RAINY RIVER PROJECT

PART VII – WATER TREATMENT - OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL WATER MANAGEMENT STRUCTURES

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Rainy River Project
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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 van Deventer	NG Mine Operations	Mine Manager		
	Sylvie St. Jean	NG Environment	Environment Manager		
	Tony Lord	NG Maintenance	Mobile Maintenance Manager		
	Andre Zerwer	BGC Engineering Inc.	Engineer of Record		
Approved by	Tyler Buckingham	NG Mill	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 Pinewood River and Culverts 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

The OMS has been prepared to directly meet requirements for the following regulatory approvals:

- LRIA-FF-2015-08: Culvert Crossing C-15
- LRIA-FF-2016-02A: Culvert Crossing CPL5
- LRIA-FF-2015-01: Culvert C2, C6, C8
- LRIA-FF-2015-07: Pinewood River Intake/Discharge Structure

2.0 FACILITY DESCRIPTIONS

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.

The focus of this part of the OMS is the Pinewood River and associated culverts. The Pinewood River is the main receiving body for all water that is acceptable to be released to the environment, based on compliance with regulated water quality parameters.

2.1 Process Affected Water (PAW)

The Mill uses water, which is then discharged (PAW) into the Tailings Management Area (TMA). The water can then be recycled back to the mill or treated. The overall water treatment process for PAW is shown in Figure 1.

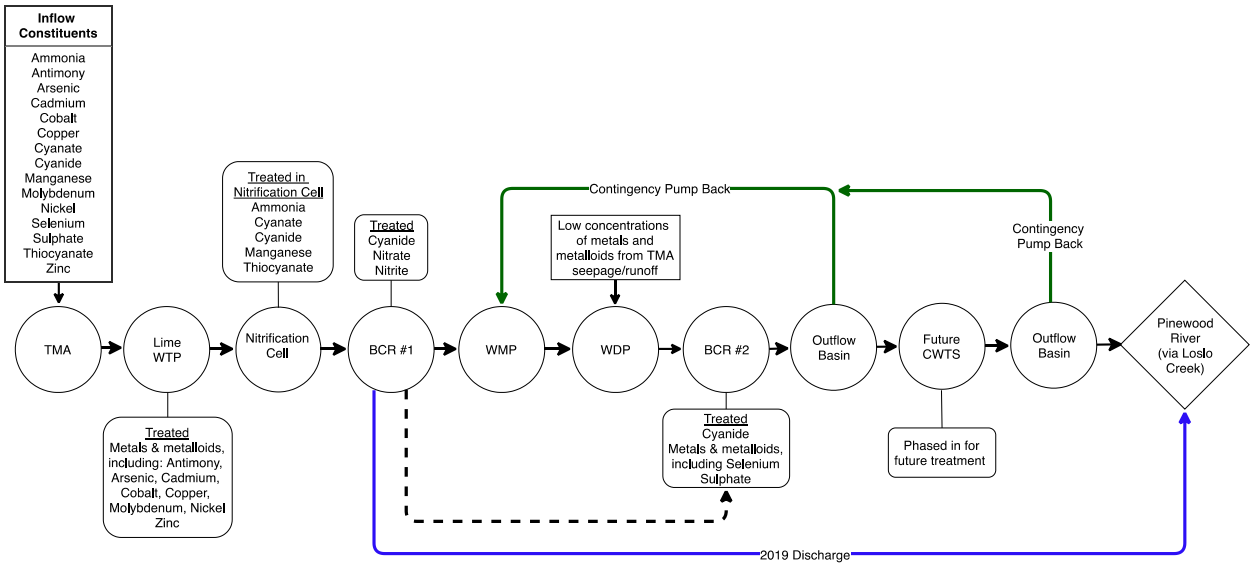

Figure 1 - Overall Water Treatment Process Schematic

The TMA has been designed to optimize natural degradation processes to provide further water treatment, by ensuring there is sufficient retention time to allow these reactions to occur. The natural degradation processes are most effective during warm weather conditions when biophysical activity is optimal, and are also augmented by exposure to sunlight. Effluents that are planned for discharge to the environment will be held for a sufficient period of time under warm weather conditions, to maximize the effects of natural degradation. Such effluent aging will take place mainly in the summer months (June through mid-September) in both the TMA and WMP.

To optimize both water quality and river flow effects, final effluent is released to the Pinewood River at two separate locations:

- At closure, through the constructed wetland to the Pinewood River at the Loslo Creek outflow (via lower Loslo Creek)

- Directly to the Pinewood River via Effluent Discharge Location 1 (EDL1) just downstream of the McCallum Creek outflow, by pipeline.

- Directly to the Pinewood River via Effluent Discharge Location 2 (EDL2) just downstream of the Loslo Creek outflow, by pipeline

EDL2 is the primary discharge and will be prioritized over EDL1. Discharge through EDL1 can be greater than EDL2, however.

The rationale for using two separate discharge locations derives from the need to achieve effective water quality treatment while minimizing adverse flow effects on the Pinewood River, under varying hydrologic operating conditions. EDL2 is located further upstream on the Pinewood River and will help to maintain flow in the Pinewood River but has a lower assimilative capacity. All effluent from the water management pond which is not discharged to EDL2 will be discharged by pipeline to EDL1 downstream of McCallum to take advantage of increased river assimilative capacity at this point.

The treatment of water (for discharge to the environment) will normally occur during the months of May through September. To facilitate this process, the water in the WMP would be drawn down by the end of April in each year. The release of WMP effluent to EDL1 and 2 in the Pinewood River would occur during the spring and fall. Water which is not discharged in the fall would be held over in the WMP until the following spring for release.

Each discharge has specific discharge criteria as specified in MECP ECA #7004-BC7KQ5 which must be met prior to discharge.

2.2 Contact and Non-Contact Water Runoff

Contact water can be either rain or overland flow that has traveled over mine infrastructure and must be collected and treated by law (ECCC). This water is collected by a network of ditches and sumps, except EMRS runoff which is collected within the MRP. Contact water is then pumped into the TMA, Mine Rock Pond (MRP), or is recycled back into the mill.

Existing creeks and smaller water bodies are diverted through the mine with a system of dams and ditches and is referred to as non-contact runoff. Three major systems are:

- Clark Creek originates north-east of the mine and flows towards the south-west, originally passing through the East Mine Rock Stockpile (EMRS) and MRP footprints. Clark Creek is diverted away from the EMRS and MRP by the Clark Creek Dam, Clark Creek diversion channel, Teeple Dam, and Teeple Pond Outlet channel.

- The West Creek system originates northeast of the mine and flows south, originally passing through the open pit, plant site, and crusher. The Stockpile Pond Dam (SPD) and West Creek Dam (WCD) were constructed to divert water into the West Creek diversion channel, which travels south of the TMA and discharges into the Pinewood River via Loslo Creek.

- Loslo Creek and Marr Creek would normally pass through the TMA footprint, but have been diverted towards the east of the TMA as Loslo and Marr Diversion Ditches, ultimately entering the WCD.

Sediment Ponds #1, #2, and #3 collect runoff water from the WMRS and often has higher suspended solids caused by eroding soil being caught up in the overland flow. To treat these suspended solids, the runoff is diverted/pumped to the sediment ponds where a lag time allows these solids to settle prior to discharge to the environment. If water quality objectives cannot be met prior to discharge, the water is to be pumped back to the TMA to allow further treatment. Water quality must always be determined before discharging to the environment. Sediment Ponds are discussed in detail in Part 5 of the OMS.

To prevent the flooding of the pit, a diversion berm was planned to be constructed between the Pinewood River and the open pit. This is no longer part of design but requires monitoring the water elevations in the Pinewood River in the range of the open pit.

2.3 Discharge Locations

There are four provincially and federally permitted locations where discharge from the mine into the environment can occur:

- Effluent Discharge Location #1 (EDL1), consisting of a 10 km pipeline and an effluent mixing structure (EMS#1) with two duckbill diffusers and riverbed armouring, downstream of the McCallum Creek and Pinewood River confluence

- Effluent Discharge Location #2 (EDL2), consisting of a 2 km pipeline and an EMS (#2) with two duckbill diffusers and riverbed armouring, downstream of the Loslo Creek and Pinewood River confluence

- Sediment Pond 1, discharging to the West Creek Diversion then reporting to the Pinewood River at the Loslo Creek confluence via splash pad at the Sediment Pond 1 spillway

- Sediment Pond 2, discharging to the Pinewood River just upstream of the Loslo Creek and Pinewood River confluence via splash pad in the field south of the pond

The locations of these discharge points are presented in Figure 2.

2.4 Water Discharge Pond and Constructed Wetlands

The Water Discharge Pond (WDP) has been designed to collect runoff from natural ground catchment south of the TMA, seepage from the seepage collection ditch, and bleed flow from the WMP (design rate of 10,000 m^3/day) for discharge to the constructed wetland. The WDP will also provide sediment control south of the TMA.

The constructed wetlands will collect the water discharged from the WDP. They have been designed to provide a target 30-day retention time following discharge from the WDP. The wetlands will be comprised of five ponds (Pond A, B, C, D, E), and the downstream pond (Pond A) will feature a control structure to stop discharge if the water quality does not meet discharge criteria. If required, water in Pond A would be pumped back to the TMA or WMP.

With the construction of BCR2, the wetlands are largely redundant until the end of mine life. The wetlands will be the primary discharge location for passive flow through the TMA at closure. The design criteria for the Water Discharge Pond Dam and Constructed Wetlands dams are provided in Table 3.

Table 3 - Water Discharge Pond and Constructed Wetlands Document Summary

Document Title	**Reference**
LAKES AND RIVERS IMPROVEMENT ACT WORK PERMIT APPLICATION SUPPORT DOCUMENT WATER DISCHARGE POND AND CONSTRUCTED WETLAND	RRP-GEO-LRIA-004D R2
As-built Report(s)	**TBD**
Drawing Title	New Gold Document Number
Water Discharge Pond Dam – Plan and Typical Cross Sections	3098004-004410-A1-D70-0002
Constructed Wetland – Plan, Profiles & Section	3098004-004420-A1-D70-0002

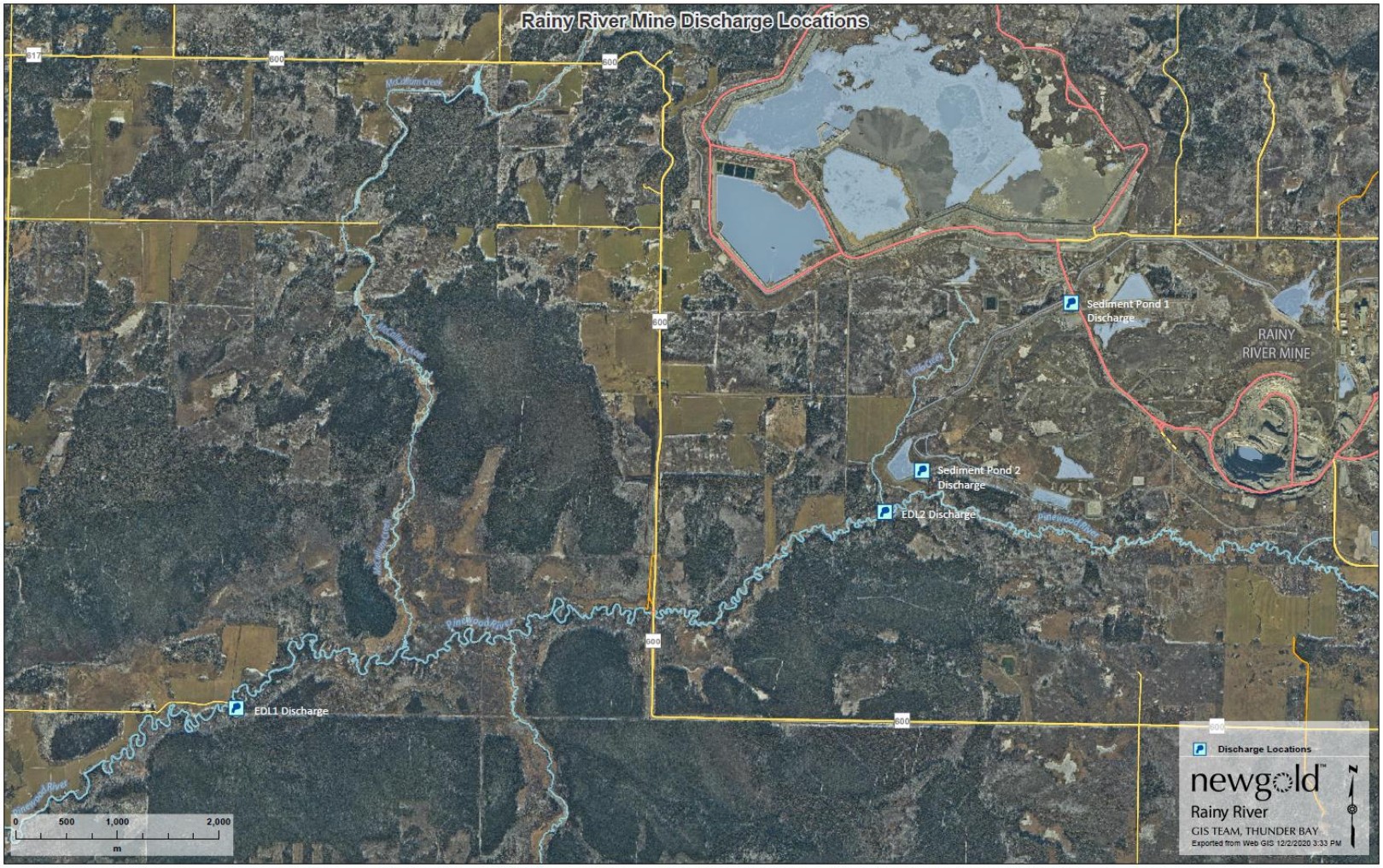

Figure 2 - Discharge Locations

3.0 OPERATIONS

3.1 Discharge Conditions

Discharge of site contact water or treated effluent can only occur at permitted final discharge points. The following conditions of ECA #7004-BC7KQ5 apply to discharges to the environment at the four permitted final discharge points at RRM:

- Treated effluent shall only be discharged to the Pinewood River via EDL1 and/or EDL2 seasonally. No water shall be discharged after December 1st of each year until spring melt when the Pinewood River is largely ice free and meets the minimum flow threshold (Condition 4(8))

- No treated effluent shall be discharged via EDL1 and/or EDL2 or any other means unless the Pinewood River is flowing at 10,000 m^3/day or greater as measured at hydraulic station H1 (formerly site 19) unless specified by the District Manager, in writing (Condition 4(9))

- The Owner shall control the combined effluent discharge rate from EDL1 and EDL2 such that at all times the ratio of the combined effluent flow rate to the flow rate of the receiver at hydrometric station H1 (i.e., the flow rate of the Pinewood River downstream of the McCallum Creek confluence) is less than or equal to 1:1 (i.e. the cumulative flow rate of the effluent must be less than or equal to the flow rate of the receiver) (Condition 4(10))

- The Owner shall ensure that the discharge at EDL2 is prioritized. The Owner shall only discharge from EDL1 if there is not sufficient flow in the receiver (i.e. Loslo Creek) for EDL2. (Condition 4(11))

- Discharge from the four final discharge point does not exceed the respective daily and monthly average objectives and limits listed in OMS Section 6.2.4, Table 6-2 (Condition 5 and 6)

- Discharge samples are collected for the effluent parameters at the monitoring frequencies listed in OMS Section 6.2.4, Table 6-3 (Condition 8(2) and 8(3))

- The Owner shall operate, and maintain the Works such that the effluent from EDL1, EDL2, Sediment Pond #1, and Sediment Pond #2 is non-acutely lethal to Rainbow Trout and *Daphnia magna* by ensuring that each Rainbow Trout acute lethality test and each Daphnia magna acute lethality test performed on any grab sample of effluent shall not result in >50% mortality of the test organism in undiluted final effluent (i.e. 100% effluent).

- The Owner shall control the effluent discharge rate from Sediment Pond #1 such that at all times the ratio of the flow rate of the effluent to the flow rate of the receiver (West Creek Diversion) is less than or equal to 1:5 (i.e. the flow rate of the effluent must be less than or equal to 16.7% of the total flow rate of the receiver once mixed).

- The Owner shall control the effluent discharge rate from Sediment Pond #2 such that at all times the ratio of the flow rate of the effluent to the flow rate of the receiver (Pinewood River) is less than or equal to 1:10 (i.e. the flow rate of the effluent must be less than or equal to 9.1% of the total flow rate of the receiver once mixed).

3.2 Discharge Roles and Responsibilities

Environment Department

- Maintain hydrometric stations and calculate daily Pinewood River and West Creek Diversion flows

- Monitor site contact water and treated effluent quality for compliance with daily and monthly average objectives and limits listed in OMS Section 6.2.4 Table 6-2 prior to discharge

- Notify Environment and Climate Change Canada of planned discharge dates and cessation of discharge

- Conduct discharge sampling for parameters at the frequencies listed in OMS Section 6.2.4 Table 6.3

- Report on daily and monthly average discharge quality

- Discharge volume calculations

- Daily discharge report with allowable discharge volume by final discharge point and cumulative discharge statistics

Mill

- Discharge the allowable volume at final discharge points EDL1 and EDL2 as indicated in the daily discharge report

- Ensure flow meters and inline temperature and pH probes are always functioning during discharge, and make the data available if not accessible

- During active tailings deposition, the Mill is responsible for inspecting the tailings lines at a frequency established in Table 4

- Report any incidents relating discharge and associated infrastructure to the Environment Department immediately

Site Services

- Discharge the allowable volume at final discharge points Sediment Pond 1 and Sediment Pond 2 as indicated in the daily discharge report

- Ensure flow meters are always functioning during discharge, and provide pumping records

- Site services is responsible for inspecting the active water lines at a frequency established in Table 4

- Report any incidents relating to discharge and associated infrastructure to the Environment Department immediately

3.3 Reporting Requirements

The environmental approvals and permits received from the government are maintained by the New Gold Environmental Department. They should be referred to for details of monitoring, inspection, and reporting requirements.

Records are retained consistent with IACC condition 11 for a minimum of 25 years or until decommissioning ends, whichever is longer and kept locally. This exceeds the ECA permit requirement of 5 years. Records include place/date/time of sampling, dates and analysis performed, analytical techniques used, names of persons collecting/analyzing samples and results of analysis.

3.3.1 Routine

Below is a list of routine reporting requirements:

- Submission of as-builts within 3 months of construction for any major part of the ECA permitted Works, ie WMP, TMA, MRP, Sediment ponds 1 and 2, etc.

- Monthly performance report including an overview of the success and adequacy of the Works, summary of all non-routine calibration/maintenance procedures, tabulation and description of any bypass/upset conditions, a summary of all effluent monitoring data collected, other relevant information including QA/QC measures and occurrences requiring implementation of an investigation, contingency or remedial action plan, and a summary of all modifications completed as a result of Schedule B of the ECA to MECP

- Quarterly electronic effluent monitoring reports to MECP

- Annual reporting to MECP on March 31 for the previous year, a works performance report, and a surface water monitoring report

- Quarterly electronic effluent monitoring reports to ECCC

- Annual electronic effluent monitoring report and environmental effects monitoring reports to ECCC by March 31

3.3.2 Non-routine

Below is a list of non-routine (event driven) reporting requirements:

- Report all spills as defined in the Environmental Protection Act immediately to spills action centre SAC, follow New Gold Incident Reporting Guidelines and follow up in writing to MECP within 10 days describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation

- In the event an effluent objective is exceeded for two consecutive months as specified in condition 5, notify the MECP in writing within seven (7) days, and submit to the District Manager, within sixty (60) days, a plan to assess the cause of the exceedance and recommend actions to address potential impact

- In the event of a non-compliant event, including an exceedance of daily or monthly average limits, pH outside of 6-9.5 or an acute toxicity failure, notify the MECP as soon as reasonably possible, followed by a written report within seven (7) days. Within fifteen (15) days of a toxicity test failure, the Owner shall submit a written report to the District Manager outlining the cause(s) of toxicity and proposed or implemented remedial measures to control toxicity a written report to the District Manager outlining the cause(s) of toxicity and proposed or implemented remedial measures to control toxicity.

- Any observation of sheen/foam/settable solids within the works report immediately to MECP immediately, and followed by a written report within 7 days

- Any exceedance of effluent limits report to SAC immediately, written confirmation to MECP within 7 days

- Notify ECCC immediately if MDMER Schedule 4 limits are exceeded, pH is outside 6-9.5 range or if the effluent is acutely lethal, followed by a written report without delay (when most results are available)

3.3.3 Operations Report

A monthly Water Balance Update Memo is prepared by the Senior Water Resource Engineer or designate. The report includes metrics and information collected as part of normal operation. Examples of information contained in the Operations report include:

- Total monthly tailings deposition tonnage and slurry water volume

- Total monthly reclaim volume

- Pond level and freeboard

- Updated water balance

- Water quality results
- Discharge quantities.

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)
- 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 3.

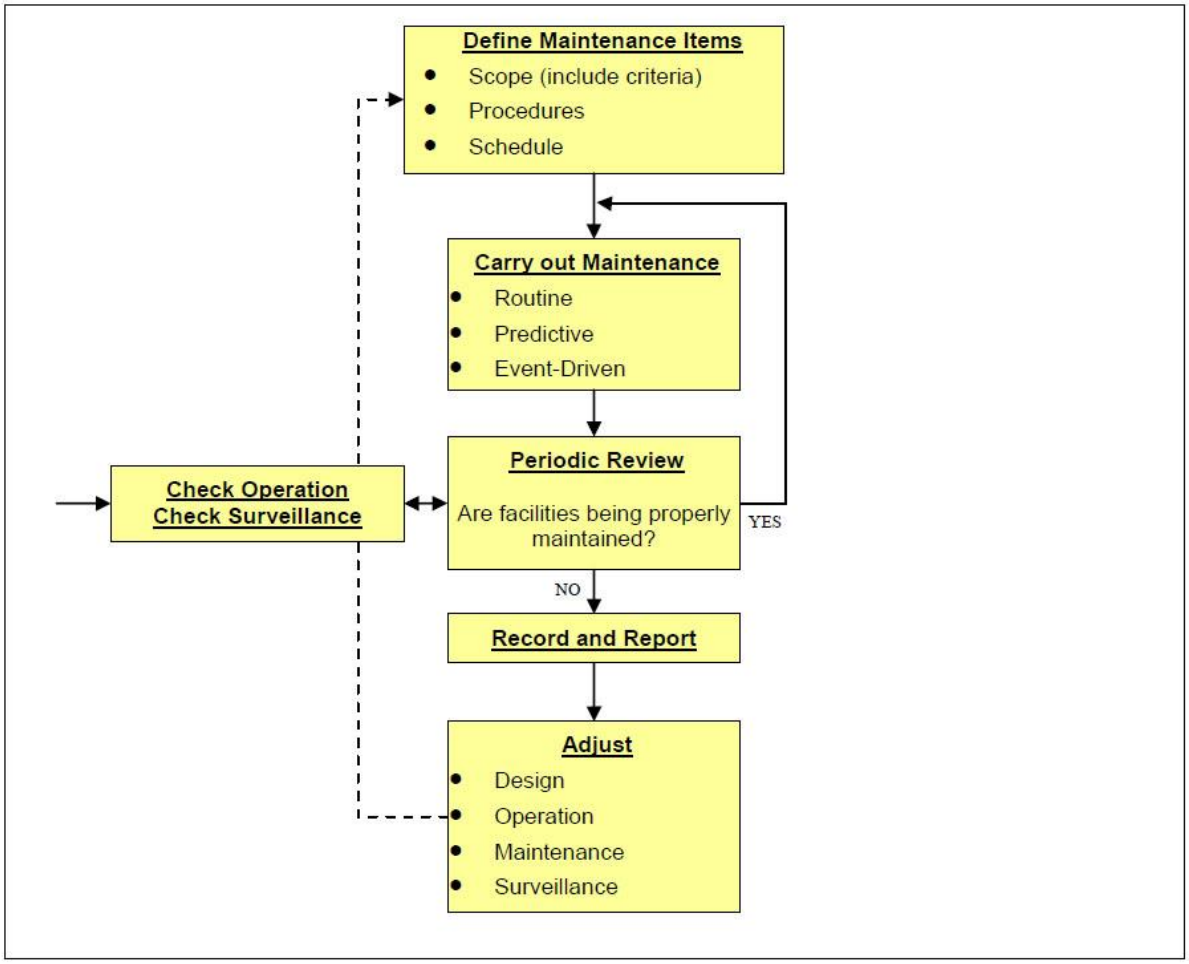

Figure 3 - Maintenance Flow Chart

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 when required.

4.2 Pumps

The maintenance of pumps is the responsibility of New Gold and maintenance records are required to be maintained. Each installation requires to be equipped with spill tray and spill kits. Changes to pumping configurations, ditching, piping, or operating parameters need to be approved by the New Gold Mill Manager, the New Gold Maintenance Manager, and the New Gold Environmental Manager, during normal working hours. This is particularly the case if splash pads need to be altered in any way.

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

- Perform regular performance tests on seepage pond pumps

- Perform annual calibration and maintenance as required on flow meters

- Perform regular non-destructive testing appropriate for components of the tailings delivery system, including for example, periodic measurement of pipeline thickness to identify areas of wear and to schedule pipeline replacement if necessary and repair liners as required

- Replace pipe work, bends and fitting components as required

- Remove accumulated debris from valves, reducers and off takes

- Carry out 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

4.3 Discharge Lines

During discharge, active lines require daily inspections. All water discharge lines are the responsibility of Site Services to maintain and inspect, while tailings lines are the responsibility of the Mill.

See RASCI - 3 for roles and responsibilities around water and tailings discharge lines.

4.4 Ditches and spillways

Ditch maintenance includes replacement or enhancement of erosion protection to prevent sediment generation or sloughing of slopes, as required.

4.5 Diversions

There are approximately 10 km of diversions associated with the Clark and West Creek diversion, as discussed in Part 6 of the OMS. Maintenance activities required include:

- Repair erosion and bank stability particularly in areas of concentrated flow e.g., culverts

- Remove debris, and where required and approved beaver dams, that are not part of natural progression of channel development

- Repair/modify fish habitat features if monitoring determines they are not meeting the success criteria per Fisheries Act Authorization 15-HCAA-00039, including dam crest/slope

4.6 Water Monitoring Instrumentation

Instrumentation is calibrated by the manufacturer prior to shipment. Calibration certificates will be maintained by maintenance department. Following instrument installation, initial reading procedures will be followed. Subsequent calibration will follow manufacturer's recommendations. Malfunctioning or damaged instruments may require repair or replacement per manufacturer guidelines or approved procedure.

4.7 Mobile Equipment

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

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

4.8 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 are 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. Normal documentation and maintenance records will be maintained because of any event driven maintenance actions. Unusual conditions that require maintenance are also communicated to maintenance staff as they occur.

4.8.1 Pipeline Leaks or Breaks

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

- Report to the Environment Department immediately, by phone call, to initiate sampling and external reporting, when required
- Inspect entire pipeline
- Repair or replace affected components
- Perform opportune and scheduled maintenance
- Repair any collateral damage caused by a leak or break
- Collect any released tailings and place in the tailings impoundment
- Reclaim any disturbed areas
- Follow any spill reporting that may be required pending type of spill and following documentation procedures.

4.8.2 Flood Event

Following extreme storms (as defined in section 7) the following are undertaken:

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

4.9 Reporting

Maintenance information will be communicated internally through formal and informal meetings, interaction between various levels of the organization (department and/or crew meetings), through information posted at the site and through this OMS Manual.

Communications with applicable contractors involved in tailings management will be conducted daily and weekly during tailings activity meetings, as appropriate. All employees and contractors are encouraged to communicate openly with site management about operational conditions requiring maintenance and reporting any significant observations such as event-driven maintenance or any maintenance requirements that exceed expected norms.

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 5.2.1)
- Inspections required after unusual events (Section **Error! Reference source not found.**)
- Water Monitoring and other instrumentation (Section 5.2.2)
- Sampling and testing in accordance with requirements (Section 5.2.3)

5.2.1 Visual Monitoring by Site Staff

Inspection frequencies are followed as per Table 4. 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 4 - Inspection Frequencies

Type	Frequency
Routine Inspection:	
Dam	Target 2x per shift
Diversions	Weekly
Ditches	Weekly
Seepage collection system	Target 2x per shift
Spillways	Weekly
Pipelines & Spigots	Target 2x per shift
Pinewood River along South of Open Pit	Weekly
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 5)
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.

During spring and fall freshet, the absence of the flood protection berm along the south side of the open pit presents a hazard. Site Services inspections during spring and fall will be completed by driving along the service road between the Pinewood and Open Pit a minimum of weekly.

Weekly inspection sheets and SOPs are provided in Appendix F. All weekly inspections will be documented in a report and will be compiled as part of the annual DSI.

5.2.2 Water Monitoring and 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 discharge, tailings reclaim lines, MRP line and freshwater line from the WMP
- Continuous water levels loggers (pressure transducers) and water levels alarms in the WMP, Outflow Basin and MRP. Data loggers are installed at the Stockpile, West Creek, Clark, Teeple Ponds as well as defined sections within the Pinewood River.
- Water sampling wells to monitor background levels and seepage potential

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

Table 5 - Maintenance Requirements following an Unusual Event

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 Dam Safety Inspector.

Unusual Event	Post – Event Inspection/Surveillance
Rapid snowmelt and/or heavy rainstorms exceeding a 1:2-year 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 Dam Safety Inspector. 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	Inspect clarity of seepage, rate of seepage and amount of material sloughed. Notify tailings dam engineer – site engineering and EOR. Consider initiating Emergency Response Plan
Pond/River level close to, or approaching a critical level	Notify 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.

5.2.3 Sampling Frequency, Requirements and Effluent Discharge Limits

Table 6 provides a summary of the sampling parameters and frequency for the four final discharge points.

Table 6 - Discharge Sampling Parameters and Frequency by Final Discharge Point

Effluent Parameter	Frequency	
	EDL1 & EDL2	Sediment Pond 1 & Sediment Pond 2
Temperature	Continuous, Weekly	Weekly
pH	Continuous, Thrice Weekly	Weekly
Hardness	Weekly	Weekly
Alkalinity	Weekly	Weekly
Total Suspended Solids	Thrice Weekly	Weekly

Total Dissolved Solids	Weekly	Weekly
Turbidity	Weekly	Weekly
Conductivity	Weekly	Weekly
Chloride	Weekly	Weekly
Sulphate	Weekly	Weekly
Orthophosphate	Weekly	Weekly
Total Kjeldahl Nitrogen	Weekly	Weekly
Total Ammonia	Weekly	Weekly
Nitrate	Weekly	Weekly
Nitrite	Weekly	Weekly
Dissolved Organic Carbon	Weekly	Weekly
Dissolved Oxygen	Weekly	Weekly
CBOD5	Weekly	NA
E. Coli	Weekly	NA
Total Cyanide	Thrice Weekly	Annually
Weak Acid Dissociable Cyanide	Thrice Weekly	NA
Free Cyanide	Thrice Weekly	NA
Thiocyanate	Weekly	NA
Cyanate	Weekly	NA
ICP Metals	Weekly	Weekly
Radium-226 (MDMER)	Weekly	Weekly
Acute Toxicity (*Daphnia* and Rainbow Trout) (*MDMER)*	Monthly	*Monthly/*Quarterly

Table 7 provides a summary of the effluent discharge limits that must be prior to and during discharge to the environment.

Table 7 - ECA Effluent Objectives and Limits by Final Discharge Point

Effluent Parameter	Effluent Objectives and Limits (mg/L)			
	EDL1 & EDL2		Sediment Pond 1 & Sediment Pond 2	
	Daily Max	Monthly Avg	Daily Max	Monthly Avg
CBOD5		25		25
Cadmium		0.001		0.001
Cobalt		0.0044		0.0044
E. Coli		100/100 mL		100/ 100mL
Total Suspended Solids	30	15	30	15
Unionized Ammonia	0.08	0.04	0.2/0.4	0.1/0.2
Total Phosphorus		0.1		
Total Cyanide	0.1	0.05		
Free Cyanide	0.02	0.01		
Total Arsenic	0.034	0.017	0.034	0.017
Total Copper	0.028	0.014	0.028	0.014
Total Lead	0.03	0.015	0.03	0.015
Total Nickel	0.094	0.047	0.094	0.047
Total Zinc	0.348	0.174	0.348	0.174
Acute Toxicity (Daphnia and Rainbow Trout)	Not greater than 50% mortality in undiluted effluent			
pH	Maintained between 6.0 and 9.5 at all times			
Radium-226 (MDMER)	1.11 Bq/L	0.37 Bq/L	1.11 Bq/L	0.37 Bq/L

To monitor background water chemistry and changes that may occur because of mining activities, the “PLAN” sets out water sampling well frequencies and targets. Should there be risks associated with seepage impacting the Pinewood river, a remediation program will be designed and implemented.

5.3 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 and testing

- Analyses and evaluations
- Reviews.

Documentation will include, as a minimum, the following:

- Weekly routine inspection log
- Twice/year instrumentation reports

Documentation will include a hard copy (paper) and electronic filing system for inspection reports, photographic and video records, incident reports, instrumentation readings, instrumentation plots, annual inspections, and third-party reviews, so that they can be quickly retrieved for review and in case of an emergency.

5.4 Reporting

The Mill Manager, or designated responsible party, and Tailings Dam 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 MRNF. Reporting includes:

- An annual report based on the DSI including ECA approval requirements
- Monthly water quality monitoring report
- Annual report including any operating problems and corrective actions, a 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 CLOSURE PLAN

This section summarizes the objectives of the Closure Plan. The Rainy River Mine Comprehensive Closure Plan Amendment (O'Kane Consultants, 2019) provides the closure plan and includes temporary closure options for short and medium-term shut-down of site facilities.

6.1 Structure Closure Overview

6.1.1 Tailings Management Area

Closure of the TMA will include, but is not limited to, the following:

- Flooding of the TMA with a 2 m or deeper water cover
- A perimeter zone of tailings beach will be maintained to keep the central pond away from the dams, this zone will be covered with a low permeability cover
- NPAG rock will be placed at the TMA transition zone with the tailings to prevent erosion and suspension and oxidation of solids; and
- Dam structures containing the TMA have been designed with adequate safety factors to provide overall long-term safety and stability.

Water entering the TMA is intended to passively flow through the final spillway into the WMP. From the WMP, flow will enter the WDP and then the constructed wetlands. Active monitoring and treatment of this system will occur for approximately 10 years following closure. Once water quality parameters have been verified to be satisfactory, the system will enter passive monitoring.

6.1.2 Open Pit

The open pit will collect overland flow and discharge into the Pinewood River. It is expected that it will take 75 years to fill the pit.

6.1.3 Other Structures

Closure of the embankments will typically involve, but is not limited to, reaching of embankments to prevent ponding of water and revegetating slopes to reclaim the area. Some embankment structures will still have a role during the closure phase, and these will not be breached. The following structures will continue to be operated during the closure phase:

- MRP will collect runoff and seepage from EMRS, which will be directed to the Open Pit to help flooding
- Sediment Ponds #1, #2, and #3 will be maintained until site is recognized as a closed mine and monitoring associated with the Metal and Diamond Mining Effluent Regulation is no longer required

- The water discharge pond dam will be breached once it no longer has a water management function.

- The constructed wetland will be left in place as this system is designed to operate passively and will have stabilized as a wetland complex during operations.

Freshwater diversion and constructed wetland structures are designed to operate passively and will remain in place at closure.

6.2 Monitoring

Monitoring requirements are described in the Rainy River Mine Comprehensive Closure Plan Amendment (O'Kane Consultants, 2019).

7.0 CONTINGENCIES

The operations are sensitive to water balance and water quality in discharges. The following are contingencies based on water management and functioning of the diversions.

7.1 Water Treatment

Two contingency plans have been developed as part of MECP approvals for water treatment:

- Pinewood River Quality Contingency Plan, Version 1 August 2016
- Groundwater and Surface Water Contingency Plan, Version 2 October 2015

Contingency options are to limit discharges, acceleration of TMA dam raises, add water quality treatment, additional monitoring, provision of water to affect areas and increased mixing ratios/improved mixing. The trigger for implementation of contingency in surface water is if protection of aquatic life criteria is not achieved 90 % of the time. The trigger for contingencies in groundwater is if water quality parameters exceed background metals concentrations in groundwater at the mining lease boundary or groundwater wells outside of the zone of influence are affected.