BIOLOGY VOL 2

IMPACT INDICATORS AND METHODS

TWIN METALS MINNESOTA PROJECT

Environmental Review Support Document

Prepared for Twin Metals Minnesota, LLC
Prepared by

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REVISION RECORD

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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

This report will describe impact assessment by:

- Describing the methodology used to assess the impacts;
- Defining the area of effects of the impacts;
- Establishing the indicators of effects to the baseline conditions; and
- Referencing relevant sections of the FSDD, SEAW, and / or federal documents to remind the reader there is a defined scope that is being followed.

The impact assessment will be used to assess impacts from the proposed action and alternatives on the baseline conditions described in the other volumes of the *Biology Data Package* results of which will be presented in a subsequent volume of the *Biology Data Package*.

3.0 IMPACT ASSESSMENT CRITERIA

3.1 Area of Analysis

Describe this based on features and / or of the proposed action or alternatives that would cause potential effect. The discussion here needs to match the discussion in the other volumes of the *Biology Data Package*. Baseline conditions should be assessed for anywhere that the proposed action or alternative could have potential effects on biological resources.

3.1.1 Habitat

Terrestrial

A discussion will be provided to describe the following:

- Areas of direct impacts.
  - Direct effects from project ground disturbance – areas that will require vegetative clearing and/or impacts from construction and operations.
- Areas of indirect effects.
  - Indirect effects – areas that could potentially be impacted by dust or changes in hydrology

Aquatic

A discussion will be provided to describe the following:

- Areas of direct impacts.
  - Direct effects from project disturbance – areas that will impact aquatic habitats such as intake or discharge points from construction and operations.
- Areas of indirect effects.
  - Indirect effects – areas that could potentially be impacted by changes in hydrology

3.1.2 Vegetation

A discussion will be provided to describe the following:

- Areas of direct impacts.
  - Direct effects from project ground disturbance – areas that will require vegetative clearing and/or impacts from construction and operations.
- Areas of indirect effects.
  - Indirect effects – areas that could potentially be impacted by dust or changes in hydrology

Wild Rice

- Area of analysis for direct effects on wild rice baseline conditions would be defined by Project boundaries for the proposed action and alternatives to the proposed action with a specific focus on the water intake corridor and associated pipeline that extends into Birch Lake including the following:
  - Construction areas (ground disturbing activities);
  - Sensitivity to disturbance; and
  - Project activities that would lead to disturbance (e.g., construction and operation).

- Area of analysis for indirect effects on wild rice baseline conditions would be determined by analyzing water quality impacts presented in the *Water Resources Data Package* and the *Multimedia Screening Assessment Data Package*.

3.1.3 Wildlife

Sensitive Species

A discussion will be provided to describe the following:

- Areas of direct impacts.
  - Discussion on direct impacts that could result from the project, including construction, operation, and closure.
    - Section on sensitive species is specific to the potential to take sensitive species, additional impacts to species are discussed in 3.2.2.
  - Direct effects from project ground disturbance – areas that will require vegetative clearing and/or impacts from construction and operations.

Terrestrial

A discussion will be provided to describe the following:

- Areas of direct impacts.
  - Direct effects from project ground disturbance – areas that will require vegetative clearing and/or impacts from construction and operations.
- Areas of indirect effects.
  - Indirect effects – habitat fragmentation, wildlife corridor reduction, noise levels, and vehicular effects, increased competition for resources or habitat due to displacement

Aquatic

- Areas of direct impacts.
  - Discussion on direct effects that could result from the project, including construction, operation, and closure.
- Direct effects from project ground disturbance – areas that will require construction or operations – water intakes or discharges – in a stream or lake.
- Areas of indirect effects.
  - Indirect effects – species that could be impacted by changes in hydrology and water quality

3.2 Methodology and Evaluation Criteria

Describe rationale for how impacts will be assessed by the implementation of the proposed action or alternatives. This section should also define how indicators will be applied to derive effect and inform the discussion of results discussed in a subsequent volume of the *Biology Data Package*.

3.2.1 Habitat

Terrestrial

- Discussion of terrestrial habitat effects for the proposed action which include direct and indirect effects.

Areas of Direct Impacts

- Determined through GIS analysis to the publically available data:
  - USGS GAP / LANDFIRE
  - USGS NLCD
  - MDNR MBS
  - MDNR MBS Sites of Biodiversity Significance
- Determined through GIS analysis to the project specific data.
  - Plant community surveys

Areas of Indirect Effects

- Methodology and evaluating criteria for indirect effects in cases of changes in hydrology or water drawdown would be part of water modeling as part of the *Water Resources Data Package*.
- Methodology and evaluating criteria for indirect effects in cases of changes in dust deposition would be part of water modeling as part of the *Multimedia Screening Assessment Data Package*

Aquatic

- Discussion of aquatic habitat effects for the proposed action which include direct and indirect.

Areas of Direct Impacts

- Determined through GIS analysis to the project-specific data.
  - Stream and lake sampling

Areas of Indirect Effects

- Methodology and evaluating criteria for indirect effects in cases of changes in hydrology, water drawdown, or change in water quality would be part of water modeling as part of the *Water Resources Data Package*.

3.2.2 Vegetation

- Determined through GIS analysis to the publically available data:
  - MDNR NHIS Database
- Determined through GIS analysis to the project specific data:
  - Any occurrences of sensitive species observed in the wildlife surveys
- Discuss potential impacts to non-native invasive plants.

Wild Rice

- Methodology and evaluating criteria for indirect effects in cases of changes in hydrology, water drawdown, or change in water quality would be part of water modeling as part of the *Water Resources Data Package*.

3.2.3 Wildlife

Sensitive Species

- Discussion of direct effect for the proposed action on sensitive species.

Areas of Direct Impacts

- Determined through GIS analysis to the publically available data:
  - MDNR NHIS Database
  - USFWS Information for Planning and Consultation
- Determined through GIS analysis to the project specific data:
  - Any occurrences of sensitive species observed in the wildlife surveys
  - High value habitats

Terrestrial

- Discussion of direct and indirect effects for the proposed action on endemic terrestrial species.

Areas of Direct Impacts

- Discussion on comparison of endemic terrestrial species to habitat
- Determined through GIS analysis to the project specific data:
  - Change to any common habitats

Areas of Potential Indirect Effects

- Habitat fragmentation could be determined through GIS analysis
- Noise Effects would be part of noise modeling in the *Noise and Vibration Data Package*.
- Vehicular Effects would be part of traffic effects as part of the *Transportation Resource Report.*

Aquatic

- Discussion of direct and indirect effects for the proposed action on endemic aquatic species.

Areas of Direct Impacts

- Determined through GIS analysis to the project specific data:
  - Change to any aquatic habitats – e.g., water intake pipeline

Areas of Potential Indirect Effects

- Methodology and evaluating criteria for indirect effects in cases of changes in hydrology, water drawdown, or change in water quality would be part of water modeling as part of the *Water Resources Data Package*.

3.3 Indicators

This section will discuss how indicators were selected and what the indicators are.

3.3.1 Habitat

Terrestrial

Discuss indicators of impacts:

- Changes to cover types.
- Changes to terrestrial habitat types and quantity.

Aquatic

Discuss indicators of impacts:

- Changes to aquatic habitat types and quantity.
- Changes water quality.
- Physical alteration of stream conditions.

3.3.2 Vegetation

Sensitive Species

Discuss indicators of impacts:

- Changes to the potential of a take of federally or state-listed species.

Non-native Invasive Species

- Change to distribution of non-native invasive plants.

Wild Rice

- Changes to the presence of wild rice (location and density);
- Changes to hydrology;
- Changes to plant health (seed number and biomass of seeds, roots, and shoots);
- Changes to surface water, pore water, or sediment quality; and
- Development of a timeline for analysis which would likely be all of the construction and operations phase and some of the closure phase.

3.3.3 Wildlife

Sensitive Species

Discuss indicators of impacts:

- Changes to the potential of a take of federally or state-listed species.
- Changes to amount of key habitats of federally or state-listed species.

Terrestrial

Discuss indicators of impacts:

- Changes to distribution of endemic species.

Aquatic

Discuss indicators of impacts:

- Changes to distribution of endemic aquatic species.

4.0 REFERENCES

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FIGURES

APPENDICES

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