WATER RESOURCES VOL 1
BASELINE DATA, METHODS AND VERIFICATION, AND BASELINE CONDITIONS

TWIN METALS MINNESOTA PROJECT
Environmental Review Support Document

Prepared for Twin Metals Minnesota, LLC
Prepared by

Document No. TMM-ES-025-0142-01
Revision 0A
November 20, 2020

REVISION RECORD

Revision	Date	Description	EDMS Download Date	Project Configuration Version
0A	11-20-2020	Submitted for Agency Review – TOC		

REVISION NARRATIVE

DISCLAIMER

This document is a working document. This document may change over time because of new information, or further analysis or deliberation.

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LIST OF ABBREVIATIONS, ACRONYMS, AND SYMBOLS

TMM	Twin Metals Minnesota, LLC

1.0 INTRODUCTION

The Twin Metals Minnesota, LLC (TMM) Project (Project) is focused on designing, permitting, constructing, and operating an underground copper, nickel, cobalt, platinum, palladium, gold, and silver mining project. Located approximately nine miles (14 kilometers [km]) southeast of Ely, Minnesota, and 11 miles (18 km) northeast of Babbitt, Minnesota, the Project targets valuable state, federal, and private minerals within the Maturi deposit, which is a part of the Duluth Complex geologic formation.

All potential Project infrastructure locations presented herein are considered preliminary and are undergoing further design and engineering evaluations which will dictate final design and locations. Further information about TMM and the Project is located at http://www.twin-metals.com/.

The purpose of this document is to provide necessary information for the environmental review and permitting process. TMM retained [insert Consultant name] (insert abbreviated Consultant name) to complete [insert text].

2.0 SUMMARY

- Provide a high level summary of what is presented within this report.
- Describe how this report volume relates to the other volumes.
- Describe the data streams (groundwater flow, groundwater quality, surface water flow, surface water quality, climatology, geologic and hydrogeologic settings, and watersheds) that are addressed within this report.
- Describe the data validation methods used in this report.
- Develop and provide a matrix of data qualification criteria to be used in this report.
- Describe how data quality is assessed and data usability is defined within this report to be carried forward into other volumes.
- Reference relevant sections of the FSDD, SEAW, and / or federal documents to remind the reader there is a defined scope that is being followed.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 Proposed Action

- Reference the TMM Project Description and Alternatives document and indicate the proposed action is defined within this document.

3.2 Alternatives to the Proposed Action

- Reference the TMM Project Description and Alternatives document and indicate the alternatives to the proposed action are defined within this document.

3.3 No Action Alternative

- Reference the TMM Project Description and Alternatives document and indicate the no action alternative is defined within this document.

4.0 REGULATORY FRAMEWORK

- Discussion of Clean Water Act applicability to surface water.
    - U.S. Army Corps of Engineers - Waters of the U.S. / Section 404
    - U.S. Army Corps of Engineers - Section 106 of the National Historic Preservation Act (NHPA) – considered if fill material is discharged into the Waters of the U.S.
    - Environmental Protection Agency / Minnesota Pollution Control Agency 401 Certification
        - Antidegradation
- Discussion of Minnesota Department of Natural Resources (MDNR) applicability to permitted structures and works in public waters.
    - Minnesota Rules, chapter 6115 for withdrawal of water from Birch Lake Reservoir for plant make-up water; for mine dewatering; and potential stream augmentation
    - Minnesota Rules, chapter 6115, for possible modifications and diversions of local streams in constructing the Dry Stack Facility and any outfalls;
    - Minnesota Rules, parts 6115.0300-6115.0520 for Dry Stack Facility related safety permits and associated water treatment structures
- Discussion of Minnesota Pollution Control Agency (MPCA) rules applicability to waters of the state.
    - Section 401 Water Quality Certification/Waiver
    - National Pollutant Discharge Elimination System and State Disposal
    - System (NPDES/SDS) Permits
- Discussion of Minnesota Department of Health (MDH), MPCA and EPA standards applicability to groundwater resources.
    - Minnesota groundwater quality standards, based on Minnesota water use classifications (Minnesota Rules, chapters 7060, 7050, and 7052).
    - USEPA Groundwater quality standards - primary MCLs (pMCL), secondary MCLs (sMCL), and MDH Human Risk Levels (HRLs).

- Discussion of MDH and MPCA permits and water quality requirements.
    - Permit for Non-Community Public Water Supply System and a Wellhead Protection Plan (if proposed)
    - State of Minnesota water quality standards and use classifications (Minnesota Rules, chapters 7050 and 7052).
- Discussion of 40 CFR 144.81(8), Class V underground injection well / control requirements applicability to backfilling portions of the underground mine.
    - Part 144.7 - Identification of underground sources of drinking water and exempted aquifers
    - Part 144.16 - Waiver of Requirement by the EPA administrator

5.0 AFFECTED ENVIRONMENT

5.1 Areas of Analysis

Area of analysis will be developed and described. Area of analysis will be developed accounting for the following:

- Areas of analysis of direct effects will be determined using the construction limits of the proposed action and alternatives that could impact the existing conditions of surface and groundwater resources.
- Areas of analysis will be developed for groundwater, surface water, and the interfaces based on the influence Project features, activities, and the phases would have on water resources.
- Areas of analysis of direct and indirect effects to the baseline conditions will be determined using areas where changes in hydrology, changes in groundwater quantity, groundwater quality, surface water flow, surface water quality, or other changes due to the proposed action and alternatives could impact the baseline conditions.
    - Changes in hydrology could be a result from water management features resulting in surface water rerouting or groundwater drawdown from underground mining.
    - Changes in water quality could be a result from seepage.
    - The indirect effect area of analysis to wetlands and riparian resources will be determined by modeling and results of subsequent volumes of the *Water Resources Data Package* as well as volumes of the *Wetlands and Riparian Resources Data Package*.

5.2 Methods

5.2.1 Desktop Review

This will include review of publicly available data for water resources within the Project boundary and vicinity areas, water bodies receiving discharges from or

providing source water for Project operations, as well as resources within the regional watershed where the Project is located.

Sources reviewed will include:

Surface Water

- USGS and MDNR Stream and River Gaging Stations Data
- USGS National Water Information (NWIS) Data
- MDNR Water Chemistry Data
- MDNR Watershed Monitoring and Assessment Reports
- MDNR Protected / Public Waters mapping

Groundwater

- USGS Hydrology and Ground-Water Quality Data and Reports
- USGS Groundwater Flow Characterization and Modeling Reports

5.2.2 Baseline Data Acquisition

Climatological, geological, hydrogeological, groundwater quality, surface water quality, and surface water flow data has been collected over a range of time periods. Data and information is available from several historic and ongoing Project-related studies, and the data relevant to the Project and required for further analysis will be reviewed. Applicable data will be referenced or incorporated from the other data packages and resource reports.

Climate and Meteorology

- Regional and site-specific data
    - Precipitation
    - Temperature
    - Evapotranspiration
    - Wind speed and direction
- Recharge estimates based on climatological data and published regional values

Surface Water

- TMM Stream Morphology Assessment Data and Evaluations
- Baseline Water Monitoring – Flow and Quality Data

Groundwater

- Baseline Water Quality Monitoring Program
- Exploration Borehole Hydrogeophysical Testing
- Hydraulic Characterization Investigation Reports
- Hydraulic Conductivity Database
- Water Levels Record Database

Hydrogeologic / Hydrostratigraphic

- Installing nested wells and piezometers
- Well and core hole boring and core logs;
- Acoustic Televiewer Surveys of well bores
- TMM hydrogeological
- TMM geotechnical and geophysical logs

5.2.3 Quality Control

- Discussion of QA/QC or QAPP
- Development of Qualifying Criteria Matrix
- Data Validation
- Data Usability Assessments
- Peer or third party reviews of data and analysis

5.3 Existing Conditions

Using the defined areas of analysis and methods, existing conditions will be described within this section including the following:

5.3.1 Surface Water

- Regional Drainage Basins, Drainage Patterns and Watershed conditions.
- Project Area Watershed Characteristics.
- Multiple figures / tables summarizing surface water flow and quality.
- Regional and Project Area Surface Water Quality.
- Seasonal and spatial variations in surface water flow and quality.
- Comparisons to water quality standards listed in Minnesota Rules, chapter 7050.
- Stream Flows (including continuous records of stream flows as requested by DNR), Hydrographs, Base flow estimates.
- Stream Morphology.
- Man-made controls (such as dam at the outlet of Birch Lake controlling lake water elevations).
- Identification of seasonal ponds within Project area (BLM USFS comment – MPO initial review).

- Supplemental data collection on surface waters, including Keeley Creek (DNR comments for future volumes during SEAW review) and incorporation of published data on Keeley and Filson Creeks from 2020 USGS Report https://pubs.er.usgs.gov/publication/sir20205039.

5.3.2 Groundwater

- Multiple figures / tables summarizing water quality monitoring.
- Water Level Trend Analysis and correlations to precipitation and recharge.
- Hydraulic connectivity across hydrostratigraphic units, vertical gradients.
- Hydraulic conductivity variations with depth and spatial distributions.
- Water Quality trend analysis and correlations to hydrostratigraphy and lithology.
- Water quality comparisons to water quality standards listed in Minnesota Rules, chapter 7050.
- Structural controls (such as faults) on groundwater flows.
- Local impacts on groundwater to Keeley Creek streamflow and Birch Lake Reservoir (a data need identified by DNR during SEAW review).
- Baseline hydrogeologic investigation of alternate Tailings Management Sites.

Hydrogeologic / Hydrostratigraphic

- Definition of Hydrostratigraphic Units.
- Hydrostratigraphic Units correlations with lithologies.
- Summary of available information on bedrock fracture characteristics including any indications of significant faults and other fractures and fracture zones (BLM USFS comment – MPO initial review).

5.3.3 Wetland Hydrology and Hydrogeologic Settings of the Wetlands

- Wetland Acreages for Mine Area Project Watersheds.
- Baseline wetland hydrology monitoring.
    - Water levels / hydrographs
- Identification of and baseline data on wetlands outside the Project area that may be subject to potential indirect impacts (DNR identified future data need during SEAW review).
- Discussion of the degree of hydraulic connection between the wetland areas and adjacent unconsolidated deposits and bedrock.
- Discussion of existence of low permeability barrier between wetlands and underlying groundwater.
- In-situ measurements of hydraulic conductivity of low permeability barriers.

6.0 REFERENCES

TABLES

FIGURES

APPENDICES

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