this document. Timing of maintenance actions for unusual conditions should be based on specific recommendations from surveillance findings. Scope and time frames for routine maintenance activities are determined and scheduled by the Maintenance Department and based on manufacturer's recommendations and best practices.

The maintenance flowchart is illustrated in Figure 4.

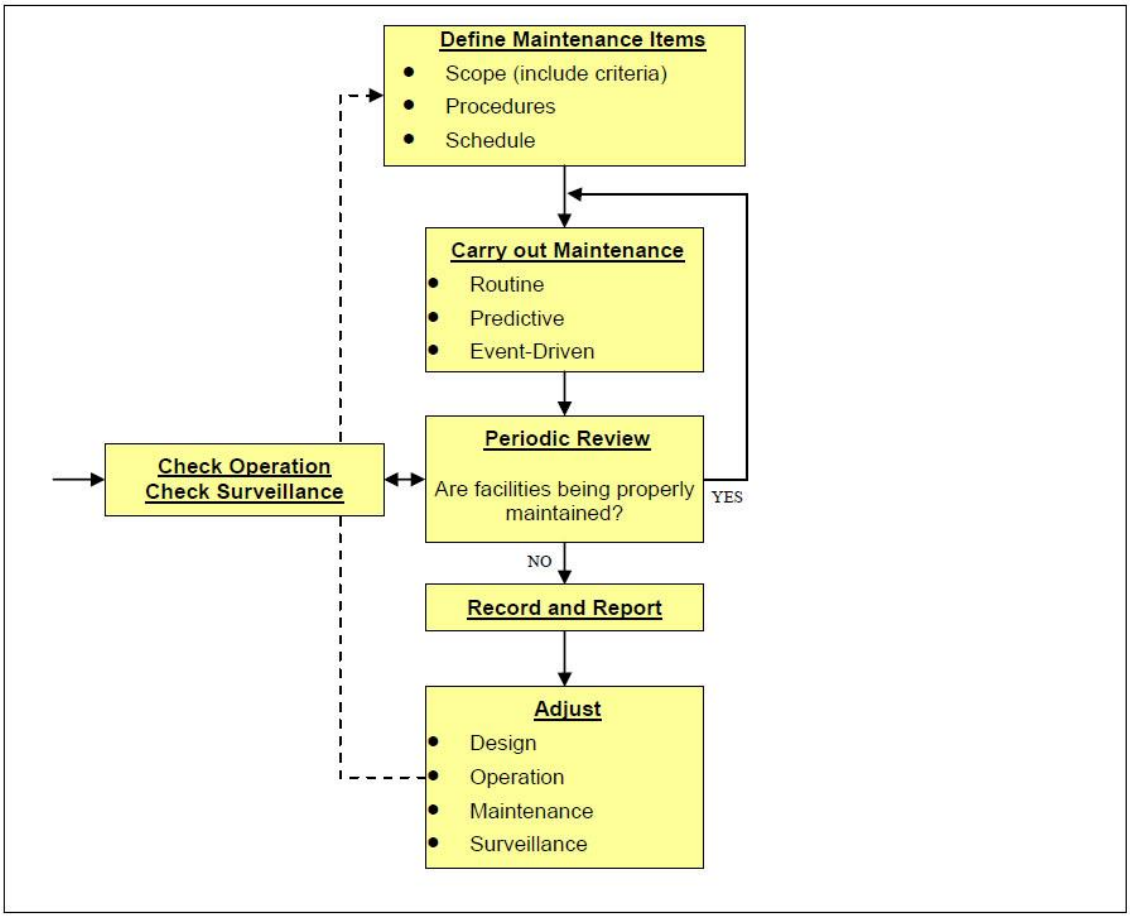

Figure 4 - Maintenance Flow Chart

4.1 Routine and Predictive Maintenance

Routine and predictive maintenance includes removal of vegetation, beaver dams, ice blockage or sediment accumulation that would otherwise affect the performance of a structure.

4.2 Dams

The following are examples of specific maintenance activities:

- Regularly check diversion ditches, spillways and culverts for accumulation of debris or sediment, or any other form of blockage including ice, and remove if required
- Visually inspect diversions, spillways, seepage collection sumps, dams and all ditches for cracking, bulging, slumping, and any other indications of slope movement (note, any indications of slope movement shall be reported to a qualified geotechnical engineer)
- Re-grade the dam crest, as required, to prevent local ponding and direct surface runoff towards the pond
- Repair erosion gullies, local slumps or slides in the dam face, diversion ditches or spillway channels
- Regularly check diversion ditches for accumulation of debris or sediment, or any other forms of blockage, and remove if required
- Removal of vegetation
- If annual survey determines necessary, correct dam crest, overflow spill way and diversion channel invert irregularities to avoid concentrated runoff

4.3 Geotechnical and Water Monitoring Instrumentation

Geotechnical and water monitoring instrumentation is calibrated by the manufacturer prior to shipment. Following instrument installation, initial reading procedures will be followed. Subsequent calibration will follow manufacturer's recommendations.

Calibration certificates will be maintained by Mill Maintenance for water monitoring instrumentation. Geotechnical instrumentation records are maintained by the Tailings Dam Engineer

Malfunctioning or damaged instruments may require repair or replacement per manufacturer guidelines and in consultation with the EoR or approved procedure. In the event of replacement of dam instrumentation, several overlapping readings of the old and new instrument are required to ensure continuity of the data records.

4.4 Pumping Systems and Pipelines

Maintenance of the tailings delivery, water recirculation systems and seepage pumps will include:

- Regular performance tests on seepage pond pumps
- Annual calibration and maintenance as required on flow meters
- Replace pipe, bends and fitting components as required
- Remove accumulated debris from valves, reducers and off takes

- Carryout maintenance as recommended by fitting and valve suppliers
- Regularly inspect major wear components
- Maintain emergency dump ponds in a dewatered/empty state
- Maintain and replace system instrumentation as required

The maintenance of pumps is the responsibility of New Gold and maintenance records are required to be maintained. Each diesel pump requires spill pan, spill kit, and flotation device. Changes to pumping configurations, ditching, piping, or operating parameters need to be approved by the Mill Manager and the Environmental Manager. In an emergency call out (after hours), the Managers or their alternate, will provide direction in consultation with the New Gold Environmental Department.

Fundamental to the successful operation of the ponds and pumping strategy is a timely reaction to rainfall events, ensuring that pumps come 'online' or are taken 'offline' as design trigger levels are reached.

4.5 Mobile Equipment

Mobile equipment is maintained based on a planned reliability program and as otherwise required. Equipment includes:

- Dozers
- Excavators
- Water truck
- Pickup trucks
- Mobile crane
- Flatbed and picker truck
- Replacement of mobile equipment as required

4.6 Event Driven Maintenance

In the event of unusual conditions or incidents that require immediate maintenance actions but are not considered an emergency, repairs and replacement of facility components are made as required and activities documented. RRM staff will provide a means to assess event driven maintenance needs through response action planning. Response planning is based on risk prioritization, maintenance crew mobilization or “call out” procedures, required repairs and replacement material availability. Event driven maintenance actions will follow applicable safety and performance procedures. Unusual conditions that require maintenance are to be communicated to maintenance staff as per RASCI.

4.6.1 Pipeline Leaks or Breaks

In the event of a pipeline leak or break the system is de-energized and repaired as follows:

- Inspect entire pipeline

- Repair or replace affected components
- Perform scheduled maintenance
- Repair damage caused by a leak or break
- Remediate area of released tailings
- Reclaim disturbed areas
- Follow spill reporting procedures

4.6.2 Earthquake Occurrence

Subsequent to an earthquake, the following are undertaken:

- Inspect dam and beach areas for sign of distress due to deformation
- Inspect dam for signs of liquefaction (e.g., local sand boils, etc.)
- Measure freeboard for compliance with design requirements
- Inspect toe area of dam for signs of deformation or piping of fines
- Inspect diversions, ditches, and spillways for signs of slumping or changes in geometry
- Inspect seepage collection areas
- Collect instrumentation data and submit to EoR for analysis

4.6.3 Flood Event

Following a flood event, as defined in Table 8, the following will be undertaken:

- Measure freeboard for compliance with design requirements
- Inspect dam, diversions, ditches, spillways, and diversions for signs of excessive erosion
- Inspect seepage return system for adequacy
- Implement appropriate response based on observations/measurements as defined in this manual

4.7 Reporting Requirements

Maintenance information will be communicated as per RASCI chart and in accordance with this OMS Manual.

Equipment logs and manuals will be maintained for reference and use by responsible staff.

Maintenance diaries and logs shall be maintained and accessible for review by other parties.

5.0 SURVEILLANCE

5.1 Objectives

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.

5.2 Surveillance Procedures

A program of regular periodic surveillance is required to ensure that the facilities are performing adequately and that problems are detected for necessary corrective actions to be implemented in a timely manner. The following surveillance procedures will be conducted:

- Visual monitoring by site staff (Section 6.3)
- Measurement of geotechnical instruments (Section 6.4)
- Sampling and testing in accordance with requirements (Section 6.5)
- LiDAR and bathymetry survey (Section 6.6)
- Collection of climate data from weather station (Section 6.7)
- Annual Dam Safety Inspections (DSI) (Section 6.8)
- Dam Safety Reviews (DSR) to be conducted in accordance with CDA, based on dam classification (Section 6.9)
- Event driven geotechnical inspections following any extreme weather events, including wind, rainfall, or earthquakes (Section 6.10)

5.3 Visual Monitoring by Site Staff

Visual monitoring by site staff is undertaken to identify potential failure modes, the associated visual observations are described in Table 4.

Table 4 - Failure Modes and Observable Conditions

Failure Mode	Conditions Related to Possible Increased Risk of Potential Failure Mode
Overtopping	• High water level • Blockage of water management structures • Extreme meteorological event • Dam settlement • Excessive accumulation of solids (near reclaim pocket) • Erosion from burst tailings pipe
Instability	• Cracking • Dam settlement • Slope movement • Dam bulging • Increased pore water pressures within the dam

	• Increased seepage • Erosion • Seismic event
Piping	• Sediment laden seepage • Wet spots at downstream dam toe or on downstream slope • Sinkholes

Inspection frequencies are followed as per Table 5 - Inspection Frequencies

Type	Frequency
Routine Inspection:	
Dam	Target 2x per shift
Diversions	Monthly
Sediment Ponds	Monthly
Ditches	Weekly
Seepage collection system	Target 2x per shift
Spillways	Weekly
Pipelines & Spigots	Target 2x per shift
Tailings Pond Monitoring:	Weekly
Pump intake	Target 2x per shift
Inflows, Outflows, Condition	Monthly
Annual Dam Inspection	Annually, with no snow cover
Event Driven Inspection	Following unusual events (defined in Table 8)
Comprehensive Review (DSR):	
Low and Moderate HPC dams	Every 10 years and prior to decommissioning
Very High HPC dams	Every 5 years and prior to decommissioning

. The TMA and WMP dams are inspected simultaneously to the tailings pipelines (See MIL-CND-SOP-0009 for details). Forms are available in Appendix G.

Table 5 - Inspection Frequencies

Type	Frequency
Routine Inspection:	
Dam	Target 2x per shift
Diversions	Monthly
Sediment Ponds	Monthly
Ditches	Weekly
Seepage collection system	Target 2x per shift
Spillways	Weekly
Pipelines & Spigots	Target 2x per shift
Tailings Pond Monitoring:	Weekly
Pump intake	Target 2x per shift
Inflows, Outflows, Condition	Monthly
Annual Dam Inspection	Annually, with no snow cover
Event Driven Inspection	Following unusual events (defined in Table 8)
Comprehensive Review (DSR):	
Low and Moderate HPC dams	Every 10 years and prior to decommissioning
Very High HPC dams	Every 5 years and prior to decommissioning

During depositing of tailings, the Mill Supervisor and Site Services Superintendent delegate those who are required to complete inspections daily. Reporting is to be escalated to hourly observations if a rainfall event is escalating and the Cell 2/3 pond level is within 500 mm of the emergency spillway elevation (equals or exceeds 369.2 m, based on Stage 2 spillway). The Mill Manager will decide whether to provide additional surveillance resources in the case where additional duties including maintenance and operation of the Cell 2/3 dewatering pumps is required to be performed.

5.4 Geotechnical Instrumentation

The performance of the dams is monitored using a variety of instruments. Instrumentation measurements, along with visual inspections, serve as the primary mechanisms for performance monitoring of the TMA and Water Management dams. A brief description of each instrument is provided below. Additional details are available in BGC-4910-DT00-MAN-0002.001.

- Slope Inclinometers (SI) – A vertical PVC pipe (either red or blue) installed through the ground typically into bedrock that measures horizontal deformation

- Vibrating Wire Piezometers (VWP) – A pressure transducer and polyurethane coated wire that measures the pore water pressure within the dam fill materials and foundation soils

- Standpipe Piezometers – A vertical PVC pipe with a perforated or screened section that is capable of measuring water levels and allows collecting water samples

- Settlement Plates – A base plate is installed at some depth with a riser pipe extending to surface, which allows the monitoring of vertical consolidation/settlement of soils

- Magnetic Extensometers – Used to monitor vertical consolidation, these are installed as a series magnetic rings, either around corrugated PVC tubing or slope inclinometer casing within the foundation

- Survey Monuments – A bar of steel is driven into the ground and the top of the bar is surveyed to monitor displacement

The following sub-sections are subject to change and should be read in conjunction with BGC-4910-DT00-MEM-0014.001.

5.4.1 Reading Frequency

Table 6 presents the data collection, reporting, and submission frequencies for geotechnical instrumentation. Note that these frequencies may change based on EoR observations.

Table 6 - Data collection, threshold reporting, and data submission frequencies

Instrument Type	Data Collection/Processing and Threshold Exceedance Reporting Frequency (Days)	

	Active Construction	Post Construction	Operations	Data Submission Frequency
SI	7	14	30	30
VWP	Twice Weekly	7	7	7
Standpipe	7	14	30	30
Settlement Plate	30			30
Magnetic Extensometer	30			30
Survey Monuments	30			30

5.4.2 Data Collection and Processing

The Tailings Dam Technician is responsible for data collection and maintenance of the VWP automated system. All instruments are manually collected, except for VWP. The VWP is connected to a datalogger, which records hourly readings for the instrument. These readings are then transmitted by radio frequency to Hubs located at the Marr site or the E-House at the intersection of WD4, WD5 and Cell 1 Dam. The Hubs transmit the collected data through cell service to the Cloud, which is stored as .csv files. These files are located at:

\\pcs01-yag\Campbellsci\LoggerNet

All geotechnical instrumentation is processed using VBA enabled excel spreadsheets. These spreadsheets store the collected data from all instruments. Additional tools for scheduling, quality assurance, monitoring trends and reporting are built into the sheets. These files are located at:

\\FPS02-YAG\\Engineering\Geotechnical\07 - Instrumentation (V: Drive)

The Tailings Dam Engineer is accountable for scheduling, collecting measurements, assuring data, and maintenance of geotechnical instrumentation. The EoR is responsible for interpretation of this data.

The raw data provided by the Barron Weather Station is used in the piezometer processing sheets to correct for barometric pressure.

5.4.3 Thresholds

Instruments have been installed to form a network of monitoring points to provide information as a basis to assess geotechnical performance of the TMA and Water Management dams. Instrument measurements are compared against defined thresholds linked to the design basis. The trigger level threshold indicates a value exceeding those used as a basis for meeting the design criteria. An alert level threshold indicates a more significant magnitude threshold exceedance.

5.4.4 GIS

The VWP have been included in the New Gold GIS web viewer. These are updated twice weekly using the processing sheets. While it is intended for all instruments to be integrated into the New Gold GIS web viewer, only the VWP have been added. The following folder link stores the automated process for adding piezometers into the GIS system:

V:\Engineering\Geotechnical\07 - Instrumentation\00) GIS

The “To_Import.csv” file is updated using the processing spreadsheets. Once complete, it is copied into the “To_Import” folder. A script searches every 30 seconds for a file and automatically uploads the data to the GIS web viewer. The “To_Import.csv” is then moved to the “Imported” folder and relabelled with the time it was uploaded (YYYY-MM-DD_HRMMSS).

To view this data in the GIS web viewer, the “Geotechnical Database” must be selected. The layers “Piezos 30-Day Rolling V2” or “Total Head Elev. By Geology” are both updated through this process. The symbols used for the 30-Day rolling are as shown in Figure 5. The green, yellow, and red colours indicate that it is either below, above trigger, or above alert thresholds, respectively. The numbers indicate the magnitude of change in the last 30 days.

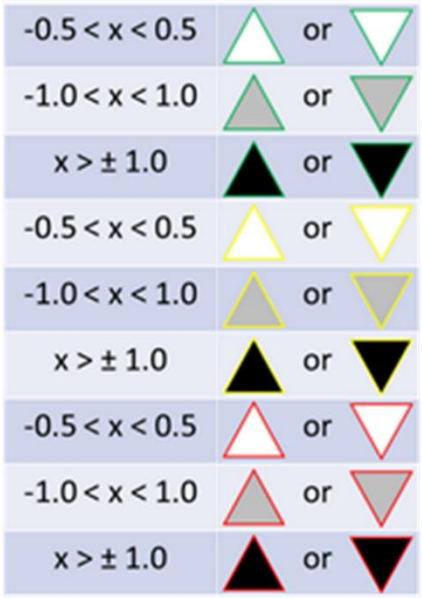

Figure 5 - Symbols for VWP used in GIS

5.5 Other instrumentation

Additional instrumentation to support the OMS manual and management of water includes;

- Densometer on the tailings pipeline;
- Flow meters on the water management pipelines including from the Pinewood River, tailings reclaim lines, MRP line and freshwater line from the WMP and

- Pressure transducers in the WMP, Clark/Teeple Ponds.

This instrumentation provides continuous recording, which is collected during routine inspections and included.

5.6 Water License Sampling and Testing

At RRM, water and effluent quality monitoring is conducted in accordance with the prescribed analytes and sampling frequency as required by Amended Environmental Compliance Approval (ECA) #7004-BC7KQ5 issued on February 11, 2020 by the Ontario Ministry of Environment, Conservation and Parks (MECP), replacing expired ECA #5781-9VJQ2J (construction) and rescinded ECA #5178-9TUPD9 (operation) issued on May 8, 2015 and September 1, 2015 respectively. Additionally, the federal *Metal and Diamond Mining Effluent Regulation SOR/2002-222 (MDMER)* and provincial O. Reg 560/94: *Effluent Monitoring and Effluent Limits – Metal Mining Sector* also have prescribed analytes and sampling frequencies that are applicable to RRM.

The NG Environment Department collects all water and effluent quality samples. Water and effluent quality data is stored by the Environment Department in the environmental data management software EQuIS by EarthSoft. A water and effluent quality sampling schedule is produced by the Environment Department in Q4 annually for the following year to ensure compliance with ECA and other regulatory sampling requirements.

5.7 Survey and Bathymetry

During construction, survey is completed for all material contact boundaries of the TMA. A combination of general contractor QC survey and NG survey are compiled by drafting support. Annually, the crests of all dams are surveyed to confirm that consolidation has not reduced the closure elevation of the dams.

When tailings are actively discharged from pipelines, elevations of the tailings (either water level or solids level) are collected weekly. The NG Construction surveyors collect these readings and they are stored by the Tailings Dam Engineer and Environmental team. A forecast is completed monthly to monitor expected days of contingency for tailings placed at its current location.

Bathymetric surveys are completed annually by the Environmental team. These coincide with LiDAR surveys.

A summary report titled "TMA Cell 2/3 Water Levels" is circulated daily at 9 a.m. to summarize the measured water and tailings levels as of 4 p.m. the day prior. This report is prepared and circulated by the Environmental Manager or designate. The purpose of the report is to highlight trend data for Cell 2/3.

All dam crest elevations and spillway/diversion channel invert elevations will be surveyed annually. This is to verify that foundation consolidation has not lowered the effective containment elevations of the dam structures.

The “Fill Placement Summary” (FPS) is collected weekly and data is submitted monthly. The FPS includes maps of weekly fill placement and fill elevation heatmaps relative to TMA Stage 3 design surface.

5.8 Weather Stations

The RRM weather station was installed at the Barron Site in September 2016 and is maintained by the Environment Department. The data collected by the Barron weather station is hosted by Campbell Scientific, and the data is updated twice per day at 09:00 and 16:00. In Q4 2020, the Barron weather station was upgraded to include an all-weather precipitation gauge, snow depth sensor, evaporation pan and newer models of existing instruments.

5.9 Dam Safety Inspections

The annual Dam Safety Inspection (DSI) is completed by the EoR, typically during the summer months. Recommendations from the DSI are recorded in an action tracker to closure.

The DSI is not required when the Dam Safety Review (DSR) is completed.

5.10 Dam Safety Reviews

The Dam Safety Review (DSR) is a requirement of the CDA. DSR scheduling requirements are summarized in Table 7. The DSR must be completed by a consultant who is free of any conflict of interest that could be caused by prior participation in the design, construction, operation, maintenance, or inspection of the dam under review. The CDA Dam Safety Guidelines recommend that a DSR be conducted every 5 years for an EXTREME consequence dam.

Table 7 - DSR Schedule

Dam Name	Construction Complete (DD-MMM-YY)	CRR Issued	Date of Initial Filling	Initial DSR (3 year from filling)	DSR Frequency (5 years from initial)
TMA AND WMP DAMS					
TMA North Dam	05-Sep-18	15-Jan-19	2019	2021	2026
TMA West Dam (Dam 4)	18-Jul-17	31-Oct-17	2019	2021	2026
Settling Pond Dam	18-Jul-17	31-Oct-17	2018	2021	2026
TMA West Dam (Dam 5)	07-Aug-17	31-Oct-17	2017	2021*	2026
TMA South Dam (0+000 – 0+800)	06-Sep-17	06-Dec-17	2017	2021*	2026
TMA South Dam (0+800 – 1+250)	19-Oct-17	15-Jan-19	2018	2021	2026
TMA South Dam (1+250 – 3+250)	16-Nov-18	29-Mar-19	2019	2021	2026
TMA Cell 1 Dam**	03-Sep-17	06-Dec-17	2017	NA	NA
TMA Cell 2 Dam**	NA	NA	2018	NA	NA
WMP Dam 1	18-Oct-16	31-Oct-17	2018	2021	2026
WMP Dam 2	02-Jul-17	31-Oct-17	2018	2021	2026
WMP Dam 3	07-Jul-17	31-Oct-17	2018	2021	2026
WATER MANAGEMENT DAMS					
Sediment Pond 1 Dam	31-Oct-18	12-Aug-19	2019	2021	2026
Sediment Pond 2 Dam	24-Sep-17	29-Dec-17	2017	2021*	2026
Sediment Pond 3 Dam			2020	2021	2026
West Creek Pond Dam	21-May-17	29-Dec-17	2017	2021*	2026
Stockpile Pond Dam	11-Oct-17	12-Jan-18	2018	2021	2026
Mine Rock Pond Dam	04-Dec-16	19-May-17	2017	2021*	2026
Clark Creek Pond Dam	25-Nov-16	19-May-17	2017	2021*	2026
Teeple Pond Dam	23-Sep-18	27-Feb-19	2019	2021	2026
Water Discharge Pond Dam	31-Oct-18	12-Aug-19	2019	2021	2026
Plant Site Ponds					

* Initial DSR is due 2020 but will be completed in 2021.

** Dams to be overtopped and inundated by tailings.

5.11 Event Driven Procedures

A list of unusual events and post-inspection requirements are given in Table 8.

Table 8 - Inspection Requirements Following Unusual Events

Unusual Event	Post – Event Inspection/Surveillance
Earthquakes	Carry out a detailed walkover of all dam structures, including crests, downstream and upstream (visible) slopes and dam toes, and all spillways, looking for signs of cracks, bulging, settlement, and/or other deformations. Look for and note any changes in seepage, particularly with respect to the rate of seepage flows at dam slopes and seepage clarity. Read all piezometers. Inspect downstream toes of dams for sand boils and dam slopes for sinkholes. Inspect ponds upstream of the dams looking for 'whirlpools. Inspect all pump stations and pipelines. Discuss findings with the Engineer of Record.
Rapid snowmelt and/or heavy rainstorms exceeding a 1:1-year, 24 hr rainfall (51 mm)	Inspect the (visible) slopes and the crests of all the tailings dams looking for areas of concentrated runoff and erosion. Make note of saturated ground/soft ground conditions at dam slopes and toes. Examine dam slopes for indications of localized slumping/instability. Inspect all pump stations and pipelines. Check the water levels in all ponds/reservoirs against the critical levels and keep checking these levels until the pond/reservoir inflows subside. Discuss findings with the Engineer of Record. Check piezometric levels at dam sites if instructed to do so.
Unusually high winds (exceeding 60 kph i.e., 75 % of maximum likely used in design)	Check the condition of erosion protection on the upstream slopes of the dams.
Extreme snowpack (170cm cumulative snowfall) (i.e., 120% or greater than normal snowfall at Barwick)	Check the water levels in all ponds/reservoirs against the critical levels and keep checking these levels until the spring freshet is over. Evaluate the situation in terms of possible snowmelt scenarios. Make predictions as to the expected storage capacity available in ponds/reservoirs. If deemed necessary, mobilize pumping and mobile treatment equipment to site.
Significant, relatively rapid erosion (any cause) of dam slope of 'sudden' seepage break at dam slope or downstream of dam in form of continuous seepage or boils	Notify Tailings Dam Engineer and EOR. Inspect clarity of seepage, rate of seepage and amount of material sloughed. Consider initiating Emergency Response Plan
Pond level close to, or approaching a critical level	Notify Mill Manager. Consider initiating Emergency Response Plan
Significant change in an instrumentation reading – see table below for definition of significant change	Check the historical readings paying special attention to seasonal changes and check the measurement again. Carry out visual inspection of all areas in the vicinity of the instrument of interest. Contact the Engineer of Record.

5.12 Documentation

Documentation of surveillance and monitoring activities shall be maintained by the Mill Manager, or as designated, as described in the preceding sections and will include recording of:

- Routine visual observations (departures from normal conditions)
- Photographs
- Instrumentation monitoring
- Analyses and evaluations
- Reviews

Documentation will include, as a minimum, the following:

- Weekly routine inspection log
- Monthly tailings facility and process water pond monitoring report
- Monthly instrumentation reports
- Annual Dam Safety Inspection reports
- Comprehensive Dam Safety Review report

Documentation will include an electronic filing system for inspection reports, photographic and video records, incident reports, instrumentation readings, instrumentation plots, annual inspections and third-party reviews, readily available for review in an emergency event.

5.13 Reporting

The Mill Manager, or designated responsible party, and Geotechnical Engineer will review collected data records from facility monitoring and assess the need for maintenance activities or response. Corrective actions will be identified and tracked to closure.

The Environmental Manager is responsible for overseeing sample and data collection and analysis. Reporting will meet MECP requirements and the annual DSI report will also be submitted to the MNRF. Reporting includes:

- As built reports of the dams, excluding the Clark and West Creek diversions, will be submitted to MECP within 90 days of completion
- An annual report based on the DSI including ECA approval requirements
- Monthly water quality monitoring report
- Annual report shall include:
    - Operating problems and corrective actions
    - Summary of calibration and maintenance works
    - Use of contingency plans

- Surface water and groundwater monitoring reports including water balance
- ML/ARD updates
- Discharge volumes and quality

Additional reporting requirements may be developed as the RRM progresses.

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.