July 2013 version

ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: The EQB webpage of Environmental Review Guidance Documents / http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.
Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.
Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project title: Canisteo Mine Pit Temporary Dewatering Project

2. Proposer

Contact person: Michael Twite
Title: Environment, Land & Gov't Affairs Mgr
Address: 102 NE Third Street, Suite 120
City, State, ZIP: Grand Rapids, MN 55744
Phone: 218-999-5165 ext. 110
Fax: 218-999-5827
Email: mike.twite@magetation.com

3. RGU

Contact person: Cynthia Warzecha
Title: Planner
Address: 500 Lafayette Road
City, State, ZIP: 5155
Phone: 651-259-5078
Fax: 651-297-1500
Email: environmentalrev.dnr@state.mn.us

4. Reason for EAW Preparation (check one)

Required:
☐ EIS Scoping
☑ Mandatory EAW

Discretionary:
☐ Citizen petition
☐ RGU discretion
☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
Subpart 24.A. Water appropriations and impoundments

5. Project Location

County: Itasca

City/Township: Coleraine, Bovey, and Trout Lake Township
PLS Location (¼, ¼, Section, Township, Range):
Section: W½ 32 Township: 56N Range: 24W
Section: 22 Township: 55N Range: 24W

Watershed (81 major watershed scale): Mississippi River – Grand Rapids

GPS Coordinates:
Pump Site: 47°17'39.95"N 93°25'44.11"W
Outfall into existing drainage: 47°17'34.42"N 93°25'20.51"W
Southern Pump Site: 47°13'56.58" N 93°22'51.12"W
Southern Outfall Site: 47°13'55.8" N 93°22'4.68"W

Tax Parcel Number:
Pump Site: 88-031-1100; Outfall: 88-032-3201
Southern Pump Site: 40-022-2304; Southern Outfall Site: 40-022-4200

At a minimum attach each of the following to the EAW:

- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and
  Figure 1: Site Location Map
- County map showing the general location of the project;
  Figure 2: Site Detail Map
  Figure 3: Canisteo Mine Complex
- Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.
  Figure 4: Dewatering Route
  Figure 5: Outflow Pump Discharge Route
- Additional figures
  Figure 6: Canisteo Dewatering Receiving Waters
  Figure 7: Slope Stability Locations
  Figure 8: NWI Wetlands
  Figure 9: Trout Lake Outflow Pump Discharge Route near Wetlands
- Attachments
  Attachment A: Natural Heritage Information System Query
  Attachment B: State Historic Preservation Office Query

6. Project Description

a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

Mag Mining, LLC (Mag), proposes to engage in temporary dewatering activities of the Canisteo Mine Pit Complex (CMP) to safely isolate the Buckeye Pit, located on the west end of the CMP northeast of Grand Rapids. Once isolated, Mag would conduct exploratory drilling, laboratory testing and bulk sampling to determine if the iron reserves within the Buckeye Pit are suitable for Magnetation's iron oxide beneficiation operations.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: **1)** construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, **2)** modifications to existing equipment or industrial processes, **3)** significant demolition, removal or remodeling of existing structures, and **4)** timing and duration of construction activities.

Mag Mining, LLC (project proposer) is a subsidiary of Magnetation LLC (Magnetation), which is a privately held company founded in 2006 with the intention of using proprietary separation technology to capture iron oxide particles left over from historical mining operations that existed on the iron range dating back to the 1890s. Magnetation currently produces hematite iron concentrate from its Plant 1 facility near Keewatin, Minnesota and its Plant 2 facility in Taconite, Minnesota. Concentrate produced from these operations is then shipped out via Magnetation's rail terminal near Grand Rapids, Minnesota. Magnetation constructed their newest facility, Plant 4, in 2014 and the plant began operations in January 2015. Magnetation's three Minnesota plants are Scram Mining operations. Scram mining is defined in Minnesota Administrative Rules, 6130.0100 as: "a mining operation which produces natural iron ore or natural iron ore concentrates from previously developed stockpiles, tailings basins, underground mine workings, or open pits, which involves no more than 80 acres of land not previously affected by mining."

The CMP, depicted in Figure 2 and Figure 3, is a large historic pit complex that is approximately 5 miles long, covering approximately 1,472 acres and reaching water depths of over 300 feet. The CMP has been filling with ground water since mining ceased in 1985. The water level has increased from approximately 1260 feet mean sea level (MSL) in 1991 to levels exceeding 1318 feet MSL in the spring of 2012. Magnetation has an existing water appropriations permit of 12,000 gallons per minute (gpm) from the CMP that has been issued by the Minnesota Department of Natural Resources (DNR) to support operations at the existing Plant 2 site, as well as operations at the Plant 4 site.

The Buckeye Pit (Figure 3) is located at the western end of the overall CMP. Based on DNR contours of the CMP, the bottom of the Buckeye Pit extends down to an elevation of approximately 1220 feet MSL. Natural iron ore reserves of indeterminate quantity and quality are located within the Buckeye Pit and these minerals have been leased to Mag by the DNR as the land agent for Minnesota's Permanent School Trust Fund. Mag is proposing to conduct temporary dewatering activities from the CMP to lower the overall water level down to

approximately 1220 feet MSL as depicted in Chart 1. This would expose a land bridge at an elevation of 1270 feet MSL (Figure 3) and isolate the Buckeye Pit from the overall CMP.

The material content and the hydrologic connectivity associated with the land bridge between the Buckeye Pit and the overall CMP is unknown at this time. When the land bridge has been exposed and sufficiently dried, Mag will explore the land bridge for stability and the ability to hold back water. It is unknown if groundwater fills the Buckeye Pit and the CMP independently or if there is a connection. Mag would explore this potential connection once sufficient dewatering has occurred.

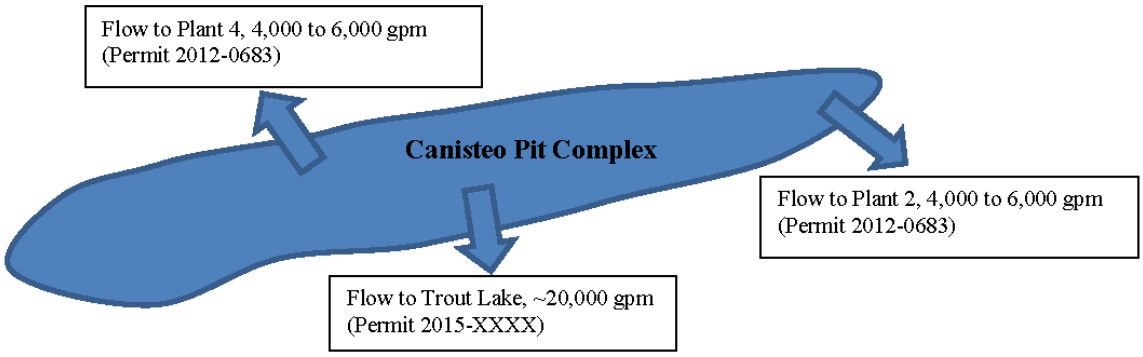
Once isolated, the Buckeye Pit would be further dewatered to a level that would allow for exploratory drilling, laboratory testing and bulk sampling of the historic mine reserves to determine their quality and suitability for further processing by Mag. A second land bridge at an elevation of 1260 feet MSL (Figure 3) would further segment the CMP into two portions, the King-Orwell pits in the center portion of the CMP and the Holman-Plummer pits on the eastern end of the CMP. Pumping would continue in the King-Orwell pits to bring the water elevation to approximately 1210 to 1220 feet MSL to even out the head between the Buckeye Pit and the King-Orwell pit. Once the water level in the King-Orwell pit portion of the CMP is down to the target elevation, the pit water level would be maintained by a combination of the existing appropriations permit (#2012-0683) feeding Plant 2 and Plant 4 operations as well as a secondary point of taking in the proposed appropriation that would be used to maintain the dewatered condition of the Buckeye Pit by feeding Plant 4 operations as illustrated in Chart 1. After the target elevation is reached in the King-Orwell pit, the primary point for dewatering flows to Trout Lake would cease.

The dewatering would be a temporary appropriation. The total volume of water to lower the CMP from the current elevation of 1310 MSL down to the target elevation of 1220 feet MSL is 75,126 acre-feet of water. At the target pumping rate of 20,000 gpm, while also accounting for runoff and groundwater inflows as well as fluctuations in pumping rates, it would take less than three years to reach the target water elevation of 1220 feet MSL in the CMP.

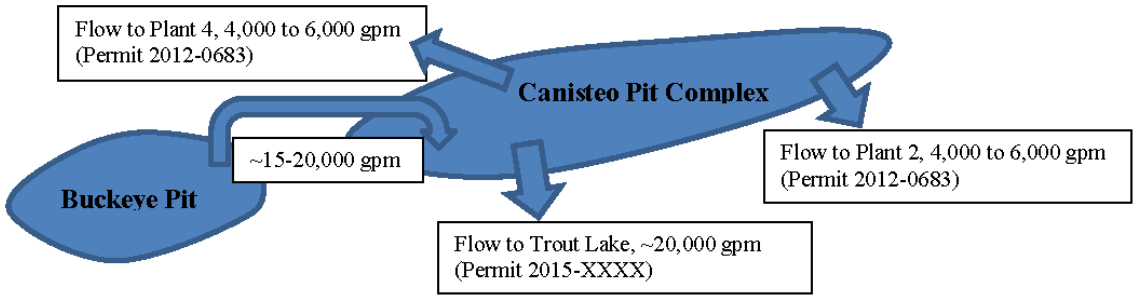
At approximately 550 days of pumping, a land bridge would be exposed at 1270 feet MSL, which would isolate the Buckeye Pit from CMP. After the Buckeye Pit is isolated, it would be drawn down to the bottom elevation of 1220 feet MSL to allow for exploratory testing and bulk sampling of mine reserves. It would take an additional 60 days to fully dewater the isolated Buckeye Pit down to 1220 feet MSL. Pumping would continue for approximately another 200 days in the CMP until the pit reaches the elevation of 1220 feet MSL at which point there would be three pits, the Buckeye Pit on the west, the King-Orwell in the center and the Holman-Plummer on the east (Chart 1). The water level in the CMP would then be maintained between 1220 and 1230 feet MSL, using a combination of the existing water appropriations permit and the new secondary point of taking in the proposed water appropriations permit (Chart 1).

Chart 1: Canisteo Pit Dewatering Process

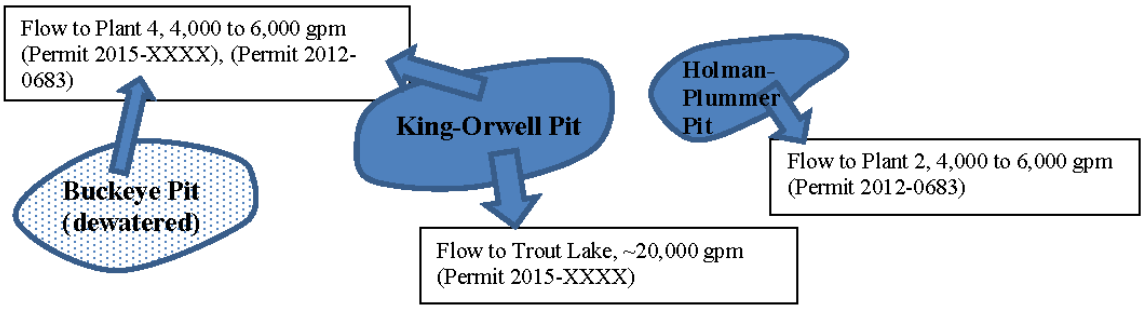
Phase 1: From current water level elevation, 1310 feet MSL, to 1270 feet MSL



Phase 2: From 1270 feet MSL to 1260 feet MSL



Phase 3: From 1260 feet MSL to 1220 feet MSL



Phase 4: Maintenance Pumping Utilizing Permitted Plant Appropriations

145

To conduct the temporary dewatering of the CMP, Mag would install appropriately sized pump(s) on a barge in the CMP (Figure 4). As pit water levels decrease, the pump(s) would float down with the barge further into the pit. The dewatering flows would be directed via a pipe across lands to an existing drainage system that is part of the City of Coleraine and the City of Bovey's (Municipal) stormwater conveyance system and empties into Trout Lake (Figure 4). The dewatering pipe would be laid on the surface, not buried or trenched, which would allow for easy access by Mag for inspections or maintenance of the dewatering pipe system. Freezing issues are not anticipated with proper use of the pumps and maintaining the target quantity of water flowing through the dewatering pipes. The corridor for the dewatering pipe would be minimally cleared of vegetation to the extent needed to allow for pipe installation. No grading or earthwork will be required for the dewatering pipes, only removal of brush or small trees. The dewatering pipe corridor was selected to minimize potential impacts along the route and is located along previously disturbed mine lands including historic stock piles. Erosional impacts would be mitigated through the use of riprap dissipation structure at the pipe outlet, which would be constructed in an upland area. Additionally, a fine-mesh fish filter will be placed on the end of the pipe. The fine mesh filter's primary use is as a preventative for invasive species into Trout Lake. The filter also aerates the water and lessens the strength of the flow out of the pipe.

Once the Buckeye Pit is isolated from the main King-Orwell Pit portion of the CMP, an additional pump(s) would be added to the Buckeye Pit. This pump(s) would be used to completely dewater the isolated Buckeye Pit. Waters from this pump(s) would be piped across the exposed land bridge into the King-Orwell Pit and dewatering flows would continue to be directed into Trout Lake. Once the dewatering of the Buckeye Pit is complete the additional flows to keep the pit dewatered would be directed to Plant 4 via a secondary point of taking under the proposed water appropriations permit (Chart 1).The project would include necessary permits and approvals, as well as employ appropriate measures to minimize or mitigation for potential impacts to wetlands, stormwater runoff, and water quality of the pits and downstream receiving waters.

Once the Buckeye Pit is completely dewatered and exploratory drilling begins, any continued dewatering necessary in this pit would become the primary consumptive water use source at Plant 4. This proposed water appropriation would be the primary water source for Plant 4 and the existing water appropriation permit 2012-0683 would be the secondary water source for Plant 4.

Temporary dewatering flows from the Project would be directed to Trout Lake. The outlet to Trout Lake is Trout Creek located on the east-central portion of the basin. Trout Creek flows south into the Swan River. An additional pump (southern pump) would be placed on township land at the southern end of Trout Lake. The intake pipe for the pump would be attached to a floating dock with the pipe located underneath the dock and a screened exclusion area around the intake. The intake screen would have a slot size less than 0.25 inches, along with a through screen velocity of <0.50 feet per second to comply with permit conditions. The electric pump

would be placed on land through a negotiated temporary access easement between Mag and the Township. The outflow pipe would be placed in the right-of-way corridors on Crooked Road and the north side of Itasca County Road 21 to the Swan River (Figure 5). The purpose of this pump would be to serve as mitigation to control the level of Trout Lake and prevent it from rising above desired levels. Mag would work directly with the DNR to establish a pumping schedule to maintain the desired water elevation of Trout Lake. If at any time the water elevations would increase above desired levels, Mag would cease dewatering activities until water elevations returned to desired levels.

c. Project magnitude:

Table 1. Project Magnitude

Construction/ Infrastructure Elements	Size
Total Project Acreage	N/A
Linear project length – Discharge pipe from CMP to Trout Lake	2,200 feet
Linear project length – Outflow Pipe from Trout Lake to Swan River	3,850 feet
Number and type of residential units	N/A
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	N/A

The Project would include the use of a temporary dewatering pipe that will be laid on the ground from the CMP to the discharge point into an existing pond. The dewatering pipe covers a distance of approximately 2,200 feet. A second pipe would also be part of the Project to maintain water levels within Trout Lake. The outflow pipe from the south end of Trout Lake to the Swan River would cover a distance of approximately 3,850 feet. The proposed dewatering project would not result in significant changes to land use, land cover or other elements considered under project magnitude.

The Project would reduce the overall water levels within the CMP, which would result in less surface area of the pit covered by water. The current surface water area of the entire CMP is approximately 1,472 acres. Of that total area, the Buckeye Pit encompasses approximately 115 acres. The Project would expose areas of the pit that have been previously mined or disturbed including the Buckeye Pit on the west end of the CMP, portions of the King-Orwell Pit in the center of the CMP, and the land bridge between the King-Orwell and Holman-Plummer portions of the CMP. The temporary dewatering would not alter these historic mine features but would make them visible compared their current state where they are under water. The CMP would look similar to other pits along the Iron Range that are in various stages of dewatering and/or mining activity.

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of the Project is to temporarily dewater the CMP to safely isolate the Buckeye Pit on the west end. Once isolated, Mag would conduct exploratory drilling, laboratory testing and bulk sampling to determine if the iron reserves within the Buckeye Pit are suitable for iron oxide beneficiation operations.

e. Are future stages of this development including development on any other property planned or likely to happen?
☐ Yes ☑ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

Mag will obtain samples from the Buckeye Pit for laboratory testing of quality. If favorable results are found with the testing, bulk sampling would occur to determine if scram operations are feasible. Depending on the results of the testing, Mag may propose scram mining within the Buckeye Pit. Due to the uncertainty of any potential future action after material testing there are no known phased or connected actions. The DNR as RGU will evaluate any future proposals by Mag to determine if additional environmental review is required.

f. Is this project a subsequent stage of an earlier project?
☐ Yes ☑ No
If yes, briefly describe the past development, timeline and any past environmental review.

7. Cover types

Estimate the acreage of the site with each of the following cover types before and after development:

Table 2. Cover Types

Cover Type	Before	After	Cover Type	Before	After
Wetlands	0	0	Lawn/landscaping	0	0
Deep water/streams	0	0	Impervious surface	0	0
Wooded/forest	0.6	0	Stormwater Pond	0	0
Brush/Grassland	0.6	1.2	Other (describe)	0	0
Cropland	0	0			
			TOTAL	**1.2**	**1.2**

As stated previously, the Project would temporarily reduce the water levels and associated surface water area of the CMP from approximately 1,472 acres to approximately 1,357 acres. Temporary dewatering would expose previously mined or disturbed areas including the Buckeye Pit, the King-Orwell Pit, and the land bridge between the King-Orwell and Holman-Plummer portions of the CMP.

The area of the Project is relatively small and would result in minimal disturbance to cover types. The dewatering corridor from the CMP to Trout Lake is approximately 2,200 feet long. The lands in this area are all previously disturbed historic mine lands including stockpiles. The lands are currently covered by a mixture of grasses, brush, and woody forests. The disturbed mine lands and stockpiles are rocky areas that would not require grading to install the dewatering pipe. The vegetation would be cleared along this corridor for a width of approximately 25 feet. This disturbed area where vegetation would be cleared would equal approximately 1.2 acres in size. The woody vegetation and shrubs would be cleared and most would be replaced by grassy areas. The project would not disturb other adjacent lands or land cover types near the Project area.

The corridor for the outflow dewatering pipe from Trout Lake to Swan River is approximately 3,850 feet long. The above-ground pipe would be placed within the right-of-way of Crooked Road from the boat launch south to Itasca County Road 21 and within the right-of-way along the north side of the county road. It is anticipated that placement of pipe would have little effect on existing vegetation within roadway right-of-way.

8. Permits and approvals required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Table 3. Permits and Approvals Required

Unit of Government	Type of Application	Status
U.S. Army Corps of Engineers	Section 404 Permit	To be applied for – if applicable
Itasca County	Wetland Conservation Act Incidental Wetland Determination	To be applied for – if applicable
Itasca County	Wetland Conservation Act Wetland Replacement Plan	To be applied for – if applicable
Department of Natural Resources	Permit to mine	To be applied for – if applicable
Department of Natural Resources	Bulk Sample Reclamation Plan Approval	To be applied for – if applicable
Department of Natural Resources	Water Appropriations	To be applied for
Department of Natural Resources	Work in Public Waters	To be applied for
Pollution Control Agency	401 Certification	To be applied for – if applicable
Itasca County	Work in Right of Way Permit	To be applied for
Itasca County	Shoreland Alteration Permit	To be applied for – if applicable

Note: Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19.

9. Land use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Land use surrounding the CMP primarily consists of gravel pits and open mines. Urban and industrial uses are present along the southwest portion of the CMP within the cities of Coleraine and Bovey. Deciduous and coniferous forests are near the CMP in several locations.

The Mesabi Trail, a paved multi-use trail, is located south of the CMP and passes through the communities of Coleraine, Bovey, and Taconite. The Keystone snowmobile trail also runs through the cities of Coleraine and Bovey. The proposed temporary dewatering pipe from the CMP to Trout Lake would intersect the Keystone snowmobile trail. The former public access to the Buckeye Pit on the west end of the CMP closed in December 2013 to allow for construction of Magnetation's Plant 4 facility. Several months of liberalized ("unlimited") fishing were allowed prior to closure of the public access.

Bovey, with a population of nearly 700, is a small mining town. The outfall site would be approximately 500 feet from the adjacent residential properties in Bovey. The temporary dewatering flow would pass alongside the Bovey Business Park in an existing stormwater conveyance system. A stand of trees would separate the existing business from the stormwater conveyance system.

Coleraine, with a population of nearly 2,000 according to the 2010 census, is a small mining town is on the shores of Trout Lake. The temporary dewatering pipe would be placed on private lands and discharge into a drainage system that is part of the municipal stormwater conveyance system. The dewatering flows would continue through the existing stormwater conveyance system, past the Minnesota Department of Transportation building, Mary Immaculate Church, and then past city of Coleraine properties and one private property adjacent to where the drainage empties into Trout Lake. A private residence and the drainage are located on the opposite sides of the private property.

ii. Plans: describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The Itasca County Comprehensive Land Use Plan, effective June 2013, includes broad goals for the future growth and development of the county as related to natural resources, housing and settlement patterns, recreation, transportation, and commercial and industrial development within the county. The plan does not identify specific planned land uses.

The Itasca County Local Water Management Plan 2012-2017 Update, adopted May 2012, acknowledges that there is the potential for some major industrial sites to be located within the county. The plan recognizes that industrial development has the potential to impact water quality, increase impervious surfaces, and require large water usage. The plan does not identify specific planned land uses.

Development in Coleraine is primarily regulated through the City's zoning code and shoreland management ordinances. The Draft Coleraine Comprehensive Plan (February 2010, updated 2014) acknowledges that mining will likely be a part of Coleraine's future. The plan states that mining interests have recommended that no new developments occur over the known Mesabi iron formation because placing residences, businesses, or industries on land that is on or near the iron formation could result in future conflicts between surface land uses and subsurface mining.

The City of Bovey Comprehensive Plan (September 2009) states that development in Bovey is primarily regulated through the city's zoning code.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

Itasca County has established Shoreland Overlay Zoning Districts and Mining Overlay Zoning Districts. The Shoreland Overlay Zoning District boundary for lakes is 1,000 feet from the ordinary high water level (OHWL). The boundary for streams and rivers is 300 feet from the OHWL or the landward extent of a floodplain, whichever is greater. Shoreland Overlay Zoning Districts incorporate underlying zoning districts and impose additional or varying requirements from the requirements of the underlying zoning districts. The southern pump and the outflow discharge to the Swan River are within the Trout Lake Shoreland Overlay District and the Swan River Shoreland Overlay District, respectively. Replacement of culverts between the discharge point from the CMP and Trout Lake may be subject to shoreland zoning requirements.

The Mining Overlay Zoning District consists of subdistricts A, B, and C that may overlay other zoning districts. Subdistrict A is the sub-crop of the Biwabik Formation (not including municipalities); Subdistrict B is the permit to mine areas or mine disturbed ground; and Subdistrict C is an area of possible future mining related activities. The proposed project is located within Subdistrict A. The southern pump at the south end of Trout Lake is outside the Mining Overlay Zoning Districts.

Itasca County has a floodplain ordinance that applies to lands within the jurisdiction of the county within the boundaries of the floodway, flood fringe, or general floodplain districts. A Federal Emergency Management Agency (FEMA) mapping identifies a 100-year flood area adjacent to the Swan River near the location of the outflow discharge from Trout Lake to the Swan River.

The cities of Coleraine and Bovey have zoning codes that regulate development within their municipal boundaries. The route of the dewatering pipe is governed by the city of Coleraine zoning ordinance. The dewatering pipe would cross private property that is zoned light Industrial by the city. Temporary easements would be acquired by Mag to allow the placement of the dewatering pipe. Mag has discussed the Project with Coleraine Zoning Officials and there are no permits or restrictions under the city's ordinances applicable to the placement of the dewatering pipe.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The proposed Project is compatible with nearby land uses, zoning, and plans. The Itasca County Comprehensive Land Use Plan supports continuation and expansion of the mining industry.

The Project is a temporary dewatering effort that would result in very little land disturbance or change in land uses. The result of the Project would be a temporary transfer of water out of the CMP into Trout Lake. With the exception of the temporary change in water surface elevation within the CMP, no other land use alterations or impacts are anticipated.

The pump(s) would be placed on a barge in the CMP. The dewatering pipe would come ashore on private lands within the limits of the City of Coleraine. Mag is currently in discussions with private land owners to acquire temporary lease agreements to place the temporary dewatering pipe on these lands. The land where the dewatering pipe would be located is zoned as "Light Industrial." The dewatering pipe would cross over the Canadian Northern rail line, which is no longer in use, and a snowmobile trail. Mag is currently in discussions with the local snowmobile club that maintains the trail. Mag would make necessary accommodations (i.e. a bridge on the trail over the pipe) to ensure that the temporary dewatering pipe does not interfere with trail use.

The dewatering pipe would outfall into a drainage system that flows across private property into the Municipal stormwater conveyance system and empties into Trout Lake. The temporary dewatering flow would pass through two existing culverts; one under the Mesabi Trail and a second culvert on private property as indicated in Figure 4. These culverts on private property may be replaced, if needed, to accommodate the existing stormwater flow and additional temporary dewatering flow from the Project. The existing stormwater conveyance system runs alongside the Bovey Business Park, crosses under US Highway 169, and flows into Trout Lake adjacent to a public access.

Field measurements were taken along the existing ditch including cross sections and elevations. The ditch is approximately 15 feet wide and would be two and half to three feet deep under bankfull conditions. The ditch was determined to have a slope of approximately 0.002ft/ft. Based on these conditions the ditch would be able to accommodate the typical baseflow in the ditch as well as the additional dewatering flows within the bankfull cross section of the ditch, with velocities remaining below the calculated bankfull velocity. This flow would still provide approximately two feet of freeboard compared to the adjacent road. The culverts farther down the ditch system under US Highway 169 are large (three 65" reinforced concrete pipe culverts) and are able to handle over 300 cfs total. In the event that storm flows draining to the ditch cause an increase in water elevations that are greater than the capacity of the stormwater system, Mag would stop the dewatering flows until the storm flows within the ditch recede to a point where dewatering flows could resume.

The southern pump would be placed on township land at a public boat launch at the southern end of Trout Lake. The exact location of the southern pump installation and inlet structure will consider ice safety effects as related to the public access. The outflow pipe would be placed in the Crooked Road right-of-way from the boat launch south to Itasca County Road 21 where it would continue to follow road right-of-way. The pipe would discharge to the Swan River. Placement of the pump would not create impacts, nor would placement of the outflow pipe in the existing right-of-way. Impacts to adjacent properties are not anticipated. Mag would obtain lease agreements from the private landowners to place the outflow dewatering pipe from the southern pump in the right-of-way on the north side of County Road 21.

A Shoreland Alteration Permit may be required for the placement of riprap within a Shoreland Overlay Zoning District. The Itasca County Zoning Ordinance states that, to the extent possible, riprap should be designed to have a natural appearance. Adherence to permit requirements would ensure compatibility with the county's zoning ordinance.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The current dewatering pipe alignment crosses properties that are zoned light Industrial by the city of Coleraine. The southern pump and outflow pipe crosses properties that are zoned as public, rural residential, and farm residential by Itasca County. The Project activities are compatible with the current zoning and property use. No modifications or conditional uses are anticipated for the Project; therefore mitigation measures are not anticipated.

The dewatering route through Trout Lake has the potential to raise water levels depending on the conveyance capacity of the Trout Creek outlet. To avoid impacts form high water on Trout Lake a secondary pump is proposed in Trout Lake that would pump water from Trout Lake directly to the Swan River. This pump will be operated to manage water levels within Trout Lake.

10. Geology, soils and topography/land forms

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Regional Geology

Glacial drift covers much of the area, with the exception of bed-rock outcrops along the Giants Range north of the Canisteo Mine Pit. Three major morainal till units and associated glaciofluvial out-wash deposits exist, formed during the Wisconsin glaciation ice advances from the north and west. Drift thickness ranges from zero along portions of the Giants Range to more than 300 feet in areas south of the Canisteo Mine Pit. The stratigraphically lowest till unit, the basal till, is a dark-greenish and brownish-gray till that is sandy, silty, clayey, and calcareous. The boulder till ranges widely in color from gray to yellow, and consists of sands and silts, with abundant cobbles and boulders. The surficial till is brown in color; sandy, silty, and calcareous; and is generally less than 30 feet thick.

Glaciofluvial outwash deposits lie stratigraphically between surficial and boulder tills, and often lies between the boulder and basal till or bedrock. These outwash deposits consist largely of sands, gravels, and boulders. Glaciofluvial outwash deposits between the surficial and boulder tills are often greater than 50 feet thick and sometimes greater than 100 feet in portions of buried valleys. These outwash deposits mainly consist of fine grained sands, but may grade to highly transmissive, coarse-grained sands, gravels, and boulders in buried valleys, and at other locations where the bedrock surface is low.

The glaciofluvial sediments found below the boulder till are fairly continuous south of the Canisteo Mine Pit. These sediments are poorly sorted and are generally less than 50 feet thick, but are greater than 100 feet thick locally in buried bedrock valleys.

Iron ore was extracted from the Canisteo Mine and other mines from a narrow belt of iron-rich bedrock strata known as the Biwabik Iron Formation, which trends to the northeast for approximately 120 miles across northeast Minnesota. The Biwabik Iron Formation is overlain and bounded to the south by the Virginia Formation. The Virginia Formation consists of argillites, siltstones, and graywackes, and is underlain and bounded to the north by the Pokegama Quartzite. The Precambrian granitic rocks that form the Giants Range underlie the Pokegama Quartzite. Cretaceous sandstones, iron formation, and shales overlie the Precambrian rocks in portions of the area (Jones, 2002).

Site Geology

The Minnesota Department of Health completed a Wellhead Protection Plan for the City of Bovey which includes general geologic cross sections of the area (Walsh, 2007). The cross

sections were constructed using geologic references and well boring log data from the Minnesota Department of Health County Well Index. The cross sections indicate that glacial till is typically present at the surface and can vary in thickness from absent near the Canisteo Mine Pit to approximately 60 feet thick in the Coleraine area. This unit is underlain by a glacial outwash sand unit that is approximately 50 feet thick. This outwash is water bearing and forms the Bovey-Coleraine aquifer. The aquifer is generally confined by the glacial till sediments above, except where it is exposed in areas along the Canisteo Mine Pit. The aquifer is bounded on the bottom by a lower till unit overlying the Virginia Formation (described above). The Virginia Formation thins to the north so that the Biwabik Iron Formation is the uppermost bedrock found in the Canisteo Mine Pit.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

Soils

Soils surrounding the CMP are primarily Udorthents with slopes ranging from nearly level to approximately 50 percent. Nashwauk fine sandy loam with slopes of up to 35 percent are also present adjacent to the CMP. Soils in the area of the temporary dewatering pipe from the CMP to Trout Lake consist of Udorthents and mine dumps. Stuntz very fine sandy loam is located near the Trout Lake shore. Soils in the area of the outflow dewatering pipe from Trout Lake to Swan River include Warba fine sandy loam with slopes ranging from nearly level to 35 percent. Greenwood peat, which is poorly drained, is also present in this area. The Pengilly-Winterfied association is the primary soil type adjacent to the Swan River. These soils are very poorly drained and are subject to frequent flooding.

Topography

In general, the Canisteo Mine Pit is located between the Giants Range to the north-northwest and the Mississippi River to the southwest. The Giants Range varies in elevation from approximately 1400 feet to 1550 feet north of the area and trends northeast to southwest. The

Mississippi River has an approximate elevation of 1260 feet south of the project area. Surface drainage in the area is generally south to southeast from the Giant Range to the Canisteo Mine Pit and generally southward on the south side of the pit.

Implications to Project

Groundwater in the area of the Canisteo Mine Pit is generally found in the unconsolidated sediments above the bedrock and its elevation is influenced by the level of water within the pit. Lowering the pit water level during the proposed dewatering activity will result in groundwater flow toward the mine pit. A groundwater flow study conducted by the USGS in cooperation with the DNR (Jones, 2002) related groundwater flow velocity to pit water elevation. The study showed that most groundwater inflow originates less than one mile from the pit boundary and that flow velocity was sensitive to location variations in horizontal hydraulic conductivity. Groundwater flow into the mine pit was found to be proportional to pit water elevation.

A slope stability study of the mine pit walls during rising pit water levels conducted in 2008 (Wenck, 2008) indicated that the steepness of the pit walls controlled slope stability in the unconsolidated sediments above the bedrock. This study[1] was revisited in 2014 to evaluate the stability of the pit walls as pit water levels are lowered. The results indicated that groundwater elevation had little effect on the stability of the mine pit walls. The pit walls will likely remain unstable at shallow depths due to the steepness of the slopes and low cohesion in the unconsolidated sandy sediments. As water levels are lowered in the CMP surficial soils will drain to the pit creating a new temporary angle of repose for saturated soil conditions. For those areas where the water level is lowered below bedrock; the bedrock elevation will be the lowest control point for this new temporary saturated soil condition. The difference in soil saturation conditions could contribute to existing soil stability issues near an unused rail right-of-way and an area that contains an existing waste rock stockpile.

The CMP dewatering project is proposed to take place over a period of less than three years. This slow rate of dewatering would allow groundwater elevations to stay in close equilibrium with the mine pit water elevation. The duration of lower water levels in the CMP will depend on the results of the exploration. If the lower water level is maintained for a long period of time additional monitoring and potential mitigation of specific areas may be needed.

11. Water resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below:

   i. Surface water – lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired

[1] Revised Slope Stability Analysis – Canisteo Mine Pit Complex Technical Memorandum, Wenck, February 2015

Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

The CMP (Figure 3) is a large historic pit complex that is approximately 5 miles long, covering approximately 1,425 acres, with water clarity of 29 feet, and water depths of over 300 feet. The CMP has been filling with ground water since mining ceased in 1985. The water level has increased from approximately 1260 feet MSL in 1991 to levels exceeding 1316 feet MSL in 2011. Magnetation has an existing water appropriations permit of 12,000 gpm from the CMP that has been issued by the DNR to feed operations at the existing Plant 2 site as well as operations at the Plant 4 site. As part of this proposed Project, Magnetation would also apply for a second water appropriations permit of approximately 20,000 gpm from the CMP using the primary point of taking in the King-Orwell Pit to complete the temporary dewatering activities. The proposed appropriation would also have a secondary point of taking used to maintain the Buckeye Pit in a dewatered condition once isolated, by feeding operations at the future Plant 4 site (Chart 1).

Dewatering flows would be directed into Trout Lake which outlets into Trout Creek, which in turn flows into the Swan River, eventually discharging to the Mississippi River. Trout Lake (Lake ID 31-126) is a large mesotrophic lake that covers approximately 1,854 acres, with water clarity of approximately 15 feet, and water depths of over 130 feet. Trout Lake has provided a northern pike and walleye fishery in recent years, with walleye stocking occurring every few years. In addition to stocking efforts, the DNR conducts fish surveys in Trout Lake. The most recent survey was in 2013. Other species besides northern pike and walleyes collected in 2013 included black crappie, bluegill, bowfin, common shiner, golden shiner, hybrid sunfish, largemouth bass, pumpkinseed, rock bass, smallmouth bass, tullibee, white sucker, yellow bullhead, and yellow perch.

The “Trout Creek Hydraulic Capacity Trout Lake Impacts” (Trout Lake Study), was completed in November 2008 by a team of DNR Hydrologists. The Trout Lake Study found that the average level of Trout Lake is about 1288.1 or 1288.2 feet MSL. The average level varies with a low during the winter of 1287.7 feet MSL and a normal spring peak lake level of less than 1288.9 feet MSL. The Trout Lake Study also indicated that the lowest outbuilding foundation was 1290.5 feet MSL and the lowest house foundation was 1291.1 feet MSL. The Trout Lake Study concluded that raising the level of Trout Lake by 1.1 feet MSL could result in localized flooding of private property. Based on the DNR recorded water levels for Trout Lake since the 2008 study, water levels in Trout Lake from 2009 through 2014 have generally fluctuated between 1288.2 and 1289.2 with one instance in 2012 when the lake reached an elevation of 1289.7 feet MSL.

Trout Lake is connected to the Swan River via Trout Creek. The Swan River’s watershed, including Trout Lake’s drainage areas, covers a total of 323 square miles. The annual average flow of the Swan River downstream of the confluence of Trout Creek, near County Road 21, is 117 cubic feet per second. Springtime peak flows in the Swan River range from 400 to 450

cfs. The biological community of the Swan River was monitored by the MPCA in 2010, including assessments of the fish and aquatic macroinvertebrate communities. The assessment point is located approximately 7.5 miles upstream of the Trout Creek confluence with the Swan River. The MPCA collected 16 different fish species and aquatic macroinvertebrates from 28 different families including several species of both fish and invertebrates considered intolerant of pollution. Based on MPCA assessment indices, the fish and aquatic macroinvertebrate in the Swan River are healthy.

ii. Groundwater – aquifers, springs, seeps. Include: **1)** depth to groundwater; **2)** if project is within a MDH wellhead protection area; **3)** identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

The CMP has been filling with ground water since mining ceased in 1985. The water level increased about 2.5 to 5 feet per year, from approximately 1260 feet MSL in 1991 to a high water level of 1318 feet MSL in the spring of 2012. During this time concerns of overland flow, resulting from the continued water level rise, from the CMP into the cities of Bovey and Coleraine grew.

Groundwater in the area of the CMP is generally found in the unconsolidated sediments above the bedrock and its elevation is influenced by the level of water within the CMP. Lowering the CMP water level during the proposed dewatering activity would result in groundwater flow toward the CMP. A groundwater flow study, Characterization of Ground-Water Flow Between the Canisteo Mine Pit and Surrounding Aquifers, Mesabi Iron Range, Minnesota, was conducted by the USGS in cooperation with the DNR (Jones, 2002). The study related groundwater flow velocity to pit water elevation. The study suggested that most groundwater inflow originates less than one mile from the CMP boundary and that flow velocity was sensitive to location variations in horizontal hydraulic conductivity. Groundwater flow into the CMP was found to be proportional to pit water elevation. The CMP dewatering project is proposed to take place over a period of less than three years. This slow rate of dewatering would allow groundwater elevations to stay in close equilibrium with the CMP water elevation. The dewatering flows would be directed to Trout Lake. A previous DNR study of Trout Lake found that Trout Lake watershed is predominantly a ground water system with very little “flashy” surface water flow.

The CMP is adjacent to a wellhead protection area for three municipalities, Bovey, Coleraine and Taconite. These three municipalities supply water to their residents from the groundwater aquifer in the area. In conjunction with the DNR, the municipalities are developing a Water Supply Contingency Plan to determine the potential for mining activities, such as dewatering the CMP, to impact groundwater supplies for the cities. Groundwater is abundant in the area of the Project; however groundwater movement is not fully understood in the region around the CMP. The water supply wells for the cities of Bovey and Coleraine are screened in the unconsolidated sediments above the Banded Iron

Formation bedrock over an interval ranging from an elevation of 1,178 feet to an elevation of 1,258 feet. The dewatering project would ultimately lower the CMP water level to an elevation of 1220 feet MSL, within the range of elevations of the screened municipal wells. However, these wells previously were able to provide adequate water supply to Bovey and Coleraine when the CMP was at this lower water elevation in prior decades (pre-1980). Impacts to the municipal water supply wells from the temporary dewatering associated with the Project are not anticipated. The municipal water supply wells for Taconite are completed deeper and draw water from a bedrock aquifer over an interval from elevation 994 feet to 1,097 feet and are unlikely to be influenced by the temporary dewatering activities in the CMP.

Magnetation currently has an existing water appropriations permit of 12,000 gpm from the CMP that has been issued by the DNR to feed operations at the existing Plant 2 site as well as operations at the Plant 4 site. The scram operations at the Plant 4 site would be fed by historic tailings and stockpile mineral reserves located north of Plant 4 (Figure 2). This water appropriation has assisted in lowering the water level to its current level. As part of their existing appropriations permit (#2012-0683), Magnetation is working with the DNR and the local municipalities to monitor the water levels in the municipal wells to determine if the current water appropriations has an impact on local groundwater supply to the municipalities. Magnetation would continue this effort as part of the temporary dewatering of the Project. Contingency actions are being developed between the three municipalities, the DNR and Magnetation to implement in the event that an impact to local water supply is noted from the water appropriations.

Upon Project completion, it has not been determined if the water level elevation would be maintained or allowed to refill to the current level within the CMP. This determination is dependent on the results of mineral testing and suitability.

Temporary dewatering from the CMP is not expected to influence the groundwater levels into Trout Lake. The hydrological analysis of the Trout Lake water levels found that the dewatering flows would raise the level of Trout Lake less than one foot. This increase in water level is further discussed below under item 11.b.iii. Water Appropriations.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

(1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

There would be no **w**astewater created by the Project.

(2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

There would be no wastewater created by the Project.

(3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

There would be no wastewater created by the Project.

ii. Stormwater – Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

There would be a small amount of stormwater runoff created by the Project, mainly from clearing vegetation along the temporary dewatering pipe corridor from the CMP to Trout Lake. The stormwater from the temporary dewatering pipe alignment from the CMP to Trout Lake would utilize drainages within the existing Municipal stormwater conveyance system. Stormwater runoff is not anticipated for the outflow pipe corridor from Trout Lake to the Swan River, which would be placed within existing roadway right-of-way. Review of the MnDOT plans for US Highway 169 reveal that there are three large 65" RCP culverts under the highway that have a combined capacity to accommodate over 300 cfs. These large culverts under US Highway 169 have sufficient capacity for the dewatering flows and stormwater needs. In the event that stormwater flows cause an increase in water elevations within the ditch that approach the shoulder of local roads or US Highway 169, Mag would cease dewatering flows until such time that water levels within the ditch recede to point where dewatering can resume. If necessary, Mag would coordinate with the cities of Bovey and Coleraine to conduct maintenance activities such as the clearing of brush and debris from channels and culverts.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate

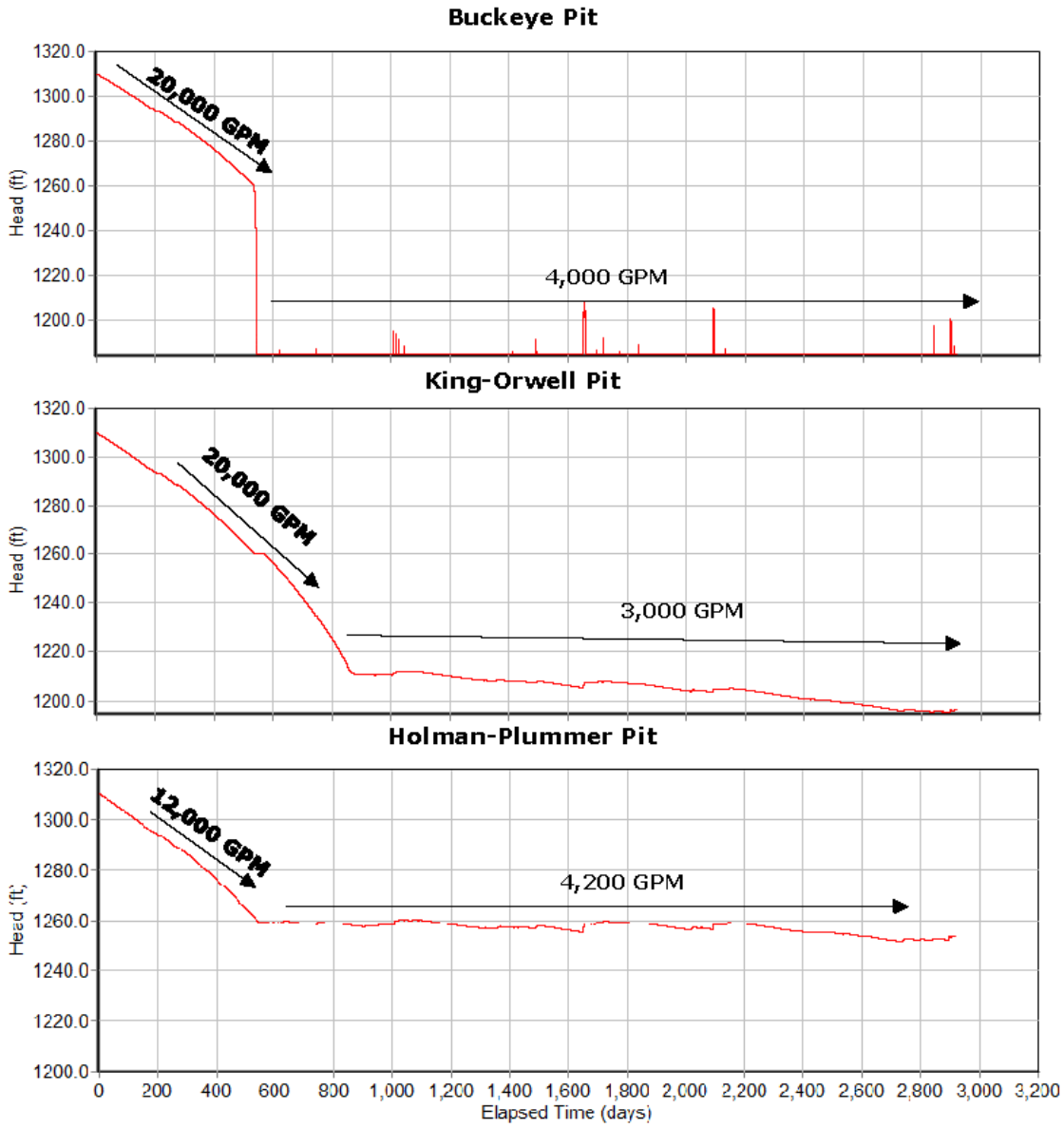
environmental effects from the water appropriation.

Mag proposes to conduct temporary dewatering activities from the CMP to lower the overall water level to approximately 1220 feet MSL. Dewatering would expose a land bridge at an elevation of 1270 feet MSL (Figure 3) and isolate the Buckeye Pit from the overall CMP. Once isolated, the Buckeye Pit would be further dewatered to a level that would allow for exploratory drilling, laboratory testing and bulk sampling of the historic mine reserves to determine their quality and suitability for further processing by Mag. A second land bridge at an elevation of 1260 feet MSL (Figure 3) would further segment the CMP into two portions, the King-Orwell pits in the center portion of the complex and the Holman-Plummer pits on the eastern end of the CMP. Once the water level in the King-Orwell pits portion of the CMP is down to the target elevation, the pit water level would be maintained by a combination of the existing appropriations permit (#2012-0683) feeding Plant 2 and Plant 4 operations and a secondary point of taking in the proposed dewatering permit associated with the Project that would maintain the Buckeye Pit in the dewatered condition as depicted in Chart 1.

A technical memorandum was prepared in 2014 to analyze the drawdown of the CMP.[2] The dewatering would be a temporary appropriation. The total volume of water to lower the CMP from the current elevation of 1310 MSL down to the target elevation of 1220 feet MSL is 75,126 acre-feet of water. At the target pumping rate of 20,000 gpm, while also accounting for runoff and groundwater inflows, as well as fluctuations in pumping rates, it would take less than three years to reach the target water elevation of 1220 feet MSL in the overall CMP. Chart 1, shows the approximate number of days to reach the desired water level elevations in sections of the CMP. At approximately 550 days of pumping, a land bridge would be exposed which would isolate the Buckeye Pit from the King-Orwell Pit. After the Buckeye Pit is isolated, it would be drawn down to the bottom elevation of 1220 feet MSL to allow for exploratory testing and bulk sampling of mine reserves, which would take approximately two months (i.e. the 600 day mark of pumping). At the end of the 850 day pumping period, the water level in the CMP would be expected to reach the target elevation. The water level would then be maintained between 1220 and 1230 feet MSL for the remainder of the Project, from a combination of Magnetation's existing appropriations permit.

[2] Hydrology and Hydraulics Summary for the Canisteo Pit Drawdown Analysis, Wenck, July 2014

Chart 2: Approximate Dewatering Timelines



To conduct the temporary dewatering of the CMP, Mag would install pump(s) on a barge in the CMP (Figure 4 and Chart 1). Once the Buckeye Pit is isolated from the main King-Orwell Pit portion of the CMP, an additional pump(s) would be added to the Buckeye Pit. This pump(s) would be used to completely dewater the isolated Buckeye Pit. Waters from this pump(s) would be piped across the exposed land bridge into the King-Orwell Pit and dewatering flows would continue to be directed into Trout Lake by the barge pump(s) on the King-Orwell Pit (Figures 4 and Chart 1).

The Project would include necessary permits and approvals, as well as employ appropriate measures to minimize or mitigation for potential impact to stormwater runoff and water quality of the pits and downstream receiving waters. Once the Buckeye Pit is completely

dewatered and exploratory drilling begins, continued dewatering that may be necessary in this pit would become the primary consumptive water use source at Plant 4. The existing water appropriation permit #2012-0683 would become the secondary water source for Plant 4.

As a condition of the appropriations permit for the dewatering, a southern pump and outflow pipe would be placed at the southern end of Trout Lake. This southern pump would take dewatering flows from Trout Lake direct to the Swan River (Figure 6). A riprap outlet dissipation structure would be constructed on uplands adjacent to Swan River. This southern pump would provide mitigation to prevent the rise of Trout Lake above desired elevations.

The results of a hydraulic analysis for Trout Creek were provided in a technical memorandum prepared in December 2014.[3] The pumping rate of 20,000 gpm from CMP would result in an approximate 44 cfs increase in flow through Trout Lake, Trout Creek and eventually into the Swan River. There is the potential that the outlet of Trout Lake (Trout Creek) will be unable sustain this level of increased flow without impacting resources, infrastructure, or water levels in the lake. The southern pump from Trout Lake directly to the Swan River is proposed to address these potential impacts. The operation of the secondary pump will determined by monitoring of lake levels and Trout Creek itself. The secondary pump is proposed to discharge in the Swan River downstream from the Trout Creek confluence. The maximum increase to Swan River from the project would be 44 cfs.

Large changes in the hydrology of river systems can result in changes to sediment load, geomorphology, water quality and aquatic habitat. River ecologists have determined that the bankfull flow of a river is important for river channel shape and stability. Changes in hydrology that result in a greater than 20 percent change in bankfull flow have the potential to degrade riverine ecosystems. Bankfull flow or channel forming flows are those higher flows that occur every one and a half years. Data from the Charter Dam Road on the Swan River was used to calculate the 1.5 year return interval flow. Taking this information and extrapolating additional watershed area to the downstream location were flows would be increased results in a bankfull flow of approximately 370 cfs. The additional 44 cfs from dewatering at this location would be a 12 percent increase in flows. The degree of change combined with the temporary duration of the increased flows are that adverse effect to river ecology are not anticipated.

iv. Surface Waters

(1) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the

[3] Updated Trout Creek Analysis Technical Memorandum, Wenck, December 2014

host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

National Wetlands Inventory (NWI) maps for the dewatering pipe alignment are provided as Figure 8 and Figure 9. Also, historical aerial photographs and topography were studied to help understand past landscape/use in the area of the dewatering route from the Canisteo Pit to Trout Lake. The dewatering pipe would be placed on uplands, which are all previously disturbed mine lands and stockpiles. Dewatering flows would be directed into an existing drainage system, which is identified as a deep water marsh on the NWI figure. Aerial photography from 1939 shows that there were farm fields and uplands where the artificial ponds exist today. The ponds in the drainage system were all created as a result of historic mining operations. Further, the existing pond that is today a characteristic deep water marsh would not be impacted by the additional water from the Project dewatering flows as the water will pass through the ponds via the existing culvert entering the open ditch system leading to Trout Lake.

NWI mapping does identify some wetlands along the proposed alignment for the outflow dewatering pipe from Trout Lake to the Swan River. Potential wetland impacts resulting from placement of the outflow pipe will be verified prior to construction. The majority of the proposed alignment is within existing roadway right-of-way, minimizing the potential for project impacts.

(2) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal, or riparian alteration is not anticipated with this Project. Existing culverts in the Municipal stormwater conveyance system could need maintenance, including removal of accumulated debris. Water levels within Trout Lake and downstream would be monitored to avoid physical alternation. Placement of the southern pump and outflow line would serve as mitigation to assure the Trout Lake elevations do not exceed desired levels. If at any time water elevations in Trout Lake reach undesirable levels, Mag would cease dewatering until desired elevations are again

reached. The Project is not expected to impact the number or type of watercraft on any waterbody.

The southern pump would take water directly from Trout Lake to the Swan River, bypassing the natural lake outlet of Trout Creek. Mag would install a rock and riprap energy dissipation structure along the bank of the Swan River to ensure that the dewatering flows do not impact the bridge or cause erosion or scouring on the opposite river bank.

Water Quality

Canisteo Mine Pit dewatering water quality impacts were assessed in a Technical Memorandum in December 2014.[4] Trout Lake, Swan River, and Trout Creek each have multiple beneficial use designations; however, Trout Lake has the most stringent water quality beneficial uses that include 1B, 2A, 4A, 4B, 5, and 6. Each beneficial use class has specific chronic aquatic life standards, maximum aquatic life standards, agricultural water quality standards, or drinking water standard associated with each measured water quality parameter. Table 4 outlines water quality parameters that have been measured in the Canisteo Pit, Trout Lake, or Swan River with corresponding chronic standards (CS), maximum standards (MS), or drinking water standards (DC). All measured parameters in the CMP are below Minnesota State numeric standards for Trout Lake. Therefore, it is unlikely that there would be water quality exceedances in Trout Lake during the 850 day dewatering of the CMP. Furthermore, no water quality exceedances are anticipated in water bodies further downstream (Trout Creek and the Swan River).

[4] Canisteo Mine Pit Dewatering Water Quality Impacts Technical Memorandum, Wenck, December 2014

Table 4. Average Water Quality Data and Standards for the Canisteo Pit, Trout Lake, and Swan River

Table 4. Average Water Quality Data and Standards for Trout Lake and Canisteo Mine Pit surface water

Parameter	Units	Canisteo Data Years	Canisteo Pit	Trout Data Years	Trout Lake	Swan Data Years	Swan River	Applicable Water Quality Standard	Criteria type	Beneficial Use Class
Methylmercury	ng/L	2012	0.034	--	--	--	--	--	--	--
Mercury	ng/L	2001-2012	0.98	2006	0.48	--	--	6.9	CS	2A
Calcium	mg/L	2011-2012	50.9	1988	65	2009	34.2	--	--	--
Iron	µg/L	2011-2012	24.3	--	--	--	--	300	DC	1B/1C
Magnesium	mg/L	2011-2012	41	1988	81	2009	15.8	--	--	--
Manganese	µg/L	2011-2012	5	--	--	--	--	50	DC	1B/1C
Potassium	mg/L	2011-2012	3.8	--	--	--	--	--	--	--
Sodium	mg/L	2011-2012	6.5	--	--	--	--	60% of Total Calculations	IR	4A
Alkalinity	mg/L	2011-2012	173.3	2001-2009	141.3	--	--	--	--	--
Total Dissolved Solids	mg/L	2011-2012	342.3	--	--	2003	186	500	DC	1B
Chloride	mg/L	2011-2012	4.2	2001-2009	6.8	2007-2009	5.8	230	CS	2A
Sulfate	mg/L	2006-2012	113	2001-2012	40.4	2007-2009	14.3	250	DC	1B
Nitrate + Nitrite as N	mg/L	2006-2012	0.011	2001-2009	0.05	2002-2009	0.06	10	DC	1B
Total Phosphorus	µg/L	2006-2012	1.7	2001-2009	18.4	2002-2009	54.3	12	CS	2A
Chlorophyll-a	µg/L	2006-2012	0.49	2001-2009	3.5	--	--	3	CS	2A
TKN	µg/L	2006-2012	73	2001-2009	460	2002-2009	74	--	--	--
Ammonia as N	µg/L	2001-2009	9	2001-2009	13	2002-2009	5	16*	CS	2A

Note: All data is an annual mean concentration for each parameter in the Canisteo Pit, Trout Lake, or the Swan River.
IR = Standard for waters used for irrigation
DC = Drinking water consumption standard
CS = Chronic Standard; Highest water concentration of a toxicant to which organisms can be exposed indefinitely without causing chronic toxicity
MS = Maximum Standard or Acute; highest concentration of a toxicant in water to which aquatic organisms can be exposed for a brief time with zero to slight mortality.
-- No applicable standard or no available data.
* This standard is for un-ionized ammonia; however total ammonia concentrations are below numeric water quality standards for un-ionized ammonia.

Sulfate and total phosphorus concentrations were modeled in Trout Lake using anticipated dewatering rates and durations. This model was run for the duration of the dewatering process (850 days) and after the dewatering process ends. A standard non-steady state advection model was used that takes into account Trout Lake inlet discharge rate, inlet sulfate concentration, sulfate diffusive flux into the hypolimnion, and outlet discharge. Water quality data to support this model was obtained from the MPCA's Environmental Data Access web page, the Natural Resources Research Institute, and Minnesota DNR, while the Trout Lake morphometry was obtained from the

Minnesota DNR GIS Data Deli web page. One assumption that was made for the model is that the lake is stratified throughout the year, which provides a conservative estimate of sulfate concentrations due to a smaller lake volume. Model results indicate that sulfate concentrations will increase to approximately 70 mg/L during the 850 day pumping period, which is well below 250 mg/L sulfate standard. Total phosphorus modeling suggests that the dewatering process will improve the trophic state of Trout Lake and downstream water bodies during the dewatering process.

Other water quality parameters have been measured in the CMP including Nitrate and Nitrite (NO3 + NO2), iron, manganese, total dissolved solids, mercury, and chloride (Table 4). Only two of the aforementioned parameters (chloride and mercury) have been measured in Trout Lake, although all measured parameters in the CMP are well below Minnesota State standards for Trout Lake. Therefore, it is unlikely that there would be water quality exceedances in Trout Lake during the 850 day dewatering of the CMP.

Water bodies that will receive water during the CMP dewatering process have no inventoried wild rice stands (Figure 6). A vegetation survey conducted by the Minnesota DNR in 2000 and a wild rice field survey conducted by the University of Minnesota in 2013 did not indicate that wild rice was present in Trout Lake. Furthermore, there have been no identified wild rice stands in the reach of Swan River or Trout Creek receiving flow for this project.

Indirect Sulfate Water Quality Impacts

Although sulfate will not directly impact nutrient and algal dynamics in Trout Lake, its impact on phosphorus release from sediments has been taken into account. In 2007 a detailed study on Trout Lake found that iron is the primary sediment constituent responsible for binding phosphorus (Nürnberg, 2007). Because sulfide, the reduced form of sulfate, is capable of reducing iron's ability to bind phosphorus in anoxic sediment, increasing sulfate may influence sediment phosphorus release during the CMP dewatering process. However, the 2007 study concluded that the additional sulfate added to Trout Lake will not substantially increase the amount of sulfide production in sediments during the temporary dewatering process. This means that the current iron content, and ultimately sediment phosphorus release, will not be substantially influenced by the temporary dewatering process.

Sulfate also is capable of impacting the production of methylmercury. Research has found that if an aquatic system is sulfate limited, the addition of sulfate can stimulate the production of the bioaccumulative form of mercury, methylmercury (Jeremiason et al, 2006; Wasik et al; 2012; Gilmour et al; 1992). However, if an aquatic system's ability to produce methymercury is not sulfate limited additional sulfate will not result in elevated mercury methylation (Hammerschmidt et al, 2004; Hines, 2010; Beck and

Johnson, 2014). Data analysis suggests that Trout Lake does not appear to be sulfate limited. Numerous sulfate samples have been collected, which have demonstrated that surface and hypolimnion sulfate concentrations are consistently near 40 mg/L. Sulfate concentrations in bottom waters would need to be much lower to limit the amount of sulfate delivered to the location of mercury methylation (anoxic hypolimnion or sediment). This evidence suggests that the temporary increase of sulfate during the CMP dewatering is unlikely to stimulate sulfate reduction and ultimately mercury methylation. This conclusion is similar to those expressed in the 2007 Nürnberg report prepared for the DNR.

Mine Pit Wall Impact on Water Quality during Dewatering Period

Over the past 30 years the CMP was allowed to fill with water, which has inundated pit walls with oxygenated water, resulting in mineral dissolution. Typically, solute concentrations from pit wall and waste rock dissolution have three phases: initial flush, declining limb, and steady state period. It is unlikely that sulfate and other parameters will increase during the dewatering period since pit wall dissolution and transport kinetics have likely reached steady state over the past 30 years. This claim is supported by the consistent water quality concentrations measured in Canisteo pit over the past 10 years. Furthermore, compared to the volume being pumped over the two year period, the relatively small contribution from overland runoff and groundwater inflow will have a very minor impact on the total volume of water in the CMP and the volume being pumped into Trout Lake. After the initial two year dewatering period, maintenance dewatering will not be transferred to Trout Lake but would be used in industrial processes.

After the Buckeye Pit is dewatered to an elevation of 1220 feet MSL, and the pit water elevation of the King-Orwell pit is 1220 feet MSL, the maximum depth of in the King-Orwell and Holman-Plummer pits would be 195 feet and 235 feet, respectively. The water depth at the proposed intake pump location for the temporary dewatering would be at least 150 feet. Data collected from the CMP in September 2012 indicate that pH, sulfates, and specific conductance are relatively consistent throughout the water column from the pit surface to a depth of 125 feet. The proposed dewatering project would lower the water levels 100 feet from the current level.

12. Contamination/Hazardous Materials/Wastes

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental

hazards. Include development of a Contingency Plan or Response Action Plan.

Through the use of the MPCA's *What's in My Neighborhood* website, two potential environmental hazard sites were identified.

1) Hollywood Bait and Gas, located within a quarter mile of the flow corridor, has been cited for a tank leak. The leak was discovered in 1998 and listed as closed in 1999.A warning citation was issued in 2012 by the MPCA. Given the nature of the Project, which would require minimal ground disturbance, no impacts related to contamination or hazardous materials are anticipated.

2) The 1st Avenue Draintile Project, an active stormwater permit, is located approximately one-quarter of a mile from the flow corridor. No impacts related to contamination or hazardous materials are anticipated.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

The Project would not generate nor store any solid waste.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

Exploration of the dewatered Buckeye Pit would use equipment with associated typical fuels and oils.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

The Project would not generate nor require the storage of hazardous waste.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

The Project is located in Northern Lakes and Forests Ecoregion. The U.S. Environmental Protection Agency describes this region as an area with "granite hills extensively modified by mine pits and dumps." Consistent with the Northern Lakes and Forests description, the current condition at the proposed dewatering site is on the shore of a mine pit that has filled with water. The dewatering pipe from the CMP to the outfall site would be on private land for approximately 2,200 feet where it would outfall on into an existing drainage system into Trout Lake. A second pump would be positioned at the southern end of Trout Lake with a dewatering pipe that would be placed in the existing right-of-way for approximately 3,840 feet where it would outfall into the Swan River, north of the County Road 21 bridge.

The CMP was previously managed as a public recreational fishery. The first DNR survey of the CMP was in 1995 after mining activity had ceased in the CMP and it had begun to fill with water. Beginning with the first survey, the CMP was managed for lake trout. Annual stocking of Isle Royale strain lake trout occurred between 1996 and 2005, followed by biennial stocking since 2007. Tullibee was also introduced twice, in 2006 and 2008. Other fish species present in the CMP as of the 2010 Survey Year include bluegill, largemouth bass, northern pike, rock bass, smallmouth bass, white sucker, and yellow perch. Rainbow smelt, a regulated invasive species, is also present in the CMP. The CMP was opened to liberalized fishing between October 17 and December 1, 2013 in preparation for mining activities to return to the area. Public water access to the CMP closed December 1, 2013.

There is little habitat value for wildlife and vegetation along the temporary dewatering pipe alignment, as this area consists of previously disturbed mine lands. There are no ecologically sensitive habitats or resources located on the Project site. The total area that would be disturbed by the dewatering pipe is small and would not pose an impact to local vegetation or wildlife populations.

A vegetation survey conducted by the DNR in 2000 and a wild rice field survey conducted by MPCA in 2013 did not identify the presence of wild rice in Trout Lake. Furthermore, there have been no reported wild rice stands downstream of Trout Lake or in water bodies that would receive CMP dewatering flows.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA) and/or correspondence number (ERDB 20150013-0005) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

A query of the National Heritage Information System (NHIS) was requested in January 2015 (Attachment A). Results of the data search identified records of several state-listed species of special concern within one mile of the proposed project area. Although an important consideration, state-listed species of special concern are not protected under the state endangered species law, but are tracked within the NHIS database and occurrences are documented when found. Permits are not required for potential disturbance or impacts to special concern species.

Three state-listed plants of special concern have been documented within one mile of the proposed Project. The prairie moonwort *(Botrychium compestre)*, the St. Lawrence grapefern *(Botrychium rugulosum)* and the least moonwort *(Botrychium simplex)* are small ferns that tend to be early to mid-succession plants. In northeastern Minnesota, prairie moonwort has been documented in sediment basins used by iron ore and taconite processing plants. The St. Lawrence grape fern grows in low, moist habitats in brushy or grassy areas and in open forest areas. The lease moonwort occurs primarily in open sites including prairies, wetland, and abandoned mine sites.

Two state-listed mussels of special concern, the Creek Heelsplitter *(Lasmigona compressa)* and the Black sandshell *(Ligumia recta)* have been documented in the Swan River. The creek heelsplitter is generally found in creeks, small rivers, and upstream portions of large rivers in water depths ranging from one to three feet deep. The creek heelsplitter has been documented within the Swan River north of the where the southern pump outfall would discharge to the Swan River. The black sandshell is generally found in the riffle and run areas of medium to large rivers in areas dominated by sand or gravel. This mussel was documented within the reach of the Swan River where the southern pump outfall pipe would discharge to the river.

Three active bald eagle *(Haliaeetus leucocephalus)* nests were observed along the shores of Trout Lake in 2005. Bald eagles are no longer a state-listed species, but they are federally protected under the Migratory Bird Treaty Act and under the Bald and Golden Eagle Protection Act. Impacts to bald eagles are not anticipated because tree removals or other substantial construction activities that would potentially impact or disturb bald eagles in the project area are not expected to occur.

The United State Fish and Wildlife Service (USFWS) lists two federally-endangered species in Itasca County, the Canada lynx *(Lynx canadensis)* and the gray wolf (*Canis lupus)* (USFWS 2015). Wolves in the western Great Lakes area, including Minnesota, were relisted under the Endangered Species Act, effective December 19, 2014. Though designated critical habitat for the Canada lynx and gray wolf has been established in Itasca County, none is located within one mile of the proposed Project area. In addition, the USFWS proposed the northern long-eared bat *(Myotis septentrionalis)* for listing as federally-endangered on October 2, 2013.

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from

the project construction and operation. Separately discuss effects to known threatened and endangered species.

Impacts to local vegetation and wildlife would be minimal. The dewatering site is a mine pit that has filled with water and the project would partially dewater the pit. The area for the dewatering pipe from the CMP to Trout Lake is on previously disturbed mine lands and the discharge pipe from Trout Lake to the Swan River would be located within existing roadway right-of way. Impacts to non-disturbed areas would be minimal.

Rainbow smelt, an invasive species in Minnesota, are present in the CMP. To prevent the spread of rainbow smelt or their eggs, Mag would install a fish screen with a mesh slot width of less than 0.01 inches over the end of the temporary dewatering pipe at the outfall site at Trout Lake. This mitigation measure would be consistent with the mitigation measure approved in Magnetation's appropriation permit (#2012-0683). This measure added to the Project would prevent the spread of this species to downstream receiving waters.

The intake pipe for the southern pump at the south end of Trout Lake would be attached to a floating dock with the pipe located underneath the dock and a screened exclusion area around the intake. The intake screen would have a slot size less than 0.25 inches, along with a through screen velocity of less than 0.50 feet per second to comply with permit conditions.

No threatened or endangered species are known to occur in the proposed project area.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Mussels can be affected by riverbed disturbance, changes in water flow, and changes in water quality, including siltation. The Project would temporarily increase water flow into the Swan River. Water discharged to the river would be low in nutrients and meet applicable water quality standards. Impacts to the water quality of the river are not anticipated.

There are no planned construction activities that would occur within the Swan River that would disturb the river channel or substrates where mussels might live. The energy dissipation structure for the southern dewatering flow outfall pipe would be placed on uplands adjacent to the Swan River. With proper energy dissipation from the southern outfall structure, impacts to the stream banks such as scouring, erosion or increased sedimentation are not expected to occur. This southern pipe would operate when needed and at the proper flow level required to maintain proper Trout Lake water levels. During normal operations, water would flow out of Trout Lake into Trout Creek before entering the Swan River. The Project is not anticipated to impact mussels within the Swan River.

As previously stated, the dewatering pipe from the CPM to the discharge point would be placed on previously disturbed mine lands. The discharge pipe from Trout Lake to the Swan River would

be constructed within existing roadway right-of way. To the extent possible, the pipes would be installed in a manner that minimizes potential impacts to vegetation in the area.

14. Historic properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

A SHPO query was requested in December 2014 (Attachment B). Historic structures, archeological sites, and/or traditional cultural properties on or near the Project area that are listed on the National Register of Historic Places (NHRP), or considered eligible for NRHP listing, are summarized in Table 5.

Table 5. Sites Listed on the NRHP or Considered Eligible for Listing

Site	General Location	NRHP Listed	Considered Eligible for NRHP Listing
Bovey Watertower (razed)	Bovey		Y
Bovey Village Hall	Bovey	Y	
Hotel Fitger	Bovey		Y
Commercial Buildings	Bovey		Y
Oliver Iron Mining Company: Canisteo District General Office	Coleraine	Y	
Oliver Iron Mining Company: Superintendent's Residence	Coleraine	Y	
Coleraine City Hall	Coleraine	Y	
Holman-Cliffs Mine Pit	Iron Range Township		Y
Holman-Cliffs Stripping Dump	Iron Range Township		Y

Project activity would occur away from NRHP listed or NRHP eligible properties and would not impact the properties. The pump(s) would be placed within CMP and the outfall site would be protected from view by vegetation. The discharge pipe from Trout Lake to the Swan River would be located within existing roadway right-of-way away from NRHP or NRHP eligible sites. Therefore, the Project would not have visual impacts on the sites.

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no scenic views or vistas on or near the project site. Vapor plumes or glare from intense lights are not expected from the Project. Minimal lighting would be used for operations and safety. Outdoor

lighting would be used at the dewatering site and pointed downward. Potential impacts from lighting are expected to be minimal.

The site is an existing mine pit that has filled with water. The Project would partially dewater the pit, so a visual effect would occur as the mine pit is dewatered. The result would be similar to other mine views along the Mesabi Iron Range, which can be considered scenic overlooks. The pump(s) would be placed on private lands and would not be visible from other roads or local properties. The outfall site from the dewatering pipe could be visible from the Mesabi Trail, but would likely be partially obstructed by existing vegetation.

Placement of the southern pump and outflow line would be at an existing public access on the southern end of Trout Lake and the outflow line would be placed in an existing right-of-way along Crooked Road and on the north side of Itasca County Road 21. Placement of the pump would create minor visual impacts at the boat access. Mag is working directly with Trout Lake Township to ensure that the placement of the pump and outflow line do not interfere with boat access use. The outflow line would mainly be placed within the road ditch and would not cause visual impacts to the area.

16. Air

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

   The Project would partially dewater an existing mine pit through the use of electric pump(s). Emissions from boilers or exhaust stacks would not occur. Hazardous air pollutants and criteria pollutants are not expected to be released. Greenhouse gas emissions are expected to be minimal through the use of the electric pump(s). No significant emissions are expected to occur as a result of the Project.

   Electric pump(s) would be used for dewatering operations and would not contribute to air emissions.

b. Vehicle emissions – Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

   Very few construction vehicles would be required for transportation of the pump(s) and the dewatering pipe to the Project site and the transportation of the dewatering pipe along the

dewatering pipe corridor. Once the dewatering pump(s) and pipe are in place, vehicle traffic associated with the Project would be minimal.

c. Dust and odors – Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Transportation of the pump(s) would be by barge from a Mag controlled access at CMP. Placement of the dewatering pipe would occur on previously disturbed mine lands. Construction of the dewatering pipe would be along existing mine lands requiring the pipe to be transported for minimal required distances. The discharge pipe from Trout Lake to the Swan River would be located within existing roadway right-of-way. As with the dewatering pipe, the discharge pipe would be transported a minimal distance.

Due to the minimal vehicle use, potential dust/particulate matter impacts on air quality would not be substantial.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

The construction and operation of the proposed Project would produce noise near the Project site. The types of equipment and operational activities at the Project site would be electric pump(s) for the dewatering operation, noise associated with the dewatering pipe construction, and the sound of the water exiting the dewatering pipe at the outfall site and entering drainage system and flowing to Trout Lake. Similar sounds would be associated with the construction and operation of the southern pump and discharge pipe from Trout Lake to the Swan River.

1) Existing noise levels/sources in the area: Nearby highway noise from US Highway 169 exists in the area and minimal noise is generated by County Road 21.

2) Nearby sensitive receptors: No residential buildings are located near the site. The Mesabi trail does run along the south side of the Buckeye Pit through the cities of Coleraine and Bovey. Trail users would be able to hear the sound of the water discharge at the outfall site. The southern pump would be placed near a public boat launch at the south end of Trout Lake. Boaters may be able to hear the sound of the pump.

3) Conformance to state noise standards: The project would conform to state noise standards.

4) Quality of life: Impacts would be minimal as the project is located in a rural area with no homes nearby. The Mesabi trail runs near the proposed discharge point and trail users may hear noises caused by the construction of the dewatering pipe and the water discharge at the outfall site. The southern pump would be placed near a boat launch at the south end of Trout Lake. Users of the boat launch may hear noises caused by construction and operation of the pump.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

1) existing and proposed additional parking spaces: No additional spaces would be needed.

2) estimated total average daily traffic generated: The project would not change daily traffic.

3) estimated maximum peak hour traffic generated and time of occurrence: NA

4) indicate source of trip generation rates used in the estimates: NA

5) availability of transit and/or other alternative transportation modes: NA

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. *If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW.* Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 *(available at:* Minnesota Department of Transportation Access Management Resources (http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance.

A slight temporary increase in traffic would occur during the placement of the pumps (dewatering pump in the CMP and the outflow pump at the south end of Trout Lake) and the construction of the dewatering pipe from the CMP and discharge pipe from Trout Lake to the Swan River. It is expected that construction traffic would consist of two to three vehicles such as light trucks and would minimally access roads when necessary. After the pumps and temporary dewatering pipes are in place and operating, the traffic associated with Project operation would be minimal and involve workers checking the pumps and/or pipes on an as needed basis (daily to weekly) to ensure proper operations.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

Transportation impacts are not anticipated; therefore measures would not be needed.

19. Cumulative potential effects

Note: Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items.

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

The geographic scale of the environmentally relevant area is the subwatersheds within the Upper Mississippi River Basin that discharge to the Swan River southeast of Trout Lake. Outflow from the dewatering process would flow into Trout Lake and discharge to Trout Creek, which discharges to the Swan River. The subwatersheds are defined as the environmentally relevant area because the primary potential effects of the project would be on water quantity and quality of Trout Lake, Trout Creek, and the Swan River.

The CMP dewatering project is proposed to take place over a period of less than three years. After the Buckeye Pit has been dewatered to a level that would allow for exploratory drilling, laboratory testing and bulk sampling of the historic mine reserves to determine their quality and suitability for processing by Mag would be conducted. The dewatering process is illustrated in Chart 1 and the dewatering locations are identified in Figure 4 and Figure 5.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

Local units of government were contacted to identify reasonably foreseeable projects for which a basis of expectation has been laid. The cities of Coleraine (Sandi Bluntach) and Bovey (Tara Guiseppi) were contacted in January, 2015 regarding other conditional use permit (CUP) applications currently in process that may combine with impacts to the Project to contribute to cumulative potential effects. Both cities indicated there are no current CUP applications in process.

The environmental services department of Itasca County (Rosann Bray) was also contacted in January 2015. Itasca County has a CUP program as well as a shoreland zoning permit program. County staff indicated that there are no CUP applications currently in process. Staff also indicated that there is only one shoreland permit currently in process, however it is a permit for a pipeline access associated with the Mississippi River south east of Grand Rapids and outside of the project area. No other conditional use permit or shoreland zoning permit applications are known to be in process at this time. The only identified permit currently in process with Itasca County is outside the project area and not associated with the project receiving waters of Trout Lake, Trout Creek, and the Swan River.

Essar Steel Minnesota LLC (ESML), located approximately 12 miles northeast of the proposed Project, has plans for future production of iron ore pellets. The facility is situated upstream from

the confluence of Trout Creek and the Swan River. The ESML facility is still under construction and is not yet operating. ESML is currently dewatering existing mine pits. The dewatering water discharges to Oxide Lake which flows to Swan Lake via Oxide Creek. The Swan River is the outlet for Swan Lake. Current dewatering activity does result in additional water in the Swan River. In calculating potential effects of the Canisteo Mine Pit Temporary Dewatering Project on the Swan River, water data from the Swan River included years where discharge from ESML was occurring.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Cumulative potential effects associated with the proposed Project are those related to surface water quantity and quality.

Surface Water Quantity

The proposed Project has the potential to make an incremental contribution to cumulative surface water quantity in the environmentally relevant area. However, as discussed in Item 11 (Water Resources), with implementation of mine water management practices, the rate of dewatering would be limited to 44 cfs, which would result in a 12 percent increase in the 1.5 year return interval flow at that location. The combined contribution of ESML's dewatering activity and the CMP temporary dewatering project were considered as part of this 12 percent increase. Furthermore, any potential effects associated with ESML operations would also be regulated by permit conditions Therefore, any potential cumulative effects would be occur within prescribed limits of specific permit conditions.

Surface Water Quality

The proposed Project has the potential to make an incremental contribution to cumulative surface water quality in the environmentally relevant area. However, as discussed in Item 11 (Water Resources), with implementation of mine water management practices, the proposed Project would be subject to applicable water quality standards. Furthermore, the contribution of ESML in the environmentally relevant area would also be subject to applicable water quality standards. Therefore, any potential cumulative effects would occur within prescribed limits of specific permit conditions.

20. Other potential environmental effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

No other potential environmental effects have been identified or are anticipated.

RGU CERTIFICATION

*The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.*

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature Cynthia Wayecha Date March 9, 2015

Title Environmental Review Planner