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Magino Project
Environmental Impact Statement

Technical Support Document 20-12

Water Management Plan

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FIGURE

SECTION 1.0 – PURPOSE OF THE WATER MANAGEMENT PLAN (WMP)

The Magino Project Water Management Plan will provide site wide guidance for water management related practices, concerns and issues for the Life of the Project. It based on the implementation of the design concepts developed for the Project infrastructure and the implementation of Best Management Practices (BMPs). The plan also draws on concepts presented in the "Environmental Code of Practice for Metal Mines" (EC, 2009).

SCOPE OF THE WMP

The plan focuses on management of water quantity and water quality for:

- Surface water runoff;
- Mine contact water;
- Groundwater;
- Process plant and TMF water;
- Freshwater supply;
- Grey water; and
- Discharge to the receiving environment.

For each of these streams, the WMP describes:

- The objectives;
- The key design features of the Project to achieve these objectives;
- The expected outcomes; and
- The follow up requirements.

The WMP will apply to all phases of the Project and will be updated and amended as required to reflect the needs of each Project phase. The water management concepts for the site are presented on Figure 1.

REGULATORY FRAMEWORK AND GUIDANCE DOCUMENTS

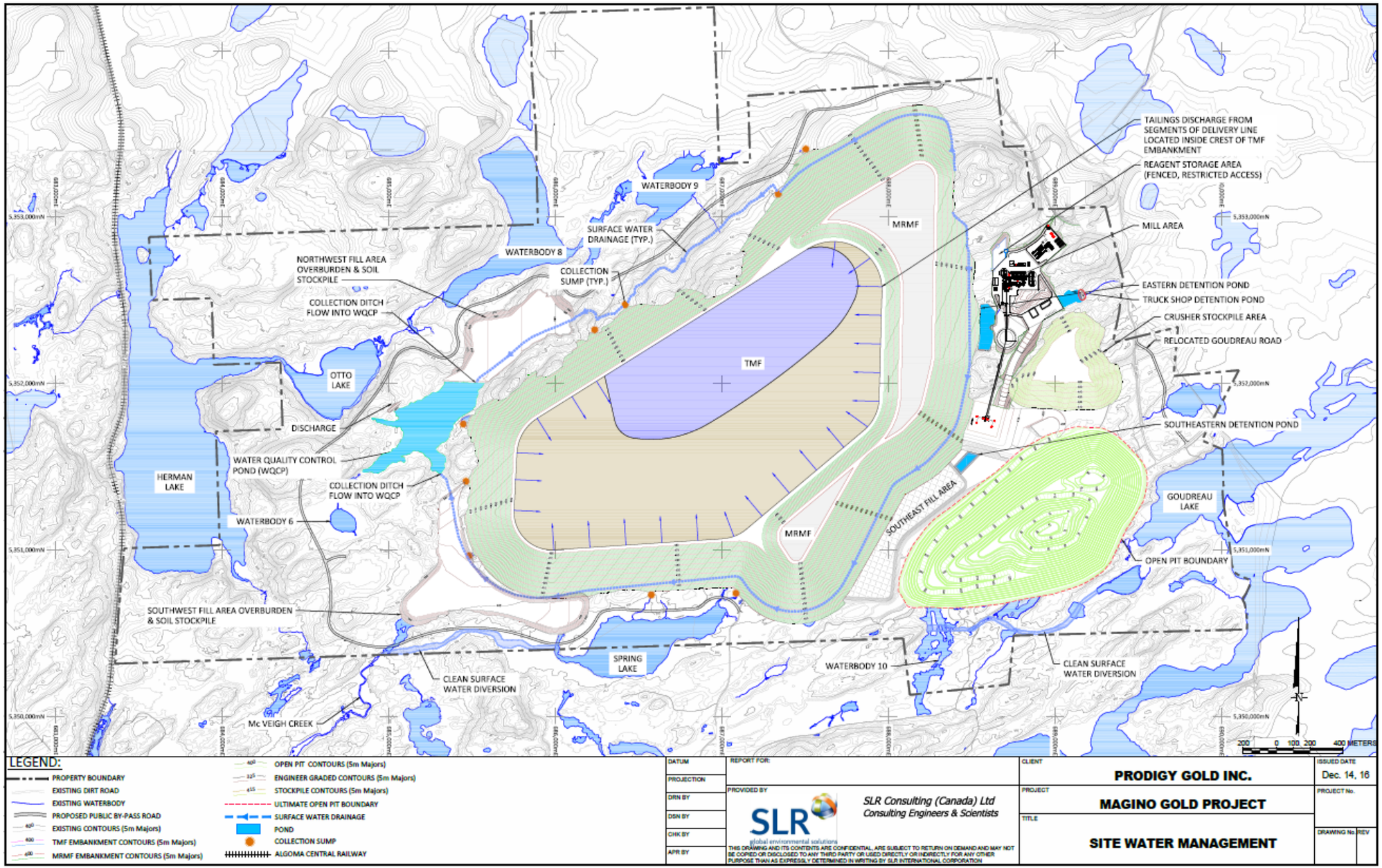
- O. Reg. 560/94 – Effluent Monitoring and Effluent Limits – Metal Mining Sector;
- Metal Mining Effluent Regulations (MMER);
- MOECC, Provincial Water Quality Objectives (PWQO);
- CCME, Canadian Water Quality Guidelines (CWQG);
- Mine Environmental Neutral Drainage (MEND) 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. Natural Resources Canada; and
- Environmental Code for Metal Mines (2009).

DEFINITIONS

In the context of this management plan:

- "Non-contact water" is defined as surface runoff resulting from natural precipitation that does not enter into contact with mine workings; and
- "Mine contact water" refers to any runoff or process water stream that come in direct contact with mine rock, tailings, or terrain where Project infrastructure components are built, and where mining activity occurs.

Figure 1: Magino Site Water Management



SECTION 2.0 – SURFACE RUNOFF MANAGEMENT

2.1 Objectives

- Minimize quantity (volume) of potentially contaminated surface runoff (mine contact water);
- Control suspended solid loading of mine contact water to less than 25 mg/L (surface runoff); and
- Control concentration of chemical contaminants in mine contact water (surface runoff) to acceptable level as prescribed by PWQO and MMER.

2.2 Key Design Concepts

Key design concepts include (also refer to TSD 6):

- Maintaining all Project activities within the confine of the Goudreau by-pass road;
- Capturing and collecting all runoff from Project activity areas;
- Sizing of all water management structures (diversion structures, collection trenches, collection ponds) to handle the one in 100-year return storm event;
- Low slope of collection ditches to minimize erosion;
- MRMF design safety of 1.5. Safety berms and perimeter ditches located to preclude release of mine rock beyond the defined perimeter limits in critical areas;
- Placing top soil and overburden stockpiles - placed at a minimum of 30 m from a waterbody in a stable configuration and compacted with the placement equipment. Vegetated to prevent erosion and, as necessary, locating perimeter ditches to preclude release of overburden (sediment) beyond the defined perimeter limits; and
- Where practicable, rely on passive management of surface runoff (gravity flow) with minimal reliance on mechanical systems for pumping of runoff.

2.2.1 Management Plans to Prevent Surface Water Contamination

The following management plans describe strategies and procedures that support this Water Management Plan:

1) Construction Environmental Protection Plan
   - The CEPP provides guidance and Standard Operating Procedures for construction activities susceptible of causing erosion, turbidity and release of contaminants to water bodies.
2) Emergency Response and Spill Prevention / Contingency Plan
   - The ERSPC provides detailed instructions for effective and efficient emergency and spill response.
3) Hazardous Substances Management Plan
   - This plan provides guidance and instruction for the transportation, handling, storage, and use of hazardous substances and hazardous waste on the Magino Site.
4) Waste Management Plan
   - This plan provides guidance and instruction on disposal of general waste.
5) Mine Material Management Plan
   - The MMMP establishes stockpiling areas for topsoil, overburden, mine rock, ore and tailings.

2.2.2 Surface Runoff Management Structure

Surface runoff management structures are shown on Figure 1 and include:

- Diversion trench between Water Body 10 and the south perimeter of the open pit;
- Diversion of the upper reach McVeigh Creek south of the by-pass road;
- Diversion of runoff from Water Body 6 and rerouting of outflow from Water Body 6 (adjacent to West overburden stockpile);
- Collector ditch surrounding the perimeter of the MRMF, TMF and Plant site;
- Three collection ponds located near the process plant;
- Berms on the perimeter of the open pit to reduce inflows into the pit;
- Water Quality Control Pond; and
- Pumping station at Water Quality Control Pond.

2.3 Expected Outcome

1) Collect and contain all mine contact water;
2) Reuse / recycle mine contact water as make up water for the process plant;
3) Use mine contact water for dust attenuation at work sites, site roads, and stockpiles; and
4) Monitor volume and quality of contact water.

2.4 Follow up and Adaptive Management

- Surface water management structures are inspected on a regular schedule; and
- The site Maintenance Department is responsible scheduling and undertaking repairs as necessary.

SECTION 3.0 – MINE CONTACT WATER

Mine contact water includes:

- Open pit water;
- Surface runoff from the process plant area and Project infrastructure;
- MRMF seepage and runoff water;
- Ore stockpiles seepage and runoff water;
- Process Plant – TMF water; and
- TMF seepage.

3.1 Objectives

- Ensuring that the quality of mine contact water is suitable for reuse as process water in the process plant; and
- Ensuring that mine contact water is compliant with MMER and PWQO.

3.2 Mine Contact Water Quality Monitoring and Prediction Program

3.2.1 Geochemical Characterization of Mine Rock and Tailings

TSD 5 describes the geochemical assessment of mine rock units and tailings to evaluate the potential for acidic or metal-containing rock drainage. This characterization is to predict water quality of the mine contact water.

This geochemical assessment consists of static testing and kinetic testing. Static ABA testing measures the acid- and base-producing potential of undisturbed soil and rock (waste and ore) in order to determine if, after disturbance, the waste material has the potential to produce acid or leach metals. Kinetic testing attempts to simulate actual weathering under controlled laboratory or field conditions to further evaluate the acid generating and metals leaching characteristics of materials with the potential to generate acid or leach metals.

The static and kinetic testing results completed to date established that there is little risk of acid generation by the mined materials and that monitoring of mine effluent and seepage should be performed to assure protection of the environment. Field cell tests are ongoing and will continue for the life of mine. Field cell testing provides early detection of potential environmental issues, allowing evaluation and, if necessary, adaptive management.

3.2.2 Process Water Quality Monitoring

The gold recovery process includes a cyanide leach. After the gold is leached from the ore, the residual solution is subjected to a cyanide destruction step which reduces the free cyanide of the water pumped to the TMF to less than 0.01 mg.L. Effective operation of the process plant and cyanide destruction operation requires continuous monitoring of tailings water quality.

3.3 Management of Mine Contact Water

3.3.1 Open Pit Dewatering

- Water is pumped directly to the Process Plant to be used as make-up for process water;
- A surge tank is provided at the Process Plant;
- Water can be used for dust attenuation or in the milling process; and
- Excess open pit water is pumped to the TMF.

3.3.2 Process Plant Area Runoff

- Runoff from the plant area is directed to three collection ponds as shown on Figure 1;
- Water collected in these ponds is either pumped to the process plant for reuse as process water, or pumped to the perimeter ditch for final collection in the Water Quality Control Pond; and
- All hazardous substances are stored on impermeable pads located within a secondary containment structure.

3.3.3 MRMF, Ore Stockpiles Seepage and Runoff Water

- All seepage and runoff from the MRMF and the ore stockpile flows by gravity to the perimeter collection ditch; and
- The final collection point for this water is the Water Quality Control Pond.

3.3.4 TMF Seepage and Discharge

- A series of interception wells are placed downstream of the TMF. The location of these wells is shown on Figure 2;
- The wells are used to monitor the quality of the groundwater which is downstream of the TMF;
- The wells are designed to allow pumping of groundwater if necessary;

- The TMF is equipped with a pump station for recycling of the TMF water to the process plant; and
- The TMF spillway also flows to the perimeter ditch and eventually to the Water Quality Control Pond.

3.3.5 Process Plant – TMF

- A pipeline is used to pump tailings from the Process Plant to the TMF;
- The tailings deposition plan is operated to prevent pooling of water against the TMF embankment;
- A pump is installed on the TMF to reclaim the water and return it to the process plant via a return pipeline; and
- The TMF is design to contain the most probable precipitation even (refer to TSD 6).

3.4 Expected Outcome

- All mine contact water is directed to the Water Quality Control Pond.

3.5 Follow up and Adaptive Management

- Routine inspection and maintenance of all water management structures.

SECTION 4.0 – GROUNDWATER

4.1 Objectives

- Minimize groundwater flows into the open pit; and
- Monitoring of groundwater quality downstream of the TMF.

4.2 Key Design Concepts

- A slurry wall is constructed between the open pit and Goudreau Lake;
- Diversion of surface flows from Water Body 10 to reduce hydrostatic pressure south of the open pit; and
- Grouting as necessary to control / reduce groundwater inflows into the open pit.

4.3 Expected Outcome

- Minimize volume of groundwater inflow open pit.

4.4 Follow up and Adaptive Management

- On-going monitoring of groundwater quality downstream of the TMF; and
- Adaptive management will consist of interception, pumping and treatment should groundwater quality exceed PWQO.

SECTION 5.0 – FRESHWATER SUPPLY

The freshwater water supply will be from Goudreau Lake.

5.1 Objectives

- Minimize freshwater use for the Project; and

- Monitor usage.

5.2 Key Design Concepts

- Potable water treatment plant.

5.3 Expected Outcome

- Potable water complies with drinking water standards.

5.4 Follow up and Adaptive Management

- Ongoing monitoring of freshwater quantity consumption; and
- Ongoing monitoring of potable water quality.

SECTION 6.0 – SEWAGE AND GREY WATER

6.1 Objectives

- Collection and treatment of sewage and grey water.

6.2 Key Design Concepts

- Primary treatment for sewage and grey water;
- Treated sewage effluent is pumped to the TMF; and
- Sludge from the treatment plant is disposed of on the MRMF.

6.3 Follow up and Adaptive Management

- Ongoing monitoring of sewage treatment performance; and
- Flow measurement for treated sewage effluent.

SECTION 7.0 – DISCHARGE TO THE RECEIVING ENVIRONMENT

7.1 Objectives

- Maintain a single discharge of effluent to the receiving environment located at the Water Quality Control Pond; and
- Monitor quantity and quality of the discharge in accordance with MMER.

7.2 Key Design Concepts

- Passive water management approach that minimize use of pumping systems for surface water management; and
- Maximum recycling and reuse of process water and mine contact water.

7.3 Expected Outcome

- Single point of discharge; and
- Compliance with MMER for the discharge.

7.4 Follow up

- Ongoing monitoring of effluent volume and quality. Refer to Environmental Monitoring

Plan (TSD 20-9) for the monitoring requirements.

7.5 Adaptive Management

The Environmental Monitoring Plan (TSD 20-9) outlines the continuous monitoring requirements for quantity and quality of the discharge to the receiving environment, as well as the detailed Environmental Effects Monitoring (EEM) required under the MMER.

Prodigy expects that the outcome of this monitoring will confirm the predictions of "non-significant" effects on receiving water quality in Otto Lake. Should environmental effects on the receiving water be observed, the water discharged from the Water Quality Control Pond will be a treated to reduce concentrations of contaminants that might cause adverse effects on the receiving water.