GEOTECHNICAL VOL 2
SURFACE INFRASTRUCTURE

TWIN METALS MINNESOTA PROJECT
Environmental Review Support Document

Prepared for Twin Metals Minnesota, LLC
Prepared by

Document No. TMM-ES-025-0151-02
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.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

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

This report will:

- Describe the proposed action and alternatives;
- Establish the area where baseline conditions need to be assessed;
- Define the methodology used to assess the baseline conditions;
- Describe the baseline conditions;
- Describe the methodology used to assess the impacts;
- Defining the area of effects of the impacts;
- Establish the indicators of effects to the baseline conditions;
- Describe the impacts of the proposed action and alternatives on the baseline conditions; and
- Reference relevant sections of the FSSD, 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

Establish regulatory framework that is applicable to resource. This include state, federal, or tribal federal statutes or regulations and NEPA / MEPA requirements. This should also include regulatory definitions and how they are used by the Project.

- Minn. R., Chapter 6132
- Dam Safety Minn. R. 6115.0300

5.0 AFFECTED ENVIRONMENT

The affected environment will be deconstructed by features and / or activities of the proposed action and alternatives that would cause the potential effects to resources.

5.1 Area of Analysis

Area of analysis will be the dry stack facility, temporary rock storage facility, water management ponds, or any other surface feature that is deemed necessary

5.2 Methods

Description of the methods used to identify, quantify, and qualify baseline conditions within the area of analysis.

5.2.1 Field Investigations

This will include review of project-specific investigations in the areas of the dry stack facilities and water management ponds.

- Depth to bedrock / isopach mapping
- Index properties of samples from boring and test trenches.
    - Engineering properties of the soils
    - Discussion of any geotechnical investigations
    - Discussion of laboratory tests run

5.3 Existing Conditions

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

- Collected existing conditions data needed to support design.
  - Site conditions for dry stack facility on Section 16
  - Site conditions for dry stack facility on MNES-1352
  - Site conditions for other surface structure – e.g. dry stack facility, temporary rock storage facility, water management ponds, etc.

6.0 IMPACT ASSESSMENT CRITERIA

6.1 Area of Analysis

A discussion will be provided to describe the following:

- Areas of impacts will be defined by the footprint of the dry stack facility and water management ponds

6.2 Methodology and Evaluation Criteria

Discussion on assessment that the design of the dry stack facility and water management ponds would meet the geotechnical requirements.

- Dry stack facility design and construction;
- Modeling approach;
  - Material and Input data
  - Results
    - subgrade settlement analysis
    - slope stability analyses
- Design and operating requirements necessary to maintain required slope stability Factors of Safety; and
- Closure of the dry stack facility
  - Long-term closure stability conditions

6.3 Indicators

- Changes to geotechnical stability;
- Mass soil movement.

6.4 Results

Discussion of results in terms of Factors of Safety and regulatory standards related to:

- Design and operating requirements;
- Long-term closure stability conditions; and
- Proposed monitoring, maintenance, and mitigation.

7.0 ENVIRONMENTAL CONSEQUENCES

Utilizing the impact assessment methods and area of analysis summarized in Section 6.0 an assessment of impacts will be conducted and described within this section. The following items will be assessed and described for the proposed action, alternatives to the proposed action, and the no action alternative:

- Impact of changes to potential geotechnical stability and mass movement of the dry stack facility, temporary rock storage facility, water management ponds, or any other surface feature that is deemed necessary.

7.1 Discussion of Environmental Effects

Using the affected environment and the impact assessment an assessment of impacts to the resource will be conducted and described within this section.

7.1.1 Proposed Action

Impacts associated with the proposed action will be described in this section.

7.1.2 Alternatives to the Proposed Action

Impacts associated with the alternatives to the proposed action will be described in this section.

This discussion will focus on differences in impacts between the alternatives and proposed action. Impacts that are the same between the proposed action and alternatives will be noted but not discussed in detail.

7.1.3 No Action Alternative

Impacts associated with the no action alternative will be described in this section.

8.0 AVOIDANCE, MINIZATION, MITIGATION, AND MONITORING MEASURES

Highlight environmental protection measures, best management practices, and mitigation plans that the proposed action and alternatives would reduce the potential

for impacts from the Project. Information should be pulled from the TMM Project Description and Alternatives document.

8.1 Proposed Action

Avoidance, minimization, mitigation, and monitoring measures associated with the proposed action will be described in this section.

- Discuss geotechnical stability avoidance / minimization steps involved in designing the surface features.
- Discuss geotechnical stability monitoring measures.

8.2 Alternatives to the Proposed Action

Avoidance, minimization, mitigation, and monitoring measures associated with the alternatives to the proposed action will be described in this section.

- Discuss geotechnical stability avoidance / minimization steps involved in designing the surface features.
- Discuss geotechnical stability monitoring measures.

9.0 REFERENCES

TABLES

FIGURES

APPENDICES

APPENDIX [#A, B, C, D]

[APPENDIX TITLE]

APPENDIX [#A, B, C, D]

[APPENDIX TITLE]

[Insert page break for each additional appendix.]