7.0 COMPARISON OF ALTERNATIVES AND OTHER CONSIDERATIONS

7.1 INTRODUCTION

This chapter compares the alternatives and their environmental consequences for the NorthMet Project Proposed Action and Land Exchange Proposed Action. It also addresses irretrievable and irreversible effects, short-term uses verses long-term productivity of the environment, unavoidable adverse effects, impacts on human health, and consideration of how the Land Exchange Proposed Action and alternatives meet the public interest. This chapter concludes with a statement on the federal Co-lead Agencies' preferred alternatives.

7.2 COMPARISON OF ALTERNATIVES

Alternatives to the NorthMet Project Proposed Action and Land Exchange Proposed Action were screened and analyzed relatively independently of each other because of the different nature of the actions and separate decision-making authority of each federal agency and the state. This section consolidates the connected actions, and summarizes the detailed analysis presented in the respective sections in Chapter 5 and 6. A description of the connected alternatives is provided below, followed by a comparison of the environmental consequences.

7.2.1 Proposed Connected Actions

The Proposed Connected Actions would involve both the NorthMet Project Proposed Action and Land Exchange Proposed Action as presented and described in Sections 3.2.2 and 3.3.2, respectively.

The NorthMet Project Proposed Action would involve three major components: a new copper-nickel-PGE Mine Site, a refurbished Plant Site at the former LTVSMC processing plant, and an existing Transportation and Utility Corridor that would connect the Mine Site and Plant Site. The NorthMet Project Proposed Action would comprise three phases. The first phase would last for approximately 18 months and would include site preparation, refurbishment of some existing buildings, and construction of new facilities and infrastructure. The second phase, which would last approximately 20 years, would include operation of the mine and processing facilities; blasting, hauling, and processing of the ore to be shipped; stockpiling of waste rock; and progressive reclamation (at the same time as mining). The third phase would occur after mining and would include infrastructure removal and final land reclamation, and post-closure maintenance.

The water quality objective of closure is to provide mechanical or non-mechanical treatment for as long as necessary to meet regulatory standards at applicable groundwater and surface water compliance points. Water quality modeling performed in support of this FEIS indicates that water treatment systems would be needed at the Mine Site and Plant Site indefinitely. The water models constructed to assess the potential effects from the NorthMet Project Proposed Action were not designed to predict the duration of treatment nor do they capture all the factors that influence the duration of treatment (e.g., potential future regulatory and technological changes).

Therefore, the models cannot be used to predict when treatment would end. Actual treatment requirements would be assessed on a recurring basis throughout operations and closure based on results of ongoing discharges, performance, and water resource monitoring, ensuring continuous protection of ground and surface water quality and compliance with applicable water quality standards. This reassessment process would rely on measured monitoring results (evaluated through modeling) rather than the results of the predictive modeling included in this FEIS. Regardless of the precise duration of effects or water treatment at either the Mine Site or Plant Site, there are measures available to address impacts to natural resources. PolyMet would be held accountable for maintenance and monitoring required under the permit and would not be released until all conditions have been met. PolyMet would be required to provide financial assurance to MDNR (managed independently) for closure and maintenance costs as a contingency if PolyMet or the operating company at that time were unable to fulfill the obligations under the Permit to Mine.

The configuration of the NorthMet Project Proposed Action is shown in Figure 3.2-1 in Section 3.2.1. The development of the Mine Site is shown in Figures 3.2-4 through 3.2-9 in Section 3.2.2.1. The Transportation and Utility Corridor is shown in Figure 3.2-20 in Section 3.2.2.2, and development of the Plant Site is shown in Figure 3.2-23 and Figure 3.2-29 in Section 3.2.2.3.

The Land Exchange Proposed Action would involve exchange of a single 6,650.2-acre (GLO) tract of federal land (encompassing the activities proposed at the Mine Site) with up to 6,722.5 acres (GLO) of privately owned, non-federal lands located within five different tracts throughout the proclamation boundary of the Superior National Forest within St. Louis, Lake, and Cook counties of northeastern Minnesota. The location of the federal and non-federal lands is shown in Figure 3.3-1 in Section 3.3.2.

7.2.2 Proposed Connected Actions Alternative B

Proposed Connected Actions Alternative B would involve the NorthMet Project Proposed Action as described in Section 3.2.2 and summarized above in Section 7.2.1, and the Land Exchange Alternative B as described in Section 3.3.3.2.

Compared to the Land Exchange Proposed Action, the Land Exchange Alternative B would involve conveying fewer acres of federal lands, approximately 4,887.3 acres (GLO), for fewer acres of non-federal land, approximately 4,651.5 acres (GLO) from a single tract (Tract 1). The configuration of the smaller federal parcel is shown in Figure 3.3-2 in Section 3.3.3.2.

7.2.3 No Action Alternative

Under the No Action Alternative there would be no NorthMet Project Proposed Action or Land Exchange Proposed Action. Refer to Section 3.2.3.2 and Section 3.3.3.1 for a discussion on the No Action alternative for the respective connected actions.

At the Mine Site, PolyMet would be required under exploration approvals to reclaim surface disturbance associated with exploratory and development drilling activities. Other existing surface uses would be allowed to continue consistent with the Superior National Forest Plan. No further upgrades or new segments would be constructed along the existing power transmission line, railroad, and Dunka Road, which would continue to be used by their private owners. At the former LTVSMC processing plant and Tailings Basin, the land owner, Cliffs Erie, would be

required to complete closure and reclamation activities as required under existing state permits, plans, and the Consent Decree.

The federal government would not convey federal lands to PolyMet and the USFS would continue managing these lands as has been done in the past. Furthermore, the federal government would not acquire the five tracts of non-federal lands and the lands would remain as private lands.

7.2.4 Comparison of Effects

A summarized comparison of the environmental consequences of the alternatives—as described in Sections 7.2.1, 7.2.2, and 7.2.3—is provided in Table 7.2.4-1. Refer to the respective sections in Chapter 4 for discussion on the affected environment and to Chapter 5 for more detail on the environmental consequences.

In comparison to the Proposed Connected Actions (see Section 7.2.1), the Proposed Connected Actions Alternative B (see Section 7.2.2) would have the same effects from the NorthMet Project Proposed Action, but would convey fewer lands through the Land Exchange, resulting in smaller net increases/decreases in environmental resources. The No Action Alternative would not directly affect the existing environment and management of these lands would continue in accordance with their current permits. Compared to the Proposed Connected Actions and Proposed Connected Actions Alternative B, the No Action Alternative would likely result in active but different comprehensive management of water from the existing LTVSMC Tailings Basin. There would be no other measurable effect on other resources compared to their existing conditions.

-Page Intentionally Left Blank-

Table 7.2.4-1 Comparison of Environmental Consequences by Alternative

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
Land Use	• No effects on land use that would require changes in ordinances or comprehensive forest plans • Federal lands within the NorthMet Project area would be replaced with acreage of equal value through a land exchange	• Mostly similar effects as Proposed Connected Actions, with fewer federal acres exchanged	• Existing LTVSMC site would be reclaimed in accordance with the Cliffs Erie reclamation/closure plan
Water Resources	• Greater than 90 percent of groundwater and 100 percent of surface water at the Tailings Basin would be captured and treated to a concentration at or below applicable water quality evaluation criteria • The NorthMet Project Proposed Action would not cause any significant water quality impacts because: 1) exceedances of the P90 threshold did not occur, 2) the NorthMet Project Proposed Action concentrations were no higher than concentrations predicted for the CEC scenario, 3) the frequency or magnitude of exceedances for NorthMet Project Proposed Action conditions was within an acceptable range, or 4) the effects were not attributable to NorthMet Project Proposed Action discharges • Mercury loadings to the Embarrass River would increase slightly, decrease slightly to the Partridge River, with an overall net decrease in NorthMet Project Proposed Action loadings to the downstream St. Louis River. Discharges from the Plant Site WWTP	• Same as under Proposed Connected Actions	• Seepage water quality from the existing LTVSMC Tailings Basin would be expected to improve over time as a result of the Cliffs Erie Consent Decree, other permit requirements (e.g., Permit to Mine), and natural attenuation of contaminants

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
	and Mine Site WWTF would be at or below the Great Lakes Initiative discharge standard of 1.3 ng/L • Sulfate concentrations would remain unchanged in the Partridge River and would be significantly reduced in the Embarrass River • Plant Site WWTP effluent would be used to augment flows to tributary streams and wetlands downgradient from the Tailings Basin to offset seepage captured in the containment system and the south surface seepage management system for water quality reasons		
Wetlands and Floodplains	• 913.8 acres of wetlands in NorthMet Project area would be directly affected • 6,568.8 to 7,694.2 acres of wetlands in NorthMet Project area could be indirectly affected • 940.7 acres of directly affected and fragmented wetlands to be mitigated up front • 1,602.7 acres of compensatory off-site wetlands • Wetland mitigation plan would be implemented to offset increased CO_2 emissions to extent practicable • 505.5-acre net increase of wetlands to the federal estate (through Land Exchange Proposed Action); therefore, Land Exchange Proposed Action conforms to EO 11990 • 376.2-acre net increase of mapped floodplain but would result in a 1,226.0-acre net decrease of floodplain area to the federal estate (through Land	• Same direct and indirect effects and compensatory mitigation at NorthMet Project area as under Proposed Connected Actions • 69.9-acre net increase of wetlands to the federal estate (through Land Exchange Alternative B); therefore, Land Exchange Alternative B conforms to EO 11990 • 376.2-acre net increase of mapped floodplain but would result in a 861.7-acre net decrease of floodplains to the federal estate (through Land Exchange Alternative B); however, no decrease in regulatory floodplains, no increase in flood damage potential, and no change in ecological function of floodplain; therefore, Land Exchange Alternative B conforms to EO 11988	• No change in wetland or floodplain acreage

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
	Exchange Proposed Action); however, no decrease in mapped floodplains, no increase in flood damage potential, and no change in ecological function of floodplain. Therefore, Land Exchange Proposed Action conforms to EO 11988		
Vegetation (includes habitat and Special Status Species)	• 4,028.5-acre decrease in vegetation in the NorthMet Project area • Special concern plant species: eight directly affected, two indirectly affected in the NorthMet Project area • 579.6-acre net increase of vegetation land cover types to federal estate (through Land Exchange Proposed Action) • 6,025.8-acre decrease of MBS High Biodiversity sites, and 767.9-acre increase of MBS Moderate Biodiversity Sites • Decrease of 10 plant species, increase of three different plant species to the federal estate (through Land Exchange Proposed Action)	• Same decrease of vegetation in NorthMet Project area as under Proposed Connected Actions • Same effects on plant species in the NorthMet Project area as under Proposed Connected Actions • 173.6-acre net increase of vegetation land cover types to the federal estate (through Land Exchange Alternative B)	• No effects on vegetation
Wildlife (includes Special Status Species)	• 4,028.5-acre decrease of wildlife habitat in the NorthMet Project area • Localized population decrease and fragmentation of critical habitat of the gray wolf and Canada lynx • Localized population decrease and loss of habitat for northern long-eared bat • Low potential for incidental take resulting from vehicular collisions due to increased NorthMet Project Proposed Action-related traffic • Special status species, including	• Same as under Proposed Connected Actions at the NorthMet Project area • 173.6-acre net increase of vegetation land cover types for wildlife habitat to the federal estate (through Land Exchange Alternative B)	• No effects on wildlife

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
	SGCN, RFSS, and other wildlife species (such as those considered tribally or culturally significant) may be affected by human activity, noise and vibration, rail and vehicle traffic, and decrease of habitat • Wildlife corridors at and adjacent to the NorthMet Project area would be affected through the reduction of access to these corridors • 579.6-acre net increase of vegetation land cover types for wildlife habitat to the federal estate (through Land Exchange Proposed Action)		
Aquatic Species	• No effects from changes in stream flow, which would remain within natural variability • No decrease in the Riparian Connectivity Index • Would not directly exceed or increase existing exceedances of Class 2B water quality standards, with the exception of aluminum that is not attributable to process water from the NorthMet Project Proposed Action (i.e., is attributable to non-contact stormwater runoff • No effect on federally or state-listed aquatic species	• Same as under Proposed Connected Actions	• Water seepage from the existing LTVSMC site would be managed in accordance with the Cliffs Erie Consent Decree
Air Quality (includes Greenhouse Gases and Global Climate Change)	• Increased emissions of criteria air pollutants, but below Prevention of Significant Deterioration major source thresholds • Amphibole mineral fiber emissions minimized by installing best available particulate emission control equipment and preventing fugitive dust generation	• Same as under Proposed Connected Actions	• Continued air (fugitive dust) effects at LTVSMC site until remediation occurs under closure/reclamation plan

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
	• The air quality of the BWCAW would not be adversely affected by the NorthMet Project Proposed Action		
Noise and Vibration	• Added noise emissions and vibration. However, in all cases, the NorthMet Project Proposed Action, during the operations phase, would comply with the applicable state standards • Noise, ground vibration, and air blast impact area/zone would be limited to 11,456, 11,334, and 11,469 acres, respectively. The BWCAW, which is 20 miles away, is outside the maximum area of audibility (247,612 acres)	• Same as under Proposed Connected Actions	• No effects
Cultural Resources and Historic Properties	• Adverse direct and indirect effects on the *Mesabe Widjiu* (Laurentian Divide), Spring Mine Lake Sugarbush, BBLV Trail Segment, Erie Mining Company Concentrator Building, and Erie Mining Company Landscape Historic District due to loss of sites and proximity to proposed activities • Direct effects, but no adverse effects, on the Erie Mining Company Railroad Mine and Plant Track, Main Line Segment, and Dunka Railroad Segment; Erie Mining Company Railroad Corridor Historic District; DM&IR Segment; and Erie Mining Company Administration Building due to refurbishment and new construction • Potential to affect 1854 Treaty resources by potential limitation or elimination of access to public lands within the 1854 Ceded Territory and effects on 1854 Treaty resources	• Same as under Proposed Connected Actions	• No effects

Resource	Proposed Connected Actions	Proposed Connected Actions Alternative B	No Action Alternative
Socioeconomics (includes Environmental Justice)	• Up to 500 new direct jobs (maximum during construction), plus additional indirect and induced jobs • Millions of dollars revenue for State of Minnesota and federal taxes • Environmental Justice (Native American) populations affected by changes in subsistence uses and potential increased living costs	• Same as under Proposed Connected Actions	• No effects
Recreation and Visual Resources	• Net increase to the federal estate of recreational land on acquired tracts through Land Exchange Proposed Action • Visual effects would occur, but would not exceed USFS standards	• Fewer federal lands conveyed at NorthMet Project Mine Site under Land Exchange Alternative B • Remaining federal lands at Mine Site would not have public access • Fewer acres acquired through Land Exchange Alternative B • Same visual resources effects as under Proposed Connected Actions	• No effects
Wilderness and Special Designation Areas	• No effects on Wilderness or Special Designation Areas • The air quality of the BWCAW would not be adversely affected by the NorthMet Project Proposed Action	• Same as under Proposed Connected Actions	• No effects
Hazardous Materials	• Potential effects from spills and use of explosives during operations	• Same as under Proposed Connected Actions	• No effects
Geotechnical Stability	• Waste rock stockpiles, Tailings Basin, and Hydrometallurgical Residue Facility would be constructed in accordance with applicable State of Minnesota standards • Monitoring and adaptive management would maintain geotechnical stability	• Same as under Proposed Connected Actions	• Tailings Basin would be subject to closure and reclamation activities in accordance with MDNR requirements

7.3 OTHER CONSIDERATIONS

In addition to disclosure of direct, indirect, and cumulative effects, NEPA requires that federal agencies identify whether, and to what extent, the proposed action would cause irreversible or irretrievable commitments of resources and considers the short-term use of the environment versus maintenance and enhancement of long-term productivity (40 CFR 1502.16). Each of these considerations is explained and disclosed below and the resultant unavoidable adverse effects are described in Table 7.2.4-1.

A number of comments were received during the SDEIS public comment period requesting that human health impacts of the NorthMet Project Proposed Action be considered in the FEIS. While human health is considered in establishing the evaluation criteria used in the resource-specific analysis in Chapter 5, a summary of the potential impacts on human health is provided below.

In addition, a summary of how the Land Exchange Proposed Action addresses the public interest review and factors that the USFS will consider in the ROD is provided below.

7.3.1 Irreversible or Irretrievable Commitment of Resources

Irreversible commitments of resources are those that involve permanent loss because the affected resource cannot be returned to its previous condition (e.g., mined ore or wetlands that would be permanently converted to rock stockpile). Irretrievable commitments of resources are more temporary in nature because the environment can be returned to its previous state through reclamation and restoration activities (e.g., wetlands that would be restored or former facilities that would be removed and the land recontoured and replanted per the reclamation plan).

The construction and operation of the NorthMet Project Proposed Action would result in the irreversible loss of approximately 225 million tons of base and precious metal ore. Mining activities would remove 913.8 acres of wetlands that would be irreversibly lost. Off-site wetland compensatory mitigation would be eventually replaced by the restoration of 1,602.7 acres of wetlands.

Other resources could also be irreversibly lost by the NorthMet Project Proposed Action. For example, changes in the viewshed from the expansion of the existing LTVSMC Tailings Basin would permanently alter visual resources. While cultural resources may be adversely affected, irreversible commitments would be minimized through avoidance. There would be both irreversible and irretrievable loss of federally managed wildlife habitat under the NorthMet Project Proposed Action and Land Exchange Proposed Action. Some species, such as white-tailed deer, may not avoid the area throughout the mine life, although some habitat would be disturbed. Others, such as the Canada lynx, may seek other, better habitat elsewhere. Air quality effects, primarily from fugitive dust, would occur during the mine life, but air quality would return to pre-mining conditions after closure and rehabilitation and restoration of disturbed areas. As discussed in Section 5.2.2, any effects on water quality would be considered irretrievable commitments due to mitigation activities.

The federal lands may contain natural resources culturally important to tribal entities, including access to the land itself, which would be irreversibly lost following the Land Exchange Proposed Action and conversion of the land from public to private ownership.

7.3.2 Short-Term Uses versus Long-Term Productivity of the Environment

Section 102(2)(C)(iv) of NEPA requires that an EIS include information on the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. The local use of the human environment by the proposed project can be summarized in terms of the unavoidable adverse environmental impacts of construction and operation and the irreversible and irretrievable commitments of resources. With the exception of the consumption of depletable resources as a result of construction, operation and closure of the NorthMet Project Proposed Action, these uses may be classed as short term. The short-term benefit of the NorthMet Project Proposed Action is to mine mineral resources. The economic productivity of the site, when used for this purpose, is larger compared to the productivity from timber or other uses for the site under current management direction.

The maximum long-term impact on productivity would result from the loss from the federal estate and continuation of the USFS's management objectives for the land and, consequently, the Mine Site would not be available for any other use. It is conceivable that after closure, much of the land within the Mine Site area could be reforested and harvested, although not by the U.S. Government.

The construction and operation of the NorthMet Project Proposed Action would cause short-term effects on air, aquatic, noise, visual, wildlife, and water resources during the 20-year life of the mine. For example, the NorthMet Project Proposed Action would increase air pollutant concentrations throughout the study area. The activities would not cause an exceedance of any NAAQS air quality standard. Once mining and reclamation activities are completed, the pollutant concentrations would return to pre-mining levels.

The noise levels in the area, while below standards, would increase during operation of the mine. After closure, the noise levels would return to pre-mining levels.

The visual effects from the NorthMet Project Proposed Action would be most noticeable during year 11, when the Category 2/3 Stockpile and Category 4 Stockpile would be at their maximum heights (after which time they would be placed into the East Pit as backfill), and year 12, when the Category 1 Stockpile would reach its maximum height. Additionally, there would be short-term effects on visual resources from fugitive dust and night-lighting during operations. Long-term visual effects would be landform changes as a result of mining activities (e.g., pit lake, Category 1 stockpile, etc.)

The Land Exchange Proposed Action would result in the permanent loss of the federal lands for mining purposes, which would be offset by the long-term increased productivity of the non-federal lands as they would be managed under the Forest Plan. As a result of the Land Exchange Proposed Action, there would be no effects as a result of short-term use of aquatic species, cultural resources, vegetation, wildlife, water resources, air resources, wetlands, or recreational and visual resources.

The NorthMet Project Proposed Action and Land Exchange Proposed Action would remove 6,650.2 acres (GLO) at the Mine Site from Forest Service administration and management under the Forest Plan. Currently, the federal lands, which include the Mine Site, are managed under the Forest Plan as General Forest – Longer Rotation (6,140.1 acres) and as General Forest (355.3 acres). If the land were exchanged, the long-term productivity of the federal lands at the Mine

Site would be lost to timber production and other forest uses for the short-term use as a mine. This would represent an unquantified opportunity cost in which the lands and resources could not be used for forest purposes. The Proposed Connected Actions Alternative B would result in 4,397.3 acres lost under General Forest – Longer Rotation management and 355.3 acres under the General Forest management category. These losses would be replaced by the acquisition, through the Land Exchange Proposed Action, of land for Forest purposes.

7.3.3 Unavoidable Adverse Effects

Regardless of the inclusion of all reasonable mitigation, some effects may not be avoided. For example, the NorthMet Project Proposed Action would utilize technologies to mitigate effects on water quality, which have been demonstrated through modeling to meet applicable water quality evaluation criteria (refer to Section 5.2.2). However, effects on water quality would remain after all reasonable mitigation measures have been applied.

After the implementation of mitigation measures that have been built into the design, the NorthMet Project Proposed Action would have unavoidable adverse effects on wetlands, vegetation, wildlife, air quality, noise and vibration, visual resources, cultural resources, water resources, and aquatic species. Unavoidable direct effects on surface features such as wetlands, vegetation, and wildlife resources would be offset by gains through off-site mitigation (wetlands) and through lands acquired through the Land Exchange Proposed Action. Unavoidable noise and vibration, air, and water emissions from the NorthMet Project Proposed Action would affect the existing conditions, but would not trigger new exceedances of relevant water quality evaluation criteria (with two exceptions, refer to Section 5.2.2) and would result in comparatively small increases to existing levels. The residual practical effects of the Land Exchange Proposed Action would be the loss of federal land, which would be used for the NorthMet Project Proposed Action, and the gain of non-federal lands.

7.3.4 Human Health Considerations

7.3.4.1 Introduction

This section summarizes relevant health issues and potential impacts for the NorthMet Project Proposed Action and identifies where specific health information can be found in the FEIS.

Public comments on the SDEIS identified several concerns based on potential interactions between the NorthMet Project Proposed Action and resources/receptors in the area. Public concerns identified potential health impacts as a result of the following:

- Exposure to air contaminants, particularly airborne amphibole mineral fibers;
- Exposure to contaminants in drinking water, surface water, and food sources (e.g., wild rice, and fish);
- Increased risk of traffic accidents involving chemicals;
- Increased exposure to noise and vibration; and
- Strain on emergency response services.

7.3.4.2 Baseline Community Health

A baseline assessment of community health can be found at the America's Health Rankings website (www.countyhealthrankings.org). The health rankings are based on composite indices of health outcomes (e.g., premature death, diabetes prevalence) and health determinants (circumstances that can affect the future health of a population, such as lifestyle behaviors, health policies, and environmental quality).

Minnesota's population health status is good relative to other states in the nation (ranking sixth-best out of 50 (www.americashealthrankings.org/MN). Within Minnesota, health in Cook County is above the state average as it ranks 28th out of 87 counties for health measures (United Health Foundation 2014). Health in Lake and St. Louis counties are poor relative to other counties in Minnesota, ranking 82nd and 75th out of 87, respectively. The FEIS did not analyze how or whether these counties' community health rankings would be affected by the NorthMet Project Proposed Action.

7.3.4.3 Human Health Impacts

The following sections describe how human health could be affected by exposure to airborne and waterborne chemicals from the NorthMet Project Proposed Action. This information is drawn from the relevant resource sections in Chapter 5 of the FEIS.

7.3.4.3.1 Exposure to Chemicals in Air Emissions

Industrial emissions to air have the potential to affect human health in several ways by the hazardous chemicals and dust irritants they may contain. State and federal ambient air quality standards have been established to protect human health and the FEIS analysis was conducted using these standards as threshold criteria to determine the magnitude and level of significance of the potential air quality impacts of the NorthMet Project Proposed Action. Section 5.2.7.2.3 analyzes human health risks from Mine Site and Plant Site air emissions. The quantitative analysis evaluated 11 chemicals to determine the lifetime cancer and non-cancer health risks of the NorthMet Project Proposed Action. The assessment found that Mine Site and Plant Site emissions would not exceed MDH lifetime cancer and non-cancer guidance levels.

An AERA addressing the emissions from site operations of the NorthMet Project Proposed Action was conducted and is summarized in Section 5.2.7.2.3 of the FEIS. Separate AERAs were conducted for the Mine Site and Plant Site due to the distance (approximately 6 miles) between Mine Site and Plant Site sources.

The AERA included an evaluation of the most sensitive health endpoint for each chemical, e.g., neurological morbidity from manganese, reproductive toxicity of methylmercury, and the carcinogenic potential of diesel, nickel, and arsenic. The FEIS concludes that there would be negligible lead emissions as a result of the NorthMet Project Proposed Action (Section 5.2.7.1.3). Toxicological information for arsenic, cobalt, diesel, nickel, manganese, mercury, and methylmercury (plus additional chemicals) was obtained from the MPCA Risk Assessment Screening Spreadsheet (RASS) and is found as an appendix to the AERA. The AERA includes an analysis of the potential health effects of those chemicals (MPCA 2013b).

Controls were incorporated to reduce airborne mercury emissions. The MPCA reviewed the NorthMet Proposed Action and determined that it would not impede State mercury reduction

goals (MPCA 2013b). At the levels estimated in the FEIS, airborne mercury emissions resulting from the NorthMet Project Proposed Action were found to not be a health concern.

In summary, the FEIS concludes that the NorthMet Project Proposed Action, as designed and with the addition of mitigation measures, would meet all NAAQS (Section 5.2.7).

7.3.4.3.2 Exposure to Airborne Amphibole Mineral Fibers

The NorthMet Project Proposed Action would mine ore from the Duluth Complex, which may contain amphibole mineral fibers. The potential air emissions of amphibole mineral fibers were analyzed in Section 5.2.7.5 of the FEIS. The vast majority of potential emissions of MN-fibers for the NorthMet Project Proposed Action would occur from the ore-crushing operations at the Plant Site, with minor potential emissions from the Tailings Basin and the Mine Site (Barr 2007o). Fine-particulate matter emission controls were incorporated to minimize any release of fiber emissions.

Overall, amphibole mineral fibers were found to represent a relatively small percent of the mineral fibers associated with the processing of NorthMet Deposit ore (Flotation Pilot Testing in July and August 2005), approximately 9 percent of the fibers identified from all collected samples of ore, tailings, and process water. Chrysotile mineral fibers were not found in samples of ore, tailings, or process water collected from the flotation pilot-testing. However, PolyMet's petrographic observations indicate that chrysotile minerals are about 2 percent of the minerals associated with the waste rock from the NorthMet Project Proposed Action.

The University of Minnesota conducted a research effort, known as the Minnesota Taconite Workers Health Study (University of Minnesota 2013), funded by the State of Minnesota, to better understand taconite worker health issues, including an epidemiological investigation into causes of excess rates of disease, including mesothelioma, among taconite workers. The Study did not rule out amphibole mineral fibers as a potential source of health risk or as playing some role in the incidence of disease among taconite workers. Mine workers' health is regulated by the U.S. Department of Labor, Mine Safety and Health Administration. Exposure limits for airborne contaminants, including amphibole mineral fibers, is found in 30 CFR, Ch. 1, Subc. K, Part 56, § 56.5001

The MDH considers the role of non-asbestiform amphibole mineral fibers in the induction of health effects to be uncertain at this time. The MDH concludes that non-asbestiform amphibole mineral fibers have the potential for an undetermined toxicity and potency.

7.3.4.4 Health Impacts from Chemicals in Water

Human health impacts could occur by ingestion of water borne chemicals either directly through drinking water or through food sources. In addition, sulfates in wild rice stands could reduce productivity which may affect its availability as a subsistence food source.

7.3.4.4.1 Drinking Water

Potential arsenic and lead releases to groundwater and surface water are evaluated in Section 5.2.2.3. GoldSim model output indicates that the dominating chemical controls on arsenic concentrations in Colby Lake (a drinking water source) are natural surface runoff, natural groundwater baseflow, and contaminant sources contributing directly to Colby Lake, all of which are not related to the NorthMet Project Proposed Action.

For conditions where arsenic would cause or add to an exceedance of the evaluation criterion in Colby Lake, the NorthMet Project Proposed Action would not likely change concentrations by more than +2.0 percent. It is therefore concluded that the NorthMet Project Proposed Action would not significantly impact Colby Lake.

Examination of GoldSim results show that lead would infrequently cause or add to an exceedance of the evaluation criterion at the Plant Site. In Unnamed Creek, when lead concentrations at PM-11 are predicted to be elevated, the flow at PM-11 is dominated by WWTP discharges. In GoldSim, the WWTP effluent lead concentration is assumed to be 3 µg/L.

Given that pilot testing shows that 2 µg/L lead concentration is achievable in the WWTP effluent, it is likely that actual lead concentrations at PM-11 would have acceptably low frequencies of exceedances.

Based on the analysis, the FEIS found that no discharges of water or seepage from the NorthMet Project Proposed Action would affect off-site domestic water wells or public sources in the area.

Amphibole mineral fibers may be found in water that has come in contact with ore at the Mine Site. There is no applicable water quality standard specific to non-asbestiform amphibole mineral fibers. The USEPA has developed drinking water standards for asbestos for drinking water utilities (USEPA 2015). This standard, called an MCL, is 7 million fibers per liter. The USEPA has provided proven methods of water treatment to meet the MCL, including coagulation/filtration, direct and diatomite filtration, and corrosion control.

Water in contact with waste rock, ore, and pit walls would be treated at the WWTF during operations utilizing a greensand filter. No discharge would occur off site during operations. During post-closure, a greensand filter, pre-filters, and a RO system or equivalently performing technology would be used to treat water to meet water quality standards prior to discharge. This treated water would be discharged into the Partridge River, which flows into Colby Lake, the only lake in the area used for drinking water. It is the source of drinking water for the City of Hoyt Lakes. Currently, the City utilizes sand filters, coagulation, and settling and has been in compliance with the USEPA asbestos standards. When the RO treatment system would be constructed at the Mine Site, it would operate in the same fashion as the City's treatment system. As such, the discharge from the Mine Site would be expected to be in compliance with the federal standard prior to it being treated again by the City of Hoyt Lakes.

7.3.4.4.2 Fish

The AERA assessed the health effects for recreational and tribal fishermen and their families consuming fish which may contain elevated bioaccumulated levels of methylmercury. It estimated a potential small change in fish mercury concentration based on modelled emissions and deposition. The FEIS concludes that this potential change in methylmercury concentration is not statistically measurable given the variability in background concentrations and the current laboratory analytical methods (see also Barr 2013j and Barr 2015g). Given that evidence and finding, no potential change in human health risks related to the fish consumption pathway is expected (Sections 5.2.2.3.4, 5.2.6.2.1, and 5.2.6.2.2 describe the impacts on water and aquatic resources, respectively, that would have a pathway to potential human health). Section 6.2.6 of the FEIS contains an assessment of cumulative effects to aquatic resources. It found that the NorthMet Project Proposed Action, in combination with other reasonably foreseeable projects, could increase solute concentrations for many constituents in the Partridge River and Embarrass

River, although not above water quality evaluation criteria. This change in existing water quality and the interactions between effects from a number of projects in the area, natural conditions, and current and future hydrology could be addressed as part of the non-degradation analysis for the NorthMet Project Proposed Action in permitting. The NorthMet Project Proposed Action, in particular, but to some extent in combination with other existing and reasonably foreseeable projects, would shift treatment of water discharged into the Partridge River and Embarrass River from natural systems (i.e., essentially an ecosystem service) to mechanical systems (e.g., the NorthMet Project Proposed Action WWTF and WWTP). Given that the solute concentrations for constituents in the Partridge River and Embarrass River are not expected to increase above water quality evaluation criteria, cumulative impacts to aquatic species due to changes in water quality from the NorthMet Project Proposed Action, in combination with other reasonably foreseeable projects, are not anticipated.

7.3.4.4.3 Wild Rice

Waters downstream from the NorthMet Project area are used as a source of wild rice by the Ojibwe people who continue to harvest it in traditional ways. Research indicates that increased sulfate levels in wild rice habitat can adversely affect its growth and productivity during certain times of its lifecycle. It is possible that Tribal member health could be indirectly affected if their diet would need to increasingly rely on less-healthy replacement foods if wild rice production were to decrease as a result of the NorthMet Project Proposed Action.

In order to protect this food source, the State has issued regulations that place limits on the allowable level of sulfate in waters used for production of wild rice (*Minnesota Rules*, part 7052.0100). Sections 5.2.2.3.2 and 5.2.2.3.3 of the FEIS analyze any sulfate released from the NorthMet Mine Site and Plant Site, respectively, that could affect the production of wild rice downstream from both the Mine Site and Tailings Basin. The analysis concludes that in the Partridge River the NorthMet Project Proposed Action would not cause or add to exceedances of the sulfate evaluation criteria of 10 mg/L applicable at the draft MPCA staff-recommended wild rice production waters near SW-005 and SW-006. In the Embarrass River, the NorthMet Project Proposed Action would decrease sulfate concentrations at PM-13 near the draft MPCA staff-recommended wild rice production waters. In neither case would wild rice productivity be adversely affected or reduce its availability as a subsistence food source.

7.3.4.5 Health Impacts from Traffic Accidents Involving Chemicals

Section 5.2.13 discusses risks involved in the transportation, storage and use of regulated hazardous materials used in mining and ore processing. These materials are regulated by state and federal rules, which limit the potential risks of off-site effects, especially if large quantities were transported to and from the NorthMet Project area. The hazardous materials analysis also included a risk assessment of large scale events which could affect populations along the transportation routes. This analysis found that given overall design and operational commitments of the NorthMet Project Proposed Action, there would not be any significant adverse effects from the proposed transportation of hazardous wastes.

7.3.4.6 Health Impacts from Noise and Vibration

Impacts of noise and ground vibration from the NorthMet Project Proposed Action are discussed in Section 5.2.8. While health effects were not explicitly discussed, modelling shows that the NorthMet Project Proposed Action would meet State of Minnesota noise and vibration limits and would not, therefore, result in health concerns.

7.3.4.7 Health Impacts from Strain on Emergency Response Services

Section 5.2.10.2 of the FEIS discusses changes in the local area's work force (local versus population influx), and demands on available services, including the medical infrastructure. A sudden increase in population can place strain on local health resources including emergency management services, primary care, and acute health care services. Similarly, a large-scale emergency event can put a strain on emergency resources. The FEIS found that the NorthMet Project Proposed Action would result in minimal population and employment changes. Hence, it is not expected that the NorthMet Project Proposed Action would place a strain on existing emergency and health care services in the area.

As a requirement of the permit to mine, the operator of the NorthMet Mining Project would be required to prepare an Emergency Response Plan, which would require them to coordinate their emergency response planning with local agencies, as described in Section 5.2.13.2.4.

7.3.5 Land Exchange Public Interest Consideration

The ROD from the USFS will describe how the public interest is served under 36 CFR 254.3(b). As stated in Section 1.4.3 of this FEIS, factors that must be considered include the opportunity to: achieve better management of federal lands and resources to meet the needs of state and local residents and their economies and secure important objectives, including but not limited to protection of fish and wildlife habitats, cultural resources, watersheds, and wilderness and aesthetic values; enhancement of recreation opportunities and public access; consolidation of lands and/or interests in lands, such as mineral and timber interests, for more logical and efficient management and development; consolidation of split estates; expansion of communities; accommodation of existing or planned land use authorizations; promotion of multiple-use values; implementations of applicable Forest Land and Resource Management Plans; and fulfillment of public needs (see 36 CFR 254.3(b) and 254.4(c)(4)). The ROD will also incorporate the finding of these factors and how the factors relate to how the public interest would be served by the Land Exchange Proposed Action, Land Exchange Alternative B, and the Land Exchange No Action Alternative. Table 7.3.5-1 below presents a comparison of how the alternatives address these factors.

Table 7.3.5-1 Public Interest Factors That Must be Considered for the Land Exchange Proposed Action

Factors		EIS Section Citation	Land Exchange Proposed Action	Land Exchange Alternative B	Land Exchange No Action Alternative
Opportunity to achieve better management of federal lands and resources to meet the needs of state and local residents and their economies	Boundary (Perimeter) Managed	5.3.1	33.2-mile net reduction in Forest boundary to be managed	8.6-mile net reduction in Forest boundary to be managed	No change
	Fragmentation (ratio of boundary to area)	5.3.1	No change	No change	No change
	Net Federal Estate Acreage	5.3.1	385.1 acres net increase to the federal estate	38.7 acres net increase to the federal estate	No change
Secure important objectives, including but not limited to:	Protection of fish and wildlife habitats	5.3.4/5.3.5/ 5.3.6/7.2.4	• See Wildlife and Aquatic Species in Table 7.2.4-1 for a summary of potential effects to fish and wildlife resources from NorthMet Project Proposed Action • 579.6-acre net increase of vegetation land cover types to the federal estate • 1,364.5-acre, 248.3-acre, 226.7-acre net increase of MIH-1, MIH-9, and MIH-14, respectively; 1,172.5-acre net decrease of MIH-5 • 6,025.8-acre net decrease in high MBS Sites; 767.9-acre net increase in medium MBS Sites • Decrease of 10 plant species, increase of three different plant species to the federal estate • Net increase in acreage of landscape ecosystems (dry-mesic red and white pine, lowland conifer, lowland hardwood, mesic birch-aspen-spruce fir, mesic red and white pine, and sugar maple) with a net decrease to jack pine-black spruce to the federal estate • Forested habitat would decrease; shrubland/grassland and aquatic habitats would increase • Increase to the federal estate of overall suitable habitat for lynx and for snowshoe hare (prey species); however the amount of unsuitable lynx habitat would also increase • Decrease to the federal estate of denning habitat and of federal lands within designated LAU • Critical lynx habitat would not change • Decrease of 29.1 acres to the federal estate of cover habitat; increase to the federal estate of forage habitat of 507.1 acres for the gray wolf • Increase of SGCN habitat to the federal estate • Net increase of surface water resources (MIH 14) to the federal estate thereby increase aquatic habitat • 99.1-acre of lake, 3.8-mile of river, and 8.1 miles of third-order stream net increase to the federal estate • 34.0-shoreline/acre unit for lakes and streams (frontage index) net increase to federal estate • Increase in watershed riparian connectivity, which indicates that the streams on both the federal and non-federal lands are located within watersheds with existing high-quality riparian connectivity • Acquiring streams located in watersheds with better aquatic connectivity values	• See Wildlife and Aquatic Species in Table 7.2.4-1 for a summary of potential effects to fish and wildlife resources from NorthMet Project Proposed Action • 173.6-acre net increase of vegetation land cover types to the federal estate • 1,411.8-acre and 206.2-acre net increase of MIH-1, MIH-14, respectively; 1,084.6-acre and 261.1 net decrease of MIH-5 and MIH-9, respectively • 4,573.1-acres and 0.3-acre net decrease in high and medium MBS Sites, respectively • Decrease of 10 plant species to the federal estate, increase of 1 different plant species to the federal estate • Net increase in acreage of landscape ecosystems (dry-mesic red and white pine, lowland conifer, lowland hardwood, mesic birch-aspen-spruce fir, mesic red and white pine, and sugar maple) with a net decrease to jack pine-black spruce to the federal estate • Forested habitat would decrease; shrubland/grassland and aquatic habitats would increase • Decrease to the federal estate of overall suitable habitat for lynx and denning habitat; however, increase of suitable snowshoe hare habitat • Decrease of federal lands within designated LAUs • Critical lynx habitat would not change • Increase of 262.7 acres of forage habitat; however, decrease of 192.9 acres of cover habitat on the federal estate for gray wolf • Increase of SGCN habitat to the federal estate • Net increase of surface water resources (MIH 14) to the federal estate thereby increase aquatic habitat • 120.7-acre of lake, 2.8-mile of river, and 8.1 miles of third-order stream net increase to the federal estate • 3.2 and 3.5-shoreline/acre unit for lakes and streams, respectively, (frontage index) net increase to federal estate • Increase in watershed riparian connectivity, which indicates that the streams on both the federal and non-federal lands are located within watersheds with existing high-quality riparian connectivity • Acquiring streams located in watersheds with better aquatic connectivity values	• See Wildlife and Aquatic Species in Table 7.2.4-1 for a summary of potential effects to fish and wildlife resources from NorthMet Project Proposed Action • Would not change the USFS' responsibility for managing wildlife and aquatic resources and would result in no change in anticipated effects on existing wildlife and aquatic species

Factors		EIS Section Citation	Land Exchange Proposed Action	Land Exchange Alternative B	Land Exchange No Action Alternative
			• The USFS determined, through a Biological Evaluation, that the project would have no beneficial impact to RFSS species, and would not likely impact individuals or result in a trend to federal listing or loss of viability for the RFSS species	• The USFS determined, through a Biological Evaluation, that the project would have no beneficial impact to RFSS species, and would not likely impact individuals or result in a trend to federal listing or loss of viability for the RFSS species	
	Cultural resources	5.3.9/7.2.4	• See Cultural Resources & Historic Properties in Table 7.2.4-1 for a summary of potential effects to cultural resources from NorthMet Project Proposed Action • For federal lands the exchange could result in lack of access to those areas and species that are traditionally or culturally important to the Bands. Band members use of the Land Exchange area is not well-defined • No known cultural resources on the non-federal lands, however, cultural resources located on private lands being transferred to federal ownership would be considered to have greater preservation protection under federal law	• See Cultural Resources & Historic Properties in Table 7.2.4-1 for a summary of potential effects to cultural resources from NorthMet Project Proposed Action • For federal lands the exchange could result in lack of access to those areas and species that are traditionally or culturally important to the Bands. Band members use of the Land Exchange area is not well-defined • No known cultural resources on the non-federal lands, however, cultural resources located on private lands being transferred to federal ownership would be considered to have greater preservation protection under federal law	• No change
	Watersheds	5.3.2/5.3.3/ 7.2.4	• See Water Resources Wetlands & Floodplains in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action • No substantive difference in the quality of groundwater resources between the federal and non-federal tracts • 4.6-mile net increase of public water streams to the federal estate • 95.2-acre net increase of public water lakes to the federal estate • 2.1-mile net increase of shoreline to the federal estate • 125.7-acre net increase of wild rice beds to the federal estate • 505.5-acre net increase of wetlands to the federal estate; therefore conforms to EO 11990 • 376.2-acre net increase of mapped floodplain but would result in a 1,226.0-acre net decrease of floodplains to the federal estate; however, no decrease in regulatory floodplains, no increase in flood damage potential, and no change in ecological function of floodplain. Therefore, conforms to EO 11988 • 99.1-acre net increase of lakes and 3.8-mile net increase of rivers to federal estate	• See Water Resources and Wetlands & Floodplains in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action • No substantive difference in the quality of groundwater resources between the federal and non-federal tracts • 3.6-mile net increase of public water streams to the federal estate • 116.8-acre net increase of public water lakes to the federal estate • 2.6-mile net increase of shoreline to the federal estate • 125.7-acre net increase of wild rice beds to the federal estate • 69.9-acre net increase of wetlands to the federal estate; therefore conforms to EO 11990 • 376.2-acre net increase of mapped floodplain but would result in an 861.7-acre net decrease of floodplains to the federal estate; however, no decrease in regulatory floodplains, no increase in flood damage potential, and no change in ecological function of floodplain. Therefore, conforms to EO 11988 • 120.7-acre net increase of lakes and 2.8-mile net increase of rivers to federal estate	• Would not change the USFS' responsibility for managing water and wetland resources and would result in no change in anticipated effects on existing water and wetland resources • See Water Resources and Wetlands & Floodplains in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action
	Wilderness and Special Designation Areas	5.3.12/7.2.4	• No change • See Table 7.2.4-1 for a summary of potential effects to Wilderness & Special Designation Areas from NorthMet Project Proposed Action	• No change • See Table 7.2.4-1 for a summary of potential effects to Wilderness & Special Designation Areas from NorthMet Project Proposed Action	• No change • See Table 7.2.4-1 for a summary of potential effects to Wilderness & Special Designation Areas from NorthMet Project Proposed Action
	Aesthetic values	5.3.11/7.2.4	• See Recreation and Visual Resources in Table 7.2.4-1 for a summary of potential effects to visual resources from NorthMet Project Proposed Action • Change in the composition of the visual character of the Superior National Forest, affecting less than one-quarter of one percent of the total area of the forest, has	• See Recreation and Visual Resources in Table 7.2.4-1 for a summary of potential effects to visual resources from NorthMet Project Proposed Action • Change in the composition of the visual character of the Superior National Forest, affecting less than one-tenth of one percent of the total area of the forest, has	• See Recreation and Visual Resources in Table 7.2.4-1 for a summary of potential effects to visual resources from NorthMet Project Proposed Action • Visual appearance of the federal and non-federal lands would remain unchanged

Factors	EIS Section Citation	Land Exchange Proposed Action	Land Exchange Alternative B	Land Exchange No Action Alternative
		generally positive aspects • Addition of land with Moderate and High SIO (in lieu of land with a Low SIO) could affect the types of forestry and management activities that can occur on those lands • USFS would acquire land with a wider diversity of SIOs and would result in a net increase to the federal estate	generally positive aspects • Addition of land with Moderate and High SIO (in lieu of land with a Low SIO) could affect the types of forestry and management activities that can occur on those lands • USFS would acquire land with a wider diversity of SIOs and would result in a net increase to the federal estate	
Enhancement of recreation opportunities and public access	5.3.1/5.3.11/ 7.2.4	• Net increase of up to 579.6 acres of publicly owned land in the 1854 Ceded Territory	• Net increase of 173.6 acres of publicly owned land in the 1854 Ceded Territory	• There would be no change in the amount of acres available for public access and recreational use • The presence of a privately owned road (Dunka Road) and rail on the southern border of the federal lands would continue to limit public access to and use of the federal lands
Consolidation of lands and/or interests in lands, such as mineral and timber interests, for more logical and efficient management and development	5.3.1	• Would result in relinquishing the federal parcel with severed, private mineral rights and known, economically developable minerals and acquiring parcels with predominantly low risk of conflict and predominantly moderate title quality • Improves the quality of title and reduces the complexity of title to the federal and non-federal lands • Risk of conflict and title quality may be further improved through subsequent arrangements with holders of mineral rights on the non-federal lands or affirmative title insurance coverage	• Would result in relinquishing the federal parcel with severed, private mineral rights and known, economically developable minerals and acquiring parcels with moderate risk of conflict and moderate title quality • Improves the quality of title and reduces the complexity of title to the federal and non-federal lands • Risk of conflict and title quality may be further improved through subsequent arrangements with holders of mineral rights on the non-federal lands or affirmative title insurance coverage	• Interest in development of mineral potential on the federal lands could continue
Consolidation of split estates	5.3.1.2.5/ 5.3.1.3.5	• Eliminates about 6,495.4 acres of split estate at the site of proposed open pit mine • Superior National Forest acquires 7,075.0 acres with moderate to low (primarily low) risk of conflict between mineral interests and USFS surface management	• Eliminates about 4,752.6 acres of split estate at the site of proposed open pit mine • Superior National Forest acquires up to about 4,926.3 acres with moderate mineral development potential, except for potential surficial aggregate resources in the far northeastern corner of Tract 1	• Existing split estates would continue • Conflict between mineral interests and USFS surface management of the federal parcel would remain
Expansion of communities	5.3.10	• Creates positive economic effects through increased opportunity for forestry and recreation and associated employment, earnings, and revenue • Negligible negative effects on other socioeconomic factors, including housing, public facilities and services, EJ populations, and subsistence	• Creates positive economic effects (to a lesser degree than the Land Exchange Proposed Action) through increased opportunity for forestry and recreation and associated employment, earnings, and revenue • Negligible negative effects on other socioeconomic factors, including housing, public facilities and services, EJ populations, and subsistence	• No change to the federal lands, and the non-federal lands would remain inaccessible to the public (including tribal entities) • No direct or indirect effects on socioeconomics
Accommodation of existing or planned land use authorizations	5.3.1	• Compatible with the USFS Management Areas and zoning/land use designations of adjacent lands	• Compatible with the USFS management areas and zoning/land use designations of adjacent lands	• Compatible with relevant local zoning ordinances and planning designations
Promotion of multiple-use values		• Current National Forest System lands would be mined on 1,673.2 acres; remainder would be privately owned forested lands • 7,075.0 aces of non-federal parcels would become subject to Superior National Forest Land and Resource Management Plan	• Current National Forest System lands would be mined on 1,673.2 acres; remainder would be privately owned forested lands • 4,926.3 aces of non-federal parcels would become subject to Superior National Forest Land and Resource Management Plan	• Existing multiple-use uses would continue on federal lands at the proposed mine site
Implementations of applicable Forest Land and Resource Management Plans	1.0/3.3.3	• Addresses Purpose and Need described in Section 1.3.2.2 and Forest Plan desired condition direction • Eliminates Conflict in terms of D-LA-1 arrangement of	• Addresses Purpose and Need described in Section 1.3.2.2 and Forest Plan desired condition direction • Eliminates Conflict in terms of D-LA-1 arrangement	• Does not fully address Purpose and Need described in section 1.3.2.2. • Does Not Eliminate Conflict in terms D-LA-1

Factors	EIS Section Citation	Land Exchange Proposed Action	Land Exchange Alternative B	Land Exchange No Action Alternative
		National Forest System lands and eliminating conflicts, and • Environmentally Sound in terms of D-MN-2, mineral development and production are conducted in environmentally sound manner • Pending necessary agency decisions and permitting, the proposed mining, and minerals production would take place as described in Chapter 3 with the potential environmental and socioeconomic consequences identified in Chapters 5 and 6.	of National Forest System lands and eliminating conflicts, and • Environmentally Sound in terms of D-MN-2, mineral development and production are conducted in environmentally sound manner • Pending necessary agency decisions and permitting, the proposed mining, and minerals production would take place as described in Chapter 3 with the potential environmental and socioeconomic consequences identified in Chapters 5 and 6.	arrangement of National Forest System lands and eliminating conflicts, and • Environmentally Sound in terms D-MN-2, mineral development and production are conducted in environmentally sound manner • Conflicts resulting from split estate would continue to require resolution with the potential environmental and socioeconomic consequences identified in Chapters 5 and 6.
Fulfillment of public needs	5.3.10/7.2.4	• See Water Resources in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action • Would result in an active mining operation that would generate federal, state, and local tax revenue, in addition to employment • Could increase economic activity associated with recreation and tourism. • Could generate four direct and 12 indirect forestry jobs. • To the degree that increased availability of publicly accessible land improves property value and generates revenue in the study area, could have positive effects on environmental justice populations • Would result in the loss of subsistence resources and opportunities on the federal lands, and a gain in subsistence resources and opportunities on the non-federal lands. • Would result in a loss of some of the ecosystem functions provided by the forest, wetland, and other natural habitats on the federal lands, particularly the portions of the federal lands (i.e., the Mine Site) where habitat would be replaced by mine facilities. Some of these functions could be restored during the post-closure period, when the federal lands (as well as the Plant Site) are revegetated. In exchange, would enable the USFS to directly manage the ecosystems functions on the non-federal lands.	• See Water Resources in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action • Would result in an active mining operation that would generate federal, state, and local tax revenue, in addition to employment • Could increase economic activity associated with recreation and tourism. • Could generate some direct and indirect forestry jobs (fewer than under the Land Exchange Proposed Action). • To the degree that increased availability of publicly accessible land improves property value and generates revenue in the study area, could have positive effects on environmental justice populations • Would result in the loss of subsistence resources and opportunities on the federal lands, and a gain (smaller than in the Land Exchange Proposed Action) in subsistence resources and opportunities on the non-federal lands. • Would result in a loss of some of the ecosystem functions provided by the forest, wetland, and other natural habitats on the federal lands, particularly the portions of the federal lands (i.e., the Mine Site) where habitat would be replaced by mine facilities. Some of these functions could be restored during the post-closure period, when the federal lands (as well as the Plant Site) are revegetated. In exchange, would enable the USFS to directly manage the ecosystems functions on the non-federal lands. However, this loss of some of the ecosystem functions would be less than from the Land Exchange Proposed Action.	• See Water Resources in Table 7.2.4-1 for a summary of potential effects to water resources from NorthMet Project Proposed Action • No change to the federal lands, and the non-federal lands would remain inaccessible to the public (including tribal entities) • Given other private ownership (e.g., the Dunka Road and railroad), the federal and non-federal lands would remain generally inaccessible to the public • No direct or indirect effects on socioeconomics

7.4 AGENCY-PREFERRED ALTERNATIVE

CEQ regulations (40 CFR 1502.14) states that based on the information and analysis presented in the affected environment and environmental consequences sections of an EIS, the EIS should present the environmental impacts of the proposal and the alternatives in comparative form to provide a clear basis for choice among the alternative options by the decision makers and the public. The regulations further state under 1502.14(e) that federal agencies shall identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference; however, the regulations do not require a rationale for the choice. No similar requirement to identify a preferred alternative exists for the MDNR under state law.

For the USFS, the Agency-Preferred Alternative is the Land Exchange Proposed Action described in Section 3.3.2. Potential effects specifically relating to the Land Exchange Proposed Action are identified in Sections 5.3 and 6.3. Table 7.3.5-1 summarizes potential effects relating to public interest factors considered for the Land Exchange Proposed Action and its alternatives.

For the USACE, Appendix B of 33 CFR 325 supersedes the CEQ requirement to identify an agency-preferred alternative. These procedures state that, "the Corps is neither an opponent nor a proponent of the applicant's proposal; therefore the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the Final EIS." The information in the FEIS will be used by USACE to determine whether the applicant's proposal is in compliance with the requirements of Section 404 of the CWA and in the overall public interest.

7.5 LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE

The CWA Section 404(b)(1) Guidelines require that the USACE determine whether a project is water dependent. "Water dependent" means that the project requires access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. If a project is determined not to be water dependent, the regulations presume that: 1) an alternative site that does not involve special aquatic sites (in this case, wetlands) is available, and 2) practicable alternatives are available that would result in less environmental loss, unless clearly demonstrated otherwise by the applicant (40 CFR 230.10(a)(3)). The regulations further require that the USACE alternatives analysis identifies the least environmentally damaging practicable alternative (LEDPA). Under the Section 404(b)(1) Guidelines, the USACE may not permit discharges of dredged or fill material into waters of the United States if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10(a)). "Environmental" in this context is defined by the USACE as non-aquatic natural resources. The term "practicable" is defined in 40 CFR 230.3(q) as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes."

The regulations also require that the USACE consider a full range of public interest factors and conduct an alternative analysis in order to identify the least environmentally damaging practicable alternative. NEPA provides a broad-based approach to impact balancing. However, NEPA does not contain substantive requirements that compel agencies to choose a particular

alternative as is required by Section 404(b)(1) of the CWA. Compliance with NEPA requirements may not necessarily translate to compliance with Section 404(b)(1) Guidelines during the Section 404 permit process. For NEPA actions where the USACE is a permitting agency, the analysis of alternatives required for NEPA EISs will, in most cases, provide the necessary information for the evaluation of alternatives under the CWA Section 404(b)(1) Guidelines (40 CFR 230.10(a)(4)). The NEPA alternative analysis would be evaluated by the USACE to determine if it is considered the LEDPA in order to proceed with authorization under the CWA. The alternatives screening process should therefore be designed to provide sufficient information regarding impacts to the aquatic ecosystem, purpose and need, and proposed impacts to the natural environment. The FEIS should contain sufficient information to identify and substantiate the LEDPA but is it not required to identify a LEDPA; however, the final determination on the LEDPA will be made within the ROD, which serves as the USACE's decision document and the basis for the DA permit decision. The LEDPA is the only alternative that is allowable pursuant to the CWA Section 404(b)(1) Guidelines. The applicant must clearly demonstrate that the preferred alternative in the FEIS is the LEDPA and that the other alternatives are not practicable for reasons of logistics, technology, cost, or other elements of project viability. Failing this, other alternatives may be considered "practicable" for the Section 404 alternatives analysis.

Under Subpart B of the Section 404(b)(1) Guidelines, the USACE's evaluation of the NorthMet Project Proposed Action is required to address the following four tests that the NorthMet Project Proposed Action must meet in order to receive a Section 404 permit:

- 40 CFR 230.10(a): Whether there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as that alternative would not result in other significant adverse environmental consequences. The alternative identified by this test is referred to as the LEDPA.
- 40 CFR 230.10(b): Whether the discharge would violate any applicable state water quality standards, Section 307 of the CWA, the ESA, or federal laws concerning marine sanctuaries.
- 40 CFR 230.10(c): Whether the discharge would cause or contribute to significant degradation of waters of the United States.
- 40 CFR 230.10(d): Whether appropriate and practicable steps have been taken that would minimize potential adverse impacts of the discharge on the aquatic ecosystem.

The ROD will include the Section 404(b)(1) analysis and the public interest review, and would determine the LEDPA. Furthermore, the ROD for the USACE cannot be finalized until 30 days after release of an FEIS and would include responses to comments that raised substantive issues that were not addressed in the FEIS. The ROD will recommend issuance, issuance with conditions, or denial of the NorthMet Project Proposed Action.

In order to determine the LEDPA for the NorthMet Project Proposed Action, the identified project alternatives would be evaluated pursuant to the four tests identified above. Alternatives that do not meet the objectives of the project sponsor will not be further evaluated. Those alternatives that satisfy the criteria of 40 CFR 230.10(a)-(d) and meet the objectives of the project sponsor would be further investigated for selection of the LEPDA. In order to determine which alternative is the LEPDA, each alternative would be evaluated for its potential impact to air quality, biological resources, floodplains, geology and soils, hazardous material and wastes,

infrastructure, land use, noise, prime farmland, water resources, and wetlands. In evaluating those resources, best professional judgment will be necessary in order to determine the degree of potential adverse effect resultant from evaluated alternatives. Similarly, in determining which alternative is the LEDPA, best professional judgment will be necessary because some alternatives may impose greater environmental harm to some resources over others. As such, a qualitative approach to selecting the LEDPA is the most effective.

-Page Intentionally Left Blank-