JORDAN AGGREGATES LLC PROJECT

Final Environmental Impact Statement

Scott County, Minnesota

Revised June 16, 2014

FINAL ENVIRONMENTAL IMPACT STATEMENT

For

JORDAN AGGREGATES LLC PROJECT

Sand Creek Township

Scott County, Minnesota

RGU:	**Scott County, Minnesota**
Proposer:	**Jordan Aggregates LLC**

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Abstract: Scott County has prepared a Final Environmental Impact Statement for the establishment of a new aggregate mine and ancillary operations on approximately 84.7 acres of property located at 17825 Valley View Drive in Sand Creek Township, Scott County, Minnesota.

Draft EIS Public Meeting Date:	**February 6th, 2013**
Draft EIS Public Meeting Time:	**5-7 PM**
Draft EIS Public Meeting Location:	**SCALE Regional Public Safety Training Facility, 17706 Valley View Dr., Jordan MN**
Draft EIS Comment Deadline:	**February 20TH, 2013**
Final EIS Public Notice in EQB Monitor:	**September 9, 2013**
Final EIS Comment Deadline for adequacy:	**December 25, 2013**
Revised FEIS Public Notice in EQB Monitor:	**June 23, 2014**
Revised FEIS Comment Deadline for adequacy:	**July 7th, 2014**

Approved for Issuance for Public Comment:

June 16, 2014

Date

RESPONSIBLE RGU REPRESENTATIVE

Executive Summary

Scott County, Minnesota has prepared a Draft and Final Environmental Impact Statement (EIS) for the establishment of a new aggregate mine and ancillary operations on approximately 84.7 acres of property located at 17825 Valley View Drive in Sand Creek Township, Scott County, Minnesota. Prior to initiation of the Draft EIS, a Scoping Decision Document (SDD) and an Environmental Assessment Worksheet (EAW) were prepared for the Jordan Aggregates Project. The purpose of the SDD was to identify the alternatives and subject areas to be examined in depth in the EIS.

Section 2.0 of this EIS discusses the alternatives evaluation and screening process conducted during Project scoping. Furthermore, the section identifies the alternatives retained for consideration in this EIS, which include the Build condition (operation of the aggregate mine Project) and the No-Build condition. Since publication of the SDD in November 2011, Jordan Aggregates LLC has modified a portion of the originally proposed traffic pattern for hauling trucks because planned improvements to one of the hauling routes, Valley View Drive, by Sand Creek Township have been withdrawn. The SDD did not identify significant impacts related to traffic and noise for the original traffic pattern and did not require further evaluation of traffic and noise issues for the Build condition. The proposed changes to the traffic patterns are included for evaluation in the Build condition as part of this EIS. The No-Build Alternative remains unchanged.

The EIS summarizes the results of all studies, reviews, consultation, and coordination conducted on the potential environmental impacts of the proposed action (Section 3.0). The primary subject areas identified through the scoping process for further analysis in the EIS include:

- Water Resources/Wetlands (limited to Sand Creek and nearby wetlands)
- Groundwater (level, quality, and use)
- Cumulative Effects

The changed traffic patterns proposed after publication of the SDD have added the following subject areas for further analysis in the Draft EIS:

- Traffic
- Noise (relative to Traffic)

A Final EIS (FEIS) was published on November 25, 2013. Comments regarding the adequacy of the FEIS were submitted before December 26, 2013, to the Environmental Health Department. The Minnesota Pollution Control Agency and the Minnesota Department of Health indicated that the FEIS was inadequate in addressing the groundwater monitoring and mitigation plan and prevention of aquifer degradation. Staff subsequently recommended and the County Board ruled that the Jordan Aggregate FEIS was inadequate based on the State agency comments, and directed staff to work collaboratively with the State agencies to address these inadequacies by preparing an acceptable groundwater monitoring and mitigation plan, and aquifer degradation prevention plan or mitigation plan. Additional time was agreed to by the Project Proposer and staff worked with the EIS Team to prepare a monitoring and mitigation plan acceptable to the RGU and EIS team, but not completely accepted by the Project Proposer. A meeting was held on May 22, with state agencies, the Project Proposer and the EIS Team to discuss the revised monitoring and mitigation plan and other aspects of the project related to the inadequacy determination. The draft revised monitoring and mitigation plan was further revised to reflect state agency comments, please seeattached Exhibit A Groundwater Monitoring and Mitigation Plan prepared by Barr Engineering. Some of the proposed monitoring and

mitigation measures may be further refined as part of the permitting process that will occur prior to any mining operations, however an attempt was made to provide sufficient details on the proposed monitoring and mitigation measures to enable readers to comment. A list of likely permits and approvals is included in Section 6.0 of this EIS.

Scott County is committed to an open and continuous public and agency involvement/outreach process. At all levels in the Project development process Scott County has and will continue to engage all Project stakeholders. The public and agency involvement/outreach efforts have included public meetings, agency advisory meetings/coordination, a project web site, and media releases.

Environmental Impact Statement
Jordan Aggregates Proposed Mining Operation
Sand Creek Township

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Supplemental Information

This EIS for the Jordan Aggregates Project includes references to several technical studies that were conducted as part of the preparation and analysis of potential effects of the proposed action. In some instances, the EIS contains a summary of the study methodology, findings, and recommendations.

A hardcopy of these studies can be accessed during regular business hours at the Scott County Environmental Health Departments, located at 200 Fourth Ave W, Shakopee MN, 55379. Electronic copies are available on the project web site located at www.co.scott.mn.us. Below is a list of the supplemental technical studies completed for the EIS.

- Groundwater-Flow and Solute-Transport Modeling Report (with Pumping Test Analyses Memo) and correspondence on re-model of revised mine pit depth
- Jordan Aggregates Mine Inundation Spillway Memo
- Jordan Aggregates – Traffic Analysis Memo (CH2MHill)
- Truck Noise Test – Jordan Aggregates Proposed Mining Operations Memo (AGC Developments Inc.)
- October 31, 2012 and June 20, 2013 letter from Todd Sherman of MnDOT concerning Jordan Aggregates Traffic Analysis
- Preliminary Water Monitoring and Response Plan
- Comments Received and Responses to the Draft Environmental Impact Statment

Table 1 List of Preparers

Agency/Organization and Name	Draft Environmental Impact Statement Responsibility
Scott County	
Al Frechette	RGU Coordination and EIS Review
Kate Sedlacek	RGU and Proposer Coordination, EIS Review, Public Comment coordination
Marty Schmitz	Zoning Administrator
Paul Nelson	Natural Resources Manager
Jason Swenson	Engineer for Natural Resources
Craig Jenson	Traffic Engineer
Barr Engineering Company	
Ray Wuolo	EIS Preparation, Groundwater Modeling, Solute Transport Modeling
Adam Janzen	Pumping Test Analyses
Tom McDonald	Surface-Water Hydrology/Conveyance
Carlson-McCain, Inc.	
John McCain	Proposer's Engineer/Project Manager, Erosion mitigation and spillway design
Nick Bonow	Pumping Test Data Collection and Planning
AGC Developments, Inc.	
Al Perez	Truck noise evaluation
CH2M Hill	
Nikki Farrington	Traffic alternatives evaluation
Howard Preston	Traffic alternatives evaluation
Sand Creek Township	
Rita Tauer	Township Clerk
Cy Wolf	Chair, Town Board
Leslie Thill	Township Supervisor
Bill Heimkes	Township Supervisor
Pat Carpenter	Township Engineer
Jim de Lambert	Township Consultant
City of Jordan	
Ed Shukle	City Administrator
Tim Loose	City Consultant

1.0 Purpose and Need

1.1 Proposed Action

Scott County has prepared this Environmental Impact Statement (EIS) for the establishment of a sand and gravel mine operated by Jordan Aggregates, LLC at the property located at 17825 Valley View Drive (hereafter referred to as the "Project Site") in Sand Creek Township, Scott County, Minnesota, described as the southwest quarter of Section 8 and the northwest quarter of Section 17, Township 114 North, Range 23 West (Figures 1-1, 1-2 and 1-3). The mine will encompass 84.7 acres and is anticipated to operate for approximately 25-30 years. Portions of the mined areas will be reclaimed using on-site overburden materials and imported fill. An area of approximately 36 acres is proposed to be unreclaimed and will persist as an open expression of the ground water within the flood plain of Sand Creek. The regular flooding of this mine pit will expose the local quaternary aquifer and possibly the upper portions of the Wonowac aquifer to any pollution conveyed by flood waters deeper into the quaternary aquifer than under the no-build alternative. The inadequacy determination was largely based on the lack of an acceptable monitoring and mitigation plan to address this identified impact. This has been addressed by the attached monitoring and mitigation plan prepared by Barr Engineering as a consultant to the RGU and distributed to commenting state agencys for review.

The purpose of the Project is to mine aggregate resources from the Project Site, process the mined aggregate for commercial sale, and reclaim portions of the mine with overburden materials from within the mining limits as well as clean soil fill materials imported from off-site. The mining and processing portions of the Project will produce sand and gravel aggregate products that are in demand for construction and development projects in the region. The mining operations may in the future include operation of a temporary asphalt plant and portable concrete mixing plant with receipt of waste concrete and asphalt to be crushed and recycled providing that applicable rules and regulations can be demonstrated to be met.

Portable hot mix asphalt and/or concrete batch plant requires a separate Interim Use Permit (IUP) applied for annually. According to the Scott County Zoning Ordinance 10-2 Administration, portable asphalt and concrete mixing plants may be allowed in all applicable districts if an interim use permit is already approved for the gravel pit in which it will be located, and the plant will provide material primarily for a public project, and providing the portable asphalt or concrete mixing plant is to be operated for a maximum two hundred forty (240) hours annually, unless an extension is approved.

In addition, the applicant must apply to the Planning Department to locate a portable asphalt or concrete mixing plant in the gravel pit. Issuance of the permit requires a Township Board recommendation and approval of the County Board. Conditions of the permit consist of, but not be limited to, pollution control standards, compliance with noise standards, hours of operation, setbacks, haul roads, area where plant is to be located, slopes, etc. Neighboring property owners within one-quarter (1/4) mile are notified of the County Board meeting at which the permit application will be considered.

The mine is proposed to extend approximately 80-120 feet into the water table, which serves as a local aquifer for several private and non-community public water supply wells in the vicinity. The reclaimed site will include a 36 acre ground water pond and be left suitable for a two-lot rural residential development provided that lots can meet all development standards in place at the time of development of the lots. A more detailed description of the Proposed Project and reclamation plans are presented in the EAW and subsequent Findings of Fact and Conclusions, which included recommendations to address comments received during the Interim Use Permit process. This EIS will focus on the scoped issues.

Scott County is serving as the Responsible Governmental Unit (RGU) for the Project. This EIS meets the requirements of Minnesota Rules 4410.0200 to 4410.7800, which are administered through the Minnesota Environmental Review Program.

1.2 Purpose of the EIS

An Environmental Assessment Worksheet (EAW) was prepared for the Proposed Project by Scott County and underwent a 30-day public review period, which ended on February 9th, 2011. Based on comments and its own review, the RGU determined that the Project had the potential for significant environmental effects and made a positive declaration on the need for an EIS in accordance with Minnesota Rule 4410.1700; preparation of an EIS was therefore required.

A Scoping Decision Document (SDD) was prepared for the Project and the Findings of Fact that followed from review and comment on the EAW by the public and regulatory agencies. The purpose of the SDD was to identify the issues and alternatives that will be examined in depth in the EIS. A Draft SDD was published and underwent a 30-day review period, during which time public comments were received. These comments received during the Public Scoping Period were

incorporated into the Final SDD, which was approved by the Scott County Board in November 2011. The final SDD also presented a tentative schedule of the environmental review process.

The purpose of the EIS is to provide information about the extent of potential environmental impacts and how they may be avoided or minimized. The EIS is not a means to approve or disapprove a project but serves as a source of information to guide approval decisions.

1.3 Changes to Proposed Project During EIS Preparation Process

Some minor changes to the Proposed Project were made during the EIS preparation process in response to a need to include mitigation of identified impacts. These mitigation measures are identified in the EIS. In addition to the mitigation measures, there was a change in the truck traffic pattern that needed to be made to the Project. This change occurred after the final SDD was published. An evaluation of traffic impacts and noise impacts from hauling trucks is included in the EIS. There was also a proposed change in the depth of the mine pit below the water table reducing the average excavated depth from MSL 600 to 640 which would leave approximately 10-30 of overburden above the Tunnel City-Wonewac (formerly called Franconia-Ironton-Galesville) aquifer.

1.3.1 Projected Truck Traffic

The Project anticipates 110 round trips of trucks hauling to and from the mine site per day during periods of peak export rate (including periods when temporary asphalt and concrete plants are operating). The export rate is a function of customer demand (e.g. a project in the area for which aggregates are being furnished from the site) and the time required to stage, load, scale and discharge a truck from the site. The proposed hours of operation are 7:30 a.m. to 9:30 p.m. for a total of 14 hours of daily operation. The anticipated truck volume was based on the Proposer's estimated loading rate of 3.5 to 4.5 minutes per truck. The Project Proposer has estimated that 80% of the traffic based on anticipated markets will be to the north and 20% will be to the east or south of the mine site. The primary regional highway route proposed to be used for distributing the product to the intended market is TH169. TH169 is a principal arterial on the Metro Highway System plan and a High Priority Interregional Corridor on the state highway system providing connections for its users to the Twin Cities Region and Southern Minnesota. These estimated numbers of truck trips and the primary use of TH169 remains unchanged from the original proposal in the EAW.

The truck traffic routing plan, as originally proposed in the EAW, utilized Valley View Drive to access the Project Site. Valley View Drive is a township road under the jurisdiction of Sand Creek Township where it abuts the Project Site. Valley View Drive to the south of the Project Site

continues into the City of Jordan 1.5 miles where it intersects with County Highway 9. To the north, the site has access to TH169 via 173rd street.

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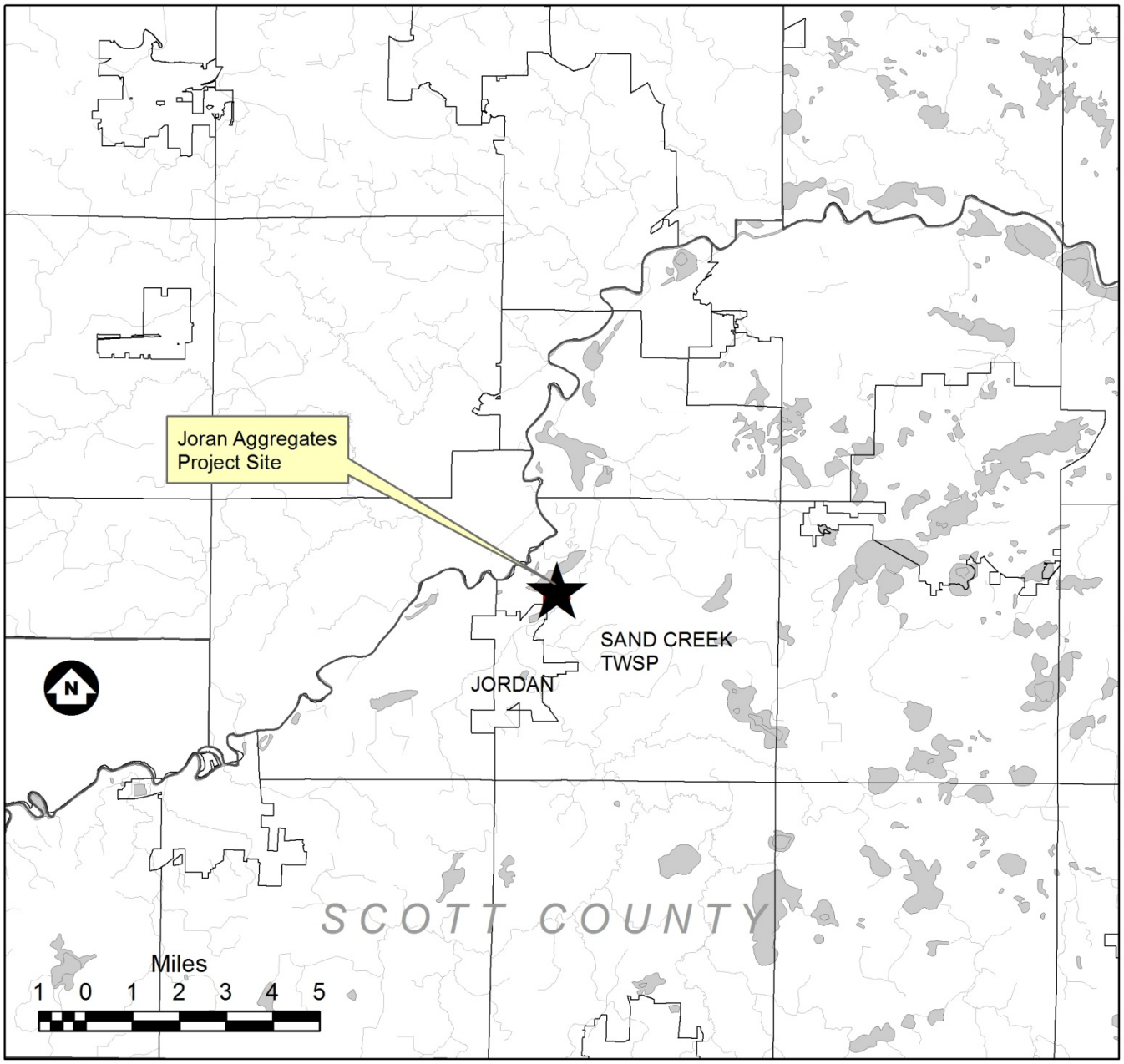

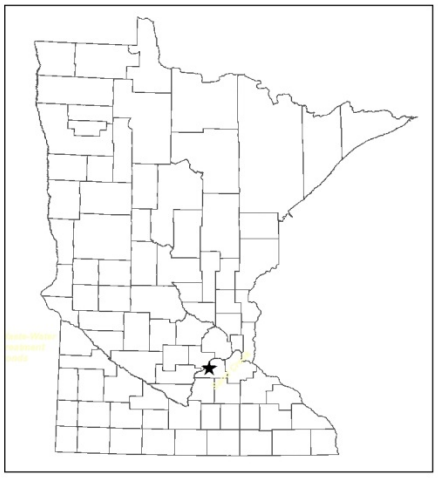

Figure 1-1

LOCATION OF JORDAN AGGREGATES PROJECT SITE, SCOTT COUNTY, MN
Jordan Aggregates EIS
Scott County, Minnesota

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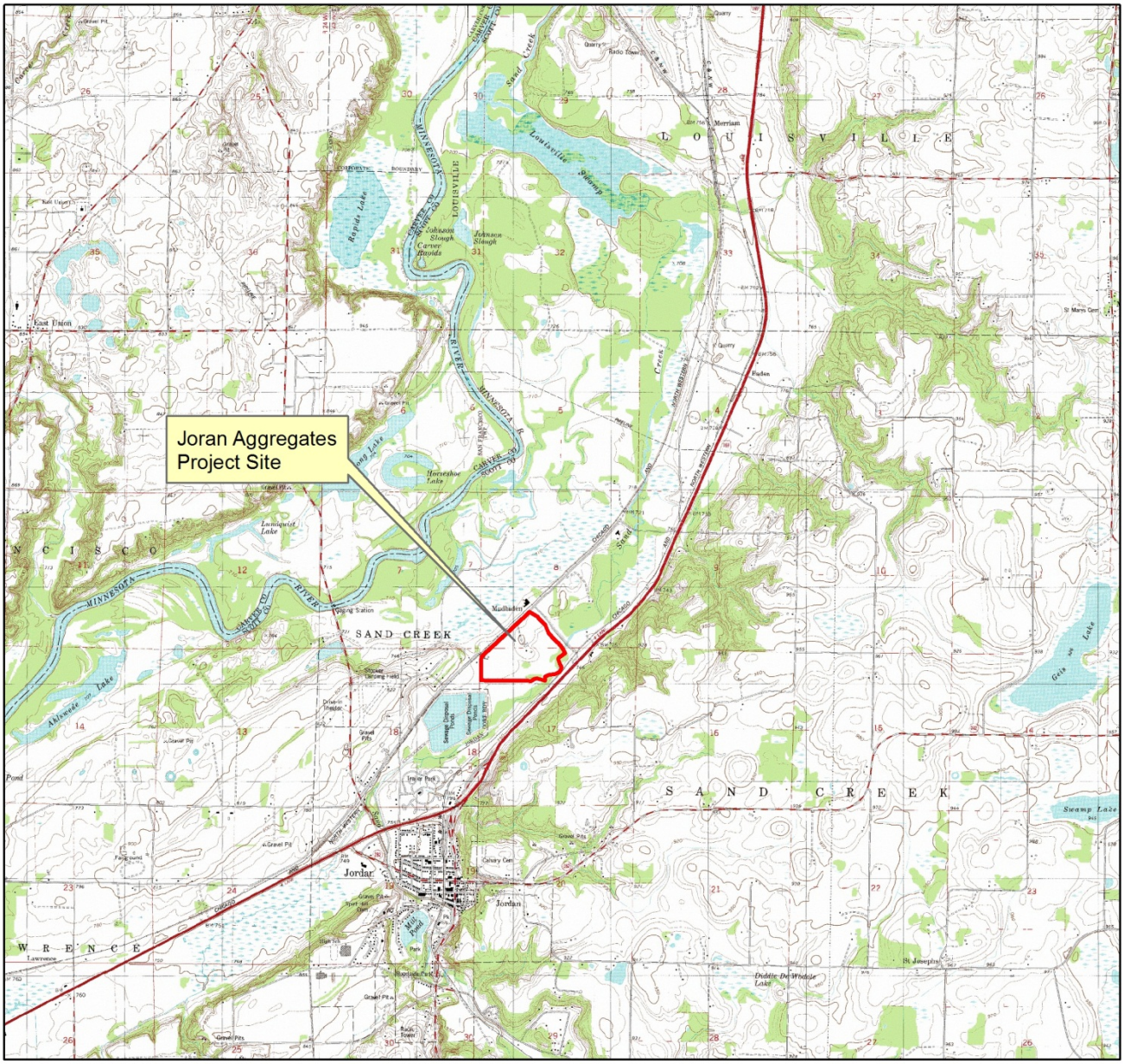


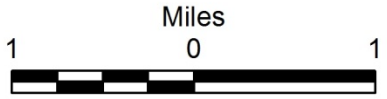
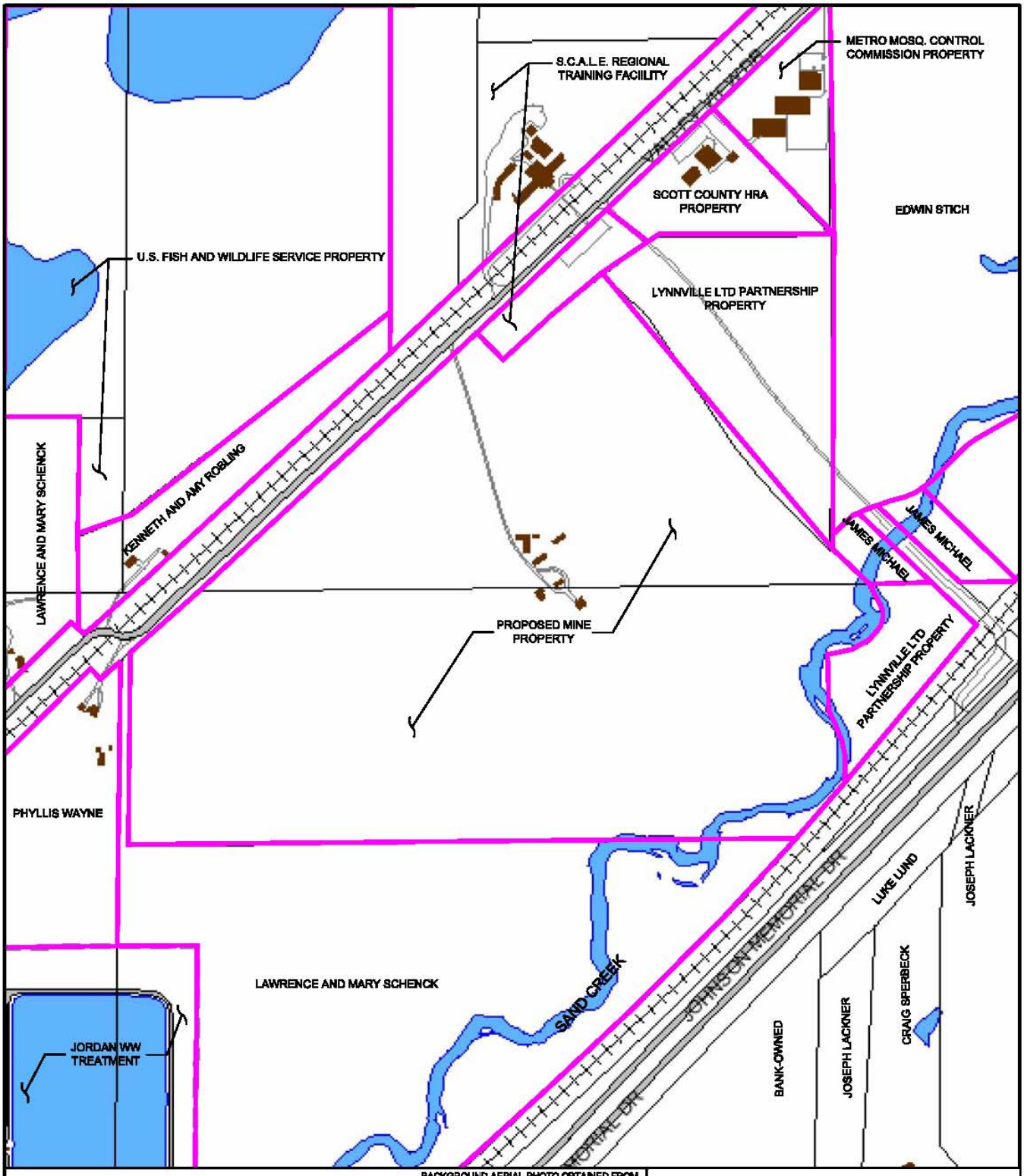


Figure 1-2

TOPOGRAPHIC MAP
IN VICINITY OF JORDAN
AGGREGATES PROJECT
SITE, SCOTT COUNTY, MN
Jordan Aggregates EIS
Scott County, Minnesota



From McCain and Associates, Inc. Figure 4 in EAW

Figure 1-3

VICINITY MAP AND SURROUNDING PROPERTIES
Jordan Aggregates EIS
Scott County, Minnesota

In the EAW, it was proposed that loaded truck traffic would access TH169 at the controlled/ signalized intersection of TH169 and County Highway 9 south of the mine site. Trucks would turn left out of the site and travel southwest along Valley View Drive to the intersection of Valley View Drive and County Highway 9 (Quaker Avenue). Trucks would then turn left and proceed south on Quaker Avenue to the controlled intersection of County Road 9 and U.S. Highway 169. The primary traffic route for trucks returning to the mine site (based on the anticipated 80% – 20% traffic split) would be 173rd Street north of the site. Southbound trucks on TH 169 would turn right onto 173rd Street, proceed west to Valley View Drive, turn left onto Valley View Drive and proceed south to the site entrance. Northbound trucks on TH 169 would either turn left onto County Highway 9 (Quaker Avenue), proceed west to Valley View Drive, turn right onto Valley View Drive and proceed north to the site entrance; or proceed north on TH169 to 173rd St, turn left to Valley View Drive and on to the mine site.

The original truck routing plan was predicated on the understanding that the portion of Valley View Drive to the south of the proposed mine site (which includes approximately one mile of unpaved, aggregate surface in Sand Creek Township with a current load limit of 5 tons) would be paved. Traffic and noise were not identified as issues requiring further study and were not included as part of the SDD though recommendations to address concerns were proposed for consideration during the IUP process.

1.3.2 Changed Conditions Requiring Changes to Traffic Patterns

As indicated above, the original traffic pattern was predicated on the understanding that an approximately one-mile portion of Valley View Drive to the south of the Project Site would be paved by Sand Creek Township and brought up from a maximum load of 5 tons to a maximum load of 10 tons from 173rd street to Mendoza Street in Sand Creek Township because it serves as the parallel supporting roadway to TH169. These improvements were planned for the summer/fall of 2011.

Sand Creek Township has recently decided not to fund paving this section of Valley View Road and may post it for 5 tons. Therefore, the original traffic plan needed to be modified by the Project Proposer to not include traffic southbound from the mine onto the unpaved portion of Valley View Road.

1.3.3 New Traffic Routing Pattern

In response to Sand Creek Township's decision to not go forward with improvements to Valley View Drive, the Project Proposer plans to route all outbound traffic (destined north and south) to 173rd

Street and right (south) on TH169. Northbound trucks, are prevented from turning left onto northbound TH169 because the 173rd Street-TH169 intersection is a ¾ access intersection with a northbound left onto 173rd Street and right-in-right-out access for southbound traffic on TH169. Therefore, it is proposed that both north and southbound trucks would turn right (south) on TH169 and northbound trucks will then turn around and proceed north on TH169.

1.3.4 Additional Impacts to Evaluate in EIS due to Changes in Traffic Pattern

Minnesota Rule 4410.2100, subpart 8 states that "after the scoping decision is made, the RGU shall not amend the decision without the agreement of the Proposer unless substantial changes are made in the proposed project that affect the potential significant environmental effects of the project or substantial new information arises relating to the proposed project that significantly affects the potential environmental effects of the proposed project or the availability of prudent and feasible alternatives to the project."

The RGU (Scott County) and representatives from the City of Jordan and Sand Creek Township met with the Proposer on May 2, 2012, to evaluate the need to amend the SDD to accommodate analyses of the changes to the traffic pattern. The Proposer had initially suggested that all northbound trucks would proceed into the City of Jordan after turning right from 173rd Street onto TH169, then turn around in Jordan by turning left onto Hwy 282 (signalized intersection), then turn left onto Hwy 21 and take the ramp onto TH169 north. It was the opinion of the RGU that such traffic patterns would constitute a change in the Project that would require amending the SDD for the evaluation of traffic and noise impacts.

The Proposer offered an alternative traffic pattern for northbound trucks that does not involve turning around in Jordan. Instead of driving into Jordan, northbound trucks would turn left on an existing turnaround between the Project Site and Jordan, and perform a U turn crossing the northbound lanes of TH169, and proceed northbound onto TH169. This modification to the change in traffic pattern was deemed insufficient to warrant modification of the SDD. The Proposer and the RGU agreed instead to include an EAW-level evaluation of traffic and noise issues related to truck hauling in the EIS so that the issues could be available for public review and comment. The Proposer also agreed to fund improvements to that portion of Valley View Drive between the Project Site and 173rd Street so that it will be able to accommodate the additional truck traffic on northbound Valley View Road.

1.5 Need for the Proposed Action

The purpose of the Project is to provide another aggregate resource for use in construction. There are ongoing needs for aggregate resources in the Twin Cities Metropolitan Area and surrounding regions. Local supplies for local needs offer a lower cost and energy saving alternative to longer distance imports.

2.0 Project Alternatives

2.1 Scoping Process and Alternatives

The Minnesota Environmental Review rules require EIS studies to include at least one alternative in each of the following categories or provide a description of why no alternative is included in the EIS (Part 4410.2300(G) of the Minnesota Environmental Review Rules).

- Alternative sites
- Alternative technologies
- Modified designs or layouts
- Modified scale or magnitude
- Alternatives that incorporate reasonable mitigation measures identified through comments received during the scoping process

An alternative may be excluded from the EIS analysis when it does not meet the underlying purpose or need for the project, it would likely not have any significant environmental benefit compared to the proposed project, or another alternative, of any type, that will be analyzed in the EIS would likely have similar environmental benefits, but substantially less adverse economic, employment, or sociological impacts (Minnesota Rules part 4410.2300, subpart G).

2.1.1 Alternative Sites

Off-site alternatives are not being investigated because they do not meet the Project purpose and need. Site Alternatives are limited to those where there is the presence of the natural resource, as well as ownership by the Project Proposer.

2.1.2 Alternative Technologies

Technology alternatives are not within the scope of the Proposed Project and will not be considered in the EIS. Best practicable technologies for the various activities will be utilized as part of the preferred alternative.

2.1.3 Modified Designs or Layouts

Modified design or layout alternatives are evaluated in the EIS to determine if a beneficial effect can be achieved relative to potential impacts while still meeting the Project purpose and need. Analyses of modified design or layout alternatives at the mine are limited to the shape and extent of the

ultimate open water area and final pit lake created by the Project. The Proposer has indicated that, given the small footprint of the Project area, alternatives to the shape and extent of the mine pit are not feasible. Analyses also include alternative traffic routes.

2.1.4 Modified Scale or Magnitude Alternatives

The scale and magnitude of the Proposed Project were defined through the analysis conducted to assess the extent and quality of mineral resources present on the site. The Proposed Project targets extraction of these resources. Modifying the scale or magnitude of the Project will not meet the purpose and need of the Project, which is to extract these resources to cost effectively serve the aggregate resource needs of the region. Scale and magnitude alternatives are not addressed in the EIS.

2.1.5 Alternatives That Incorporate Reasonable Mitigation Measures

The Minnesota Environmental Review Rules require consideration of mitigation measures identified through comments on the EAW or the Draft EIS. The EIS considers all relevant mitigation measures suggested through public comment and recommends incorporation of reasonable mitigation measures into project design and permitting as warranted. The EAW identified, as a possible alternative water supply for the area, the extension of municipal water from the City of Jordan. The City, however, does not currently have plans to extend municipal water to this area.

2.1.6 Alternatives Considered

Two alternatives are considered and addressed in this EIS. The first is the Preferred Alternative (i.e. the Proposed Project), which includes all the elements as described in Section 2.1.7 below. The second alternative is the No-Build Alternative, which assumes the Project Site is not open to mining and ancillary operations and the land continues to be utilized for agricultural purposes (see Section 2.1.8).

2.1.7 Preferred Alternative

Existing Conditions

The Property currently consists of agricultural and open land use and is rented out to two different tenants: one tenant occupies the homestead and the other farms the remainder of the acreage. Structures existing on the Property include one house and five outbuildings located generally in the center of the Property. The homestead will become an office for the mine when mining is commenced, and removed when mining is commenced at the house site (see Figure 2-1).

VIEW IS SOUTHWEST TOWARD CITY OF JORDAN

Adapted from Figure 10 in EAW

EXISTING CONDITIONS AT
PROJECT SITE
Jordan Aggregates EIS
Scott County, Minnesota

The house is currently served by a non-complying septic system, which will be brought up to code and an alternate septic site will also be identified and preserved until the structure is no longer used and is removed. Structural improvements to the building will be made as required to ensure the structure conforms for the proposed commercial use as an office. The structures and septic tanks on the Property are located in the area proposed to be completely mined and will be removed – their current location being left as an open expression of the aquifer. Wells will be abandoned according to the Minnesota Well Code by a licensed water-well driller. There are no improved roads on the Property. A gravel driveway provides access to the house from Valley View Drive. The landscape on the Property is characterized by a mixture of tilled agricultural land, relatively small wooded and/or grassy areas near the homestead and along the banks of Sand Creek.

The Proposed Project Site will occupy 87.5 acres in the northwest portion of the Property. Of this area, 84.7 acres will be mined and the balance will be perimeter buffer space. The Project Site is bounded by Valley View Drive to the northwest, an offset of 100 feet along Sand Creek to the southeast, and adjacent properties on the remainder of the perimeter. Existing conditions on the Project Site are shown on Figure 2-1.

The average site elevation is approximately 730 ft above mean sea level (msl). Site topography is characterized by two primary regions:

1. Upland Area located in the northwestern portion of the site – The upland area is characterized by gently rolling terrain with surface elevations ranging from approximately 727 feet to 749 feet above mean sea level (msl).

2. Lowland Area located in the southeastern portion of the site – The lowland area is located within the Sand Creek floodplain and is characterized by generally flat terrain. Surface elevations range from 724 feet to 727 feet above msl.

Site drainage flows either southeast toward Sand Creek (totaling approximately 71acres) or northwest to the ditch along Valley View Drive. Existing topography and drainage are shown on Figure 2-2. The ditch area along Valley View Drive, approximately 17 acres, is landlocked and has no direct outlet to the Minnesota River at this time. If the area were to overflow, it would drain south to Sand Creek before it could discharge to the Minnesota River. Regional drainage is toward the Minnesota River, which is approximately 0.7 miles northwest of the Project Site.

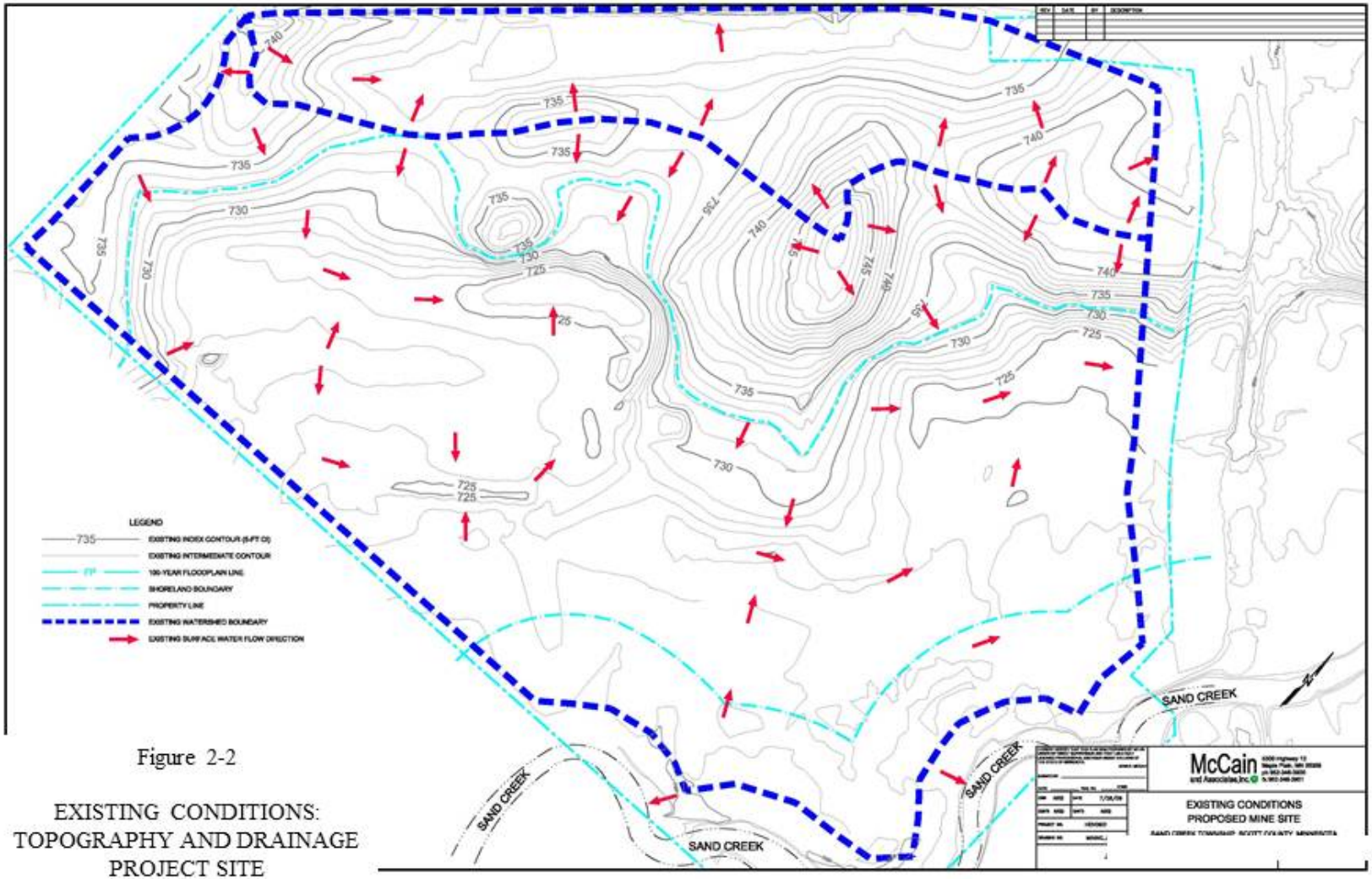


Figure 2-2

EXISTING CONDITIONS:
TOPOGRAPHY AND DRAINAGE
PROJECT SITE
Jordan Aggregates EIS
Scott County, Minnesota

Mining Operation

Processing of sand and gravel including imported concrete and asphalt recycle materials will be conducted in accordance with the County's Ordinance and will not be conducted closer than one hundred (100) feet to the property line, nor closer than five hundred (500) feet to any residential structures. Details related to the proposed staff recommendations for the IUP related to acceptance, stockpiling and processing of recycled concrete and asphalt were presented in the Findings of Fact and Conclusions for the EAW. Additionally, the mining operations will not be conducted closer than two hundred (200) feet to any residence or residential zoning district boundary existing on the approval date of the mining interim use permit. Mining operations will also not be conducted closer than thirty (30) feet to any property line, or within thirty (30) feet of the right-of-way line of any existing or platted street, road or highway, except that excavating may be conducted within such limits in order to reduce the elevation thereof in conformity to the existing or platted street, road or highway engineering plans. Side slopes of the mining operation will conform with the site plan.

Within the mining limits, sand and gravel will be excavated down to the water table, which is anticipated to be at an elevation of approximately 720 feet above msl. Based on site topography, this results in excavation depths ranging from 4 to 49 feet. In the center of the site, excavation will extend below the water table to an approximate elevation 640 feet above msl or to within 10-30 feet above the top of bedrock, leaving an open expression of the aquifer forming a pond of approximately 36 acres and 80-100 feet deep. Along the perimeter of the mine, excavation slopes will be graded to a slope of 1.5H:1V.

A Mining and Phasing Plan for the active mine is shown on Figure 2-3. The plan illustrates the excavation depths within the proposed mining boundary and provides a general phasing layout for the operation. Mining will begin in the southern half of Phase 1 and proceed within Phase 1 until the appropriate grades for the processing plant are achieved as shown on Figure 2-3. Mining in Phase 1 is expected to involve excavating a moderate amount of material and smoothing out the terrain, mainly for the purpose of preparing the plant site.

Mining will then proceed into Phase 2A, with this area being mined down to the base grade of an approximate elevation 720 feet above msl (but not below the water table) and then brought back up to the processing plant grades shown on Figure 2-4 using a combination of on-site overburden and imported reclamation fill. While mining is occurring in Phase 2A, overburden from within the Pond Phase and Phases 2B and 2C will be stripped and transported to Phase 2A for use as reclamation fill. As Phase 2A is being brought up to grade, mining will occur in Phase 3. As base grades in Phase 3

are established, at approximately 720 feet above msl, overburden from the Pond Phase and Phase 3B will be used for Phase 3 reclamation. Imported material will not be used to reclaim below the 100-year flood plain (elevation 732.5 feet, msl). As a provision of the IUP, the Proposer may request a variance from this requirement, provided an engineering evaluation of imported soils can demonstrate that imported soils can be placed (or mixed with site soils and placed) below the 100-year flood plain and meet both geotechnical stability constrains and not pose a potential environmental hazard by the introduction of contaminants or impacts to Sand Creek in the event of floods. Excavated soils and imported soils to be used for site reclamation will be required to be stockpiled outside of the 100 year floodway and protected from erosion to preclude sediment impacts on Sand Creek.

As shown on Figure 2-5, the majority of the project site is below the 100-year flood plain (Figure 2-5A). During mining, the process plant area will be brought to a grade above the 100-year flood plain (Figure 2-5B) and after reclamation, the northern portion of the site will be graded such that it will be above the 100-year flood plain (Figure 2-5C). A detailed reclamation soil stockpiling, placement and vegetation plan will be recommended to be provided as an IUP application requirement. Since virtually the entire site will be excavated below the 10 and 100 year flood elevation, reclaimed areas must be immediately compacted and vegetation established to prevent impacts to Sand Creek from sediment erosion into the Creek during flood events. The plan should be required to include details on how this will be done and how vegetation will be irrigated to ensure rapid establishment. Mining will continue to occur between growing seasons so the plan will be recommended to be of sufficient detail on how overburden/reclamation soils and disturbed areas will be protected from erosion during the winter months and not be exposed during spring flood season.

Reclamation of Phases 2B, 2C, and 3B will consist of top-dressing the mine base grades with well-drained hydric soils excavated from within the mining limits in order to create wetland areas proposed as an end use for these phases. Phase 4 will be the last upland area to be mined. This area is likely to utilize mostly imported fill for reclamation, as most of the overburden from other areas of the Site will have been used in the reclamation of Phases 1-3. Mining of the pond area will occur continuously throughout the development and reclamation of Phases 1 through 4.

The aggregate resources on site consist of unconsolidated sand and gravel; therefore no blasting or dewatering will be required. Aggregates above the water table will be excavated and transported on-site using common heavy construction equipment such as excavators, loaders, haul trucks, and conveyors. Below the water table, a barge-mounted clamshell-type excavator will be used.

Aggregate processing is expected to include crushing, screening and washing of natural aggregate products, as well as recycled concrete and asphalt in order to produce desirable gradations and aggregate products. Temporary portable hot mix asphalt and/or concrete batch plants may be operated on the Project Site through a separate Interim Use Permit applied for annually to provide material for area construction projects. Approval for operation of the plants will be sought pursuant to the provisions of Zoning Ordinance Chapter 10.

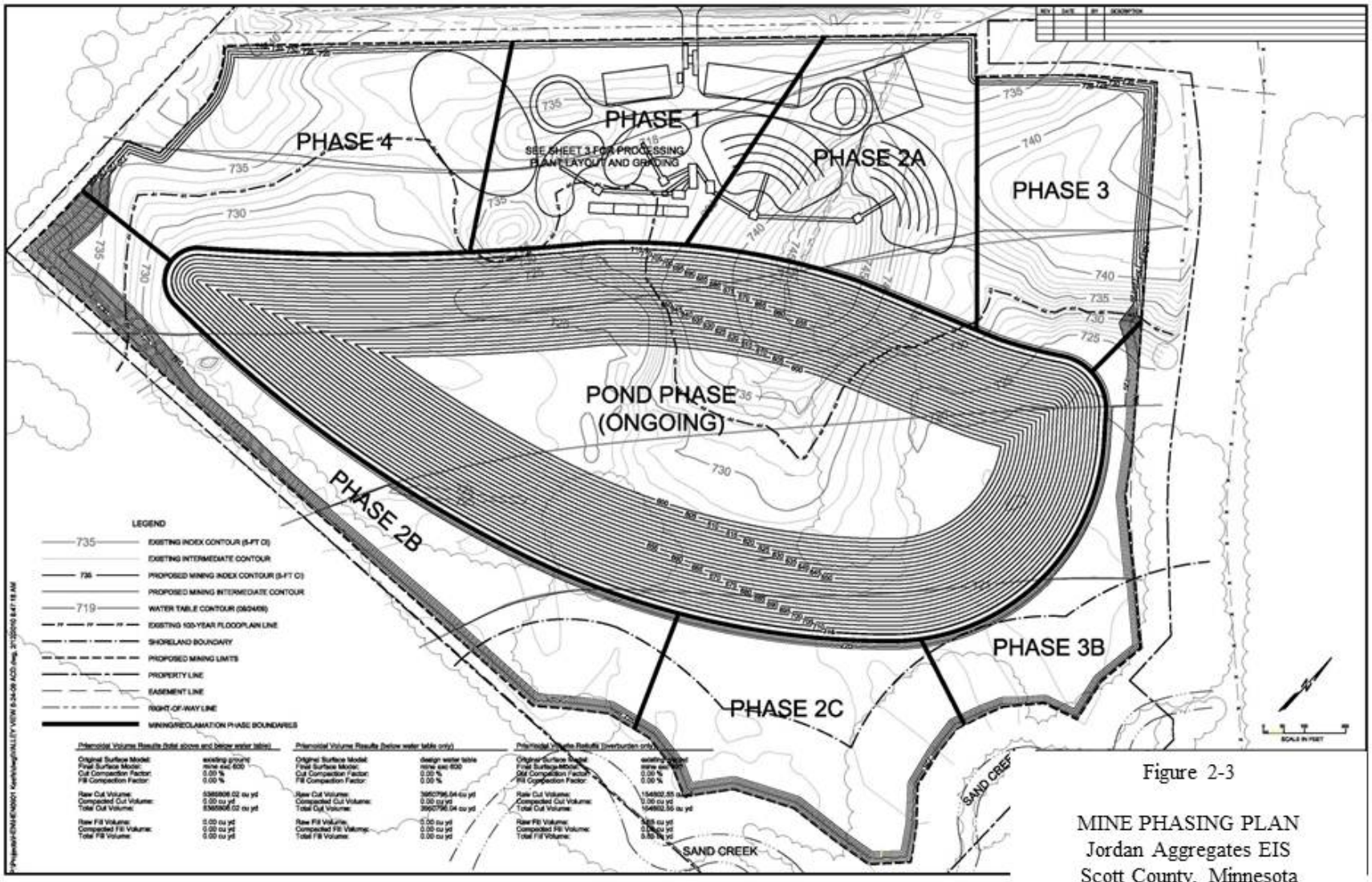


Figure 2-3

MINE PHASING PLAN
Jordan Aggregates EIS
Scott County, Minnesota

Plan developed by John McCain of Carlson-McCain, Inc.

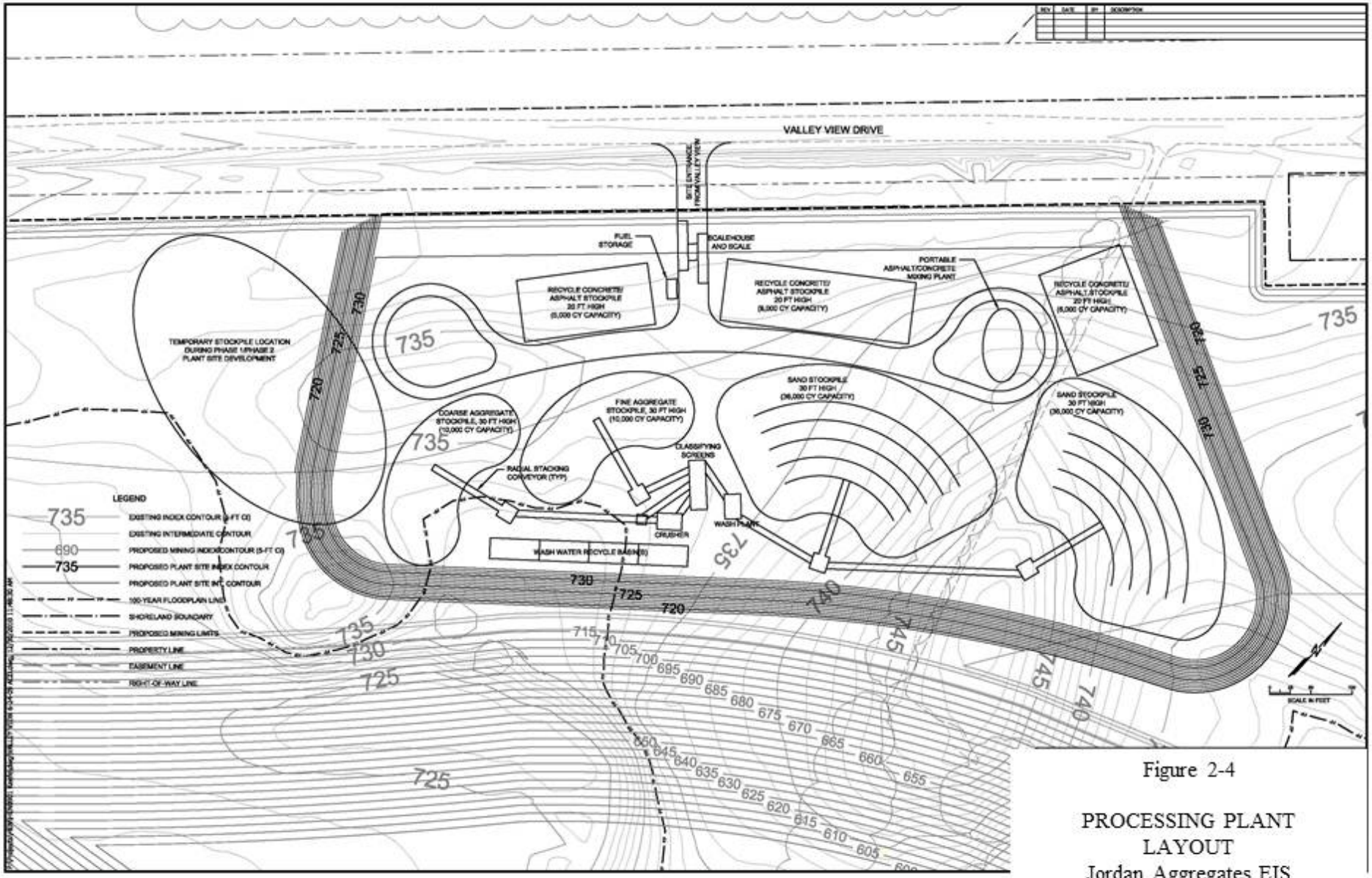


Figure 2-4

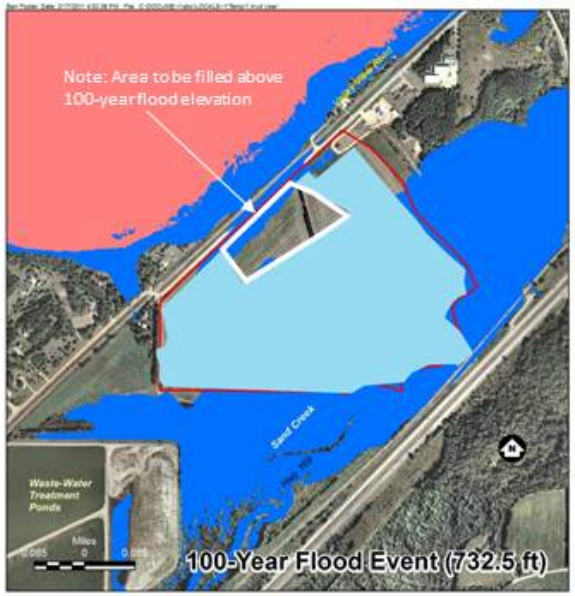
PROCESSING PLANT LAYOUT
Jordan Aggregates EIS
Scott County, Minnesota

Plan developed by John McCain of Carlson-McCain, Inc.

EXPLANATION
1-Meter DEM
<VALUE>
Minnesota River 100-year
Sand Creek 100-year
Not inundated

A

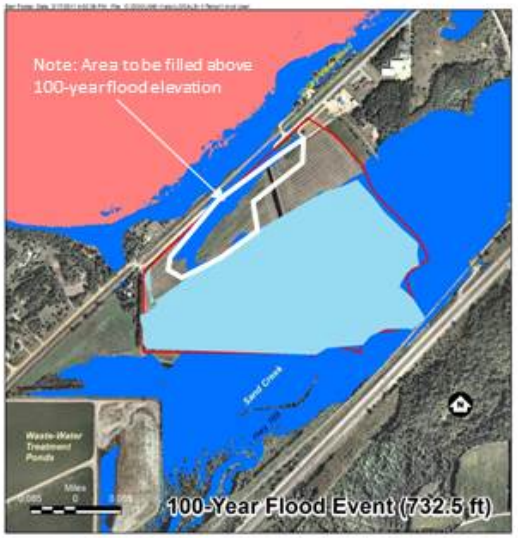
EXISTING CONDITIONS:
FLOOD INUNDATION FOR
100-YEAR FLOOD EVENT
Jordan Aggregates EIS
Scott County, Minnesota



EXPLANATION
100_year_inundation_with_mine_ongoing
1-Meter DEM
<VALUE>
Minnesota River 100-year
Sand Creek 100-year
Not inundated

B

MINE-OPERATING CONDITIONS:
FLOOD INUNDATION FOR
100-YEAR FLOOD EVENT
Jordan Aggregates EIS
Scott County, Minnesota



EXPLANATION
100_year_inundation_with_after mining
1-Meter DEM
<VALUE>
Minnesota River 100-year
Sand Creek 100-year
Not inundated

C

RECLAIMED CONDITIONS:
FLOOD INUNDATION FOR
100-YEAR FLOOD EVENT
Jordan Aggregates EIS
Scott County, Minnesota

Figure 2-5

FLOOD INUNDATION FOR
100-YEAR FLOOD EVENT
Jordan Aggregates EIS
Scott County, Minnesota

Truck Traffic

Aggregate products will be available for commercial sale and will be exported from the site by trucks at a rate of 10,000 round-trips per year and up to 110 round-trips per day during periods of peak demand. The anticipated truck volumes stated will result in an average of 5 round trips per hour with a maximum of 11 round trips per hour during peak production. The Proposer estimates that 80% of the traffic based on anticipated markets will be to the north and 20% will be to the east or south of the mine site.

The primary regional highway route proposed to be used for distributing the product to the intended market is TH169. TH169 is a principal arterial on the Metro Highway System plan and a High Priority Interregional Corridor on the state highway system providing connections for its users to the Twin Cities Region and Southern Minnesota. County Highway 9/282 is the primary east-west regional corridor in the vicinity of the Project Site. It is designated as an A Minor roadway on the Metropolitan transportation system. CH 9 to the west provides access across the Minnesota River into Carver County on Carver County Road 45.

The road directly serving this site is Valley View Drive. It is a township road under the jurisdiction of Sand Creek Township where it abuts the Proposed Project Site. Valley View Drive to the south of the Project Site includes approximately one mile of unpaved, aggregate surface in Sand Creek Township with a load limit of 5 tons. If Sand Creek Township posts Valley View Drive for 5 tons all trucks leaving and entering the mine over 5 tons will be via Valley View Drive, north to 173rd Street. This portion of Valley View Drive is paved and will be improved to a 10 ton standard road by the Project Proposer.

Consistent with the IRC Plan for TH169, Sand Creek Township secured Cooperative Agreement Funding from Mn/DOT to restrict the access point of TH169 at 173rd street to a ¾ access. This eliminated the eastbound 173rd to northbound TH169 movement. All trucks entering the Project Site from the north will turn right onto 173rd Street from southbound TH169, proceed west to Valley View Drive, turn left onto Valley View Drive and proceed south to the Project Site entrance.

All trucks leaving the Project Site will turn right onto southbound TH169 from 173rd Street. Those trucks with southbound destinations (approximately 20% of loaded trucks) will continue south on TH169 through Jordan or access the primary east-west regional corridor via County Highway 9/282. Those trucks with northbound destinations (approximately 80% of loaded trucks) have several options for accessing northbound TH169 once they have taken a right turn unto TH169:

1. They can turn left onto Hwy 282 at the signalized intersection, then left onto Hwy 21, then take the ramp entrance to northbound TH169.
2. They can proceed south on TH169 for approximately one mile to an existing paved turn-around between the southbound and northbound lanes of TH169. The location of this turnaround with respect to the Project Site and the intersection of 173rd Street and TH169 is shown on Figure 2-6. Over this one mile distance, the trucks will merge into the left lane of southbound TH169 and then merge into the existing left-turn lane. From the left-turn lane, trucks will enter the turn-around and wait until traffic permits a left-turn onto northbound TH169. This maneuver would be accomplished with little or no encroachment on the northbound right shoulder of TH169, as shown on Figure 2-7. Trucks would then proceed on northbound TH169.
3. They can proceed south on TH169 and exit unto TH21 and travel east into Jordan then take a right turn at TH282 and proceed southwest to access northbound TH169 at the controlled intersection..
4. They can proceed south on TH169 and turn left onto eastbound TH 282 at the TH 282/CR 9 intersection, From the left-hand turn lane, trucks would make a U-turn onto northbound TH169,

These options are further explained and evaluated in Section 3.8 Traffic Impacts.

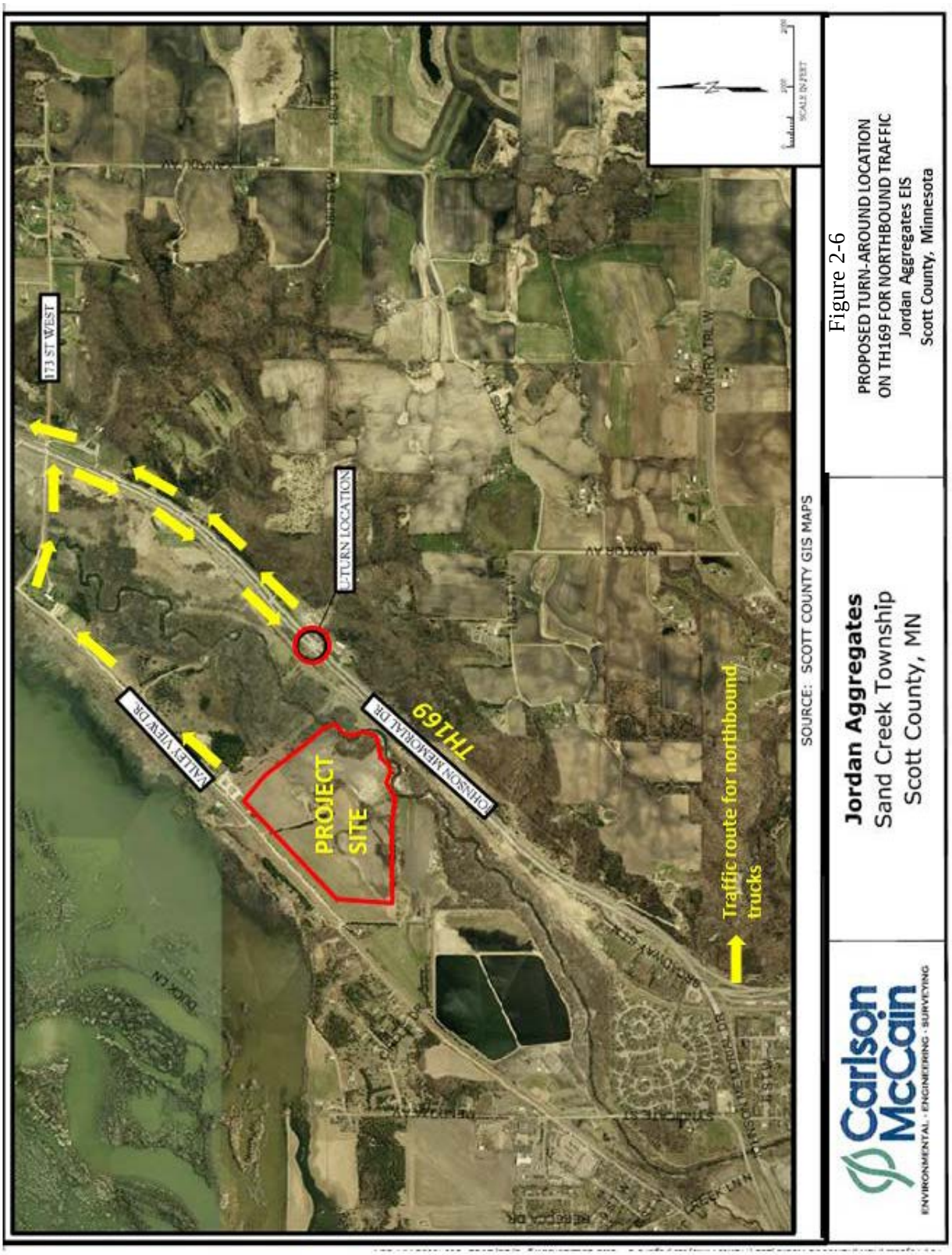


Figure 2-6
PROPOSED TURN-AROUND LOCATION
ON TH169 FOR NORTHBOUND TRAFFIC
Jordan Aggregates EIS
Scott County, Minnesota

Figure 2-7
TRACTOR TRAILER U-TURN ONTO NORTHBOUND
TH169 AT TURNAROUND SOUTH OF PROJECT SITE
Jordan Aggregates EIS
Scott County, Minnesota

Reclamation

Chapter 10.5.3 of the Zoning Ordinance requires that reclamation begin after the mining of twenty-five (25%) of the total area to be mined or four (4) acres, whichever is less. The Project Proposer has indicated the Chapter 10 requirements to begin restoration efforts after 4-acres of mining will conflict with their proposed phasing of the mining operations. The Project Proposer will request a variance from that requirement at the time of application for the IUP Mining Permit. Recognizing much of the pre-existing site is within the flood plain of Sand Creek, and that the proposed mining will result in mining almost the entire site to elevations below the 10 year flood elevation, and recognizing further that the proposed spillway will be constructed 1.5-2 feet below the current lowest stream bank elevation proximate to the Project Site, flooding of the mining area is acknowledged to occur periodically. Similarly, details of where temporary stockpiles will be placed and the length of time and aerial extent of exposed soil areas has not been presented. Staff are recommending that these details will be required as a submittal for the IUP application to enable prior review and approval by the appropriate agencies.

The plant and processing site encompasses approximately 9 acres. An area of this size is needed to provide space for processing equipment and stockpiles that are necessary for producing the various aggregate products that will be made available for sale. Additionally, the lowland Phases 2B, 2C, and 3B will contribute a disproportionate amount of unreclaimed area to the total due to their low volume to area ratios and their primary use as sources of reclamation fill for the upland phases. There is very little overburden in the upland phases, so during the mining of these phases it will be necessary to have the lowland phases open in order to provide an as-needed supply of reclamation material. Depending upon the amount of imported reclamation fill used, there may be a greater or lesser need for material from the lowland phases; however it is preferable to use on-site material for reclamation fill wherever possible.

Both on-site overburden materials and imported fill will be used as needed to establish final reclamation grades. It is estimated that between 250,000 and 350,000 cubic yards of overburden from within the site will be used for reclamation fill. An additional 550,000 to 650,000 cubic yards of fill material will be imported for use as reclamation fill. Recognizing that importation of clean suitable soil will be required to ensure the site is reclaimed as proposed the County will be requiring the establishment of a fiscal security sufficient to ensure this is accomplished as a condition for the IUP. The security will be sufficient to cover the cost of evaluating soil suitability, acquiring, transporting, spreading, compacting and stabilizing the reclaimed areas with suitable vegetation. Specifics on the security will be established during the IUP process. The Project Proposer will

identify the source of imported material and assess the potential for contamination. This assessment will include contacting the source site owner/operator to ascertain whether any known contamination exists and reviewing available environmental documents (Phase I ESA, etc.) if they exist. If the history of imported soil is unknown, sampling and laboratory analysis of the soil will be required to demonstrate compliance with the Soil Reference Value (SRV) limits prior to the material being accepted at the site. The reclamation fill cannot contain chemical constituents of concern that exceed the limits specified for the MPCA's Tier I SRV. Documentation of investigation and test results of imported fill will be provided to Scott County as a condition of the mining IUP. No open dumping will be allowed at the site.

Reclamation fill will be compacted in lifts as it is placed. Reclamation fill within areas designated as building pads and roadways will be compacted in lifts to at least 95 percent of Standard Proctor maximum dry density. In non-building pad/roadway areas, reclamation fill will be placed in lifts, compacted as feasible depending upon soil type and moisture condition, and allowed to consolidate naturally over time. The Project Proposer will conduct density and moisture testing to verify adequate compaction and the test results will be reviewed by an engineer and provided to Scott County as a condition of the IUP. Areas subject to flooding will be reclaimed in a timely manner and protected from erosion by the use of appropriate sequencing and use of erosion controls.

Reclamation will begin along the northwest boundary of the Project Site and progress inward. Perimeter reclamation slopes will be graded to a slope of 5H:1V. In the upland area, reclamation grades will be established at an elevation of approximately 742 ft, which is ten feet above the 100-year flood level of approximately 732.5 ft. As finished reclamation grades are established, topsoil of a quality equal to or greater than the existing topsoil will be placed on the upland area and the surface will be seeded with a County-approved grass mixture.

Ground elevations in the lowland/floodplain area will be at or above the water table elevation (approximately Elev. 719 to 722) at the completion of mining operations. The only reclamation fill to be placed in the lowland/floodplain is a one-foot layer of on-site soils reserved from overburden excavation for establishment of suitable vegetation in the 100-year floodplain. Approximately 35,500 cubic yards of material will be required, taken from the estimated 250,000 to 350,000 cubic yards of on-site reclamation soil available. No imported fill will be placed below elevation 732.5 (the 100 year flood elevation) anywhere on this site unless it is approved by the County.

End Use Plan

It is anticipated that the mine will be active for up to 30 years. At this time the City of Jordan has not included this property in its long range land use plan because future growth is anticipated to the south and west of the city. The mining operation's End Use Plan must comply with Scott County's Comprehensive Plan. Scott County's Comprehensive Plan identifies the site as Commercial Reserve District. The purpose of this district is to reserve land for future commercial and/or industrial development with urban services. Dual-use end planning will likely be necessary to comply with the current zoned use (residential) and the future zoned use (commercial).

The site will be reclaimed to accommodate future residential development. The End Use Plan proposes two residential lots. Under the current Zoning Ordinance, one (1) dwelling unit per forty (40) acres of land is allowed in the Urban Business Reserve District.

Since it is unknown when urban services will be available for this property, the End Use Plan must identify undisturbed areas for future septic system locations for the two residential lots. Municipal services would be needed for ultimate development for urban uses.

2.1.8 No-Build Alternative

The No-Build Alternative assumes the Project Site continues to be used primarily for agricultural purposes and makes projections or forecasts based on this use to identify No-Build Alternative effects and impacts.

3.0 Affected Environment and Environmental Consequences

The subject areas presented and analyzed in Section 3.0 were identified in the SDD and for inclusion in the Jordan Aggregate EIS.

3.1 Erosion of the Upgradient Side Wall of the Mine Pond

3.1.1 Affected Environment

A potential for Sand Creek to overtop and breach the natural berm between the Creek and the mine pit that remains in place as a result of the mining operations was identified in the EAW. The SDD indicated a need to evaluate the stability of the proposed interior mine slopes and the efficacy of erosion control techniques and flow control structures that could be employed to stabilize the existing ground between the mine and Sand Creek to prevent re-channelization of Sand Creek.

The Sand Creek watershed has a drainage area of 274.3 square miles at its confluence with the Minnesota River. The Jordan Aggregates Project Site is adjacent to and north of Sand Creek, approximately 8.8 miles upstream from the confluence of Sand Creek and the Minnesota River. The Project Site is approximately 1.7 miles downstream from where Sand Creek flows beneath Highway 169 at Jordan. The total watershed drainage area of Sand Creek at the Project Site is approximately 236.3 square miles (Inter-Fluv, 2008).

Flow discharge in Sand Creek in the vicinity of Jordan and the Project Site is seasonally highly variable, with the largest flows occurring during the spring and early summer. Winter base flows at Jordan on average have been reported to be about 1.8 cubic feet per second (cfs) (Metropolitan Council, 2004) but the stream may be gaining further downstream as it approaches the confluence with the Minnesota River (Barr, 2011). The relationship between the elevation of the water table and the water-surface elevation of Sand Creek adjacent to the Project Site suggests that it may be a losing stream along this reach.

The mean discharges of Sand Creek at Jordan for four flood recurrence intervals were reported in Inter-Fluv (2008) as:

Table 2 Sand Creek Floods

Flood Recurrence Interval	10-Year	50-Year	100-Year	500-Year
Estimated Discharge (cubic feet per second)	5,019	7,444	8,894	11,314

Porter Creek, Raven Stream, and West Raven Stream contribute substantial volumes of water to Sand Creek (Inter-Fluv, 2008).

The 100-year flood plain elevation of Sand Creek at the Project Site is at approximately 732.5 feet above mean sea level (msl). The 10-year flood plain elevation is only slightly lower (731.5 ft msl) A flood control spillway is proposed to be constructed at Elev. 726 into the natural berm separating the mine and Sand Creek (discussed in more detail in Section 3.1.3). Thus, it can be expected that during a 2, 10 and 100-year flood event, floodwater will enter the mine-pit area through the spillway and the mine will be inundated with flood waters from Sand Creek. Studies on rivers in North America have found that the return interval for bankfull stream flows or stage ranges from 1.4 to 1.6 years. In urban watersheds it can be closer to 1.2 years. Bankfull stage is the point where water overflows into the floodplain. The 1.2 year interval flow has roughly an 80% chance of being exceeded in any particular year while the 1.6 year interval flow has a 66% chance of being exceeded. Thus under existing conditions there is between a 66% and 80% chance in any given year of having some period of time with flows exceeding bankfull. Because the proposed spillway is two feet below stream bank elevation, flooding into the proposed pit is expected to occur more frequently than overland flooding would have occurred but no projected frequency for this occurrence has been determined. As flood waters recede, water from the mine-pit area at the Project Site will flow back into the Sand Creek channel through the spillway to an elevation of 726 feet, msl, then through a concrete culvert to Elev. 722 feet. The remaining flood water that does not flow back into Sand Creek will infiltrate into the ground.

During some flood events there is the possibility of pond water from the mine pond having a higher turbidity caused by the dredging operation than the flood water from Sand Creek and once the flood water begins to recede turbid waters from the mine pond could flow back into Sand Creek via the 200 foot constructed spillway.

Since the pit itself will be highly permeable, a substantial amount of flood water can also be expected to infiltrate into the quaternary aquifer, and in some flood events the level of the ground water in the

pit may not even rise above the 722 foot elevation. The larger the exposed mine pit the greater the volume of flood introduced water that can infiltrate into the aquifer.

The proposed mine boundary is demarcated by a wide (approximately 200-500 feet), flat bench that will be excavated to an elevation of 720 to 722 feet, msl (see Figure 3-1). The bench area separates the Sand Creek channel berm from the mine pit. The slope of the berm on the mine-side is proposed to be approximately 5H:1V, rising to the existing topographic surface of the berm area. The slope on the Sand Creek side of the berm is proposed to remain as it currently exists. The top of the berm is proposed to be approximately 100 feet from the normal channel bank of Sand Creek.

The natural sediments that form the berm deposit between the mine pit and the Sand Creek channel are unconsolidated alluvial and over-bank deposits of silt- to gravel-size material. Flood deposition of sediment north of the meander bend along the south end of the proposed project site are shown on Figure 3-2 on 2010 and 2011 air photos. The bank material along this reach of Sand Creek is primarily sand and the floodplain vegetation is a mix of grasses and woody species including silver maple, cottonwood, and box elder (Inter-Fluv, 2008). The channel in this section was noted by Inter-Fluv (2008) to appear to be vertically unstable, with possible degradation. The upsteam section of the channel was dredged out by the City of Jordan in the late 1990's or early 2000's and significant aggredation has occurred in the upstream reach since the Inter-Fluv report of 2008.

3.1.2 Environmental Consequences

During flood events, Sand Creek will overtop the berm and access the floodplain, including the mine pit and surrounding areas. With a 5H:1V back slope on the berm, there is little chance that hydrostatic forces of the floodwaters against the berm material will cause mass failure (i.e. lateral displacement) of the berm materials due to differential lateral load and any differential lateral load will be substantially reduced or eliminated once inundation of the flood plain takes place. A spillway has been incorporated into the design to ensure rapid equalization of hydrostatic forces. In addition, localized erosion of the berm is not expected to be problematic because of the equalization of flood waters. Given the additional concern about stream migration it would be appropriate to consider, during the IUP process, establishment of suitable securities for monitoring the movement of the stream and to fund any corrective actions.

There are concerns about flood waters eroding into the berm, both during flood inundation and then again during flood recession. These concerns are similar to those involving the overtopping of earthen dams and embankments. As rising flood waters reach a low point in the berm, water may

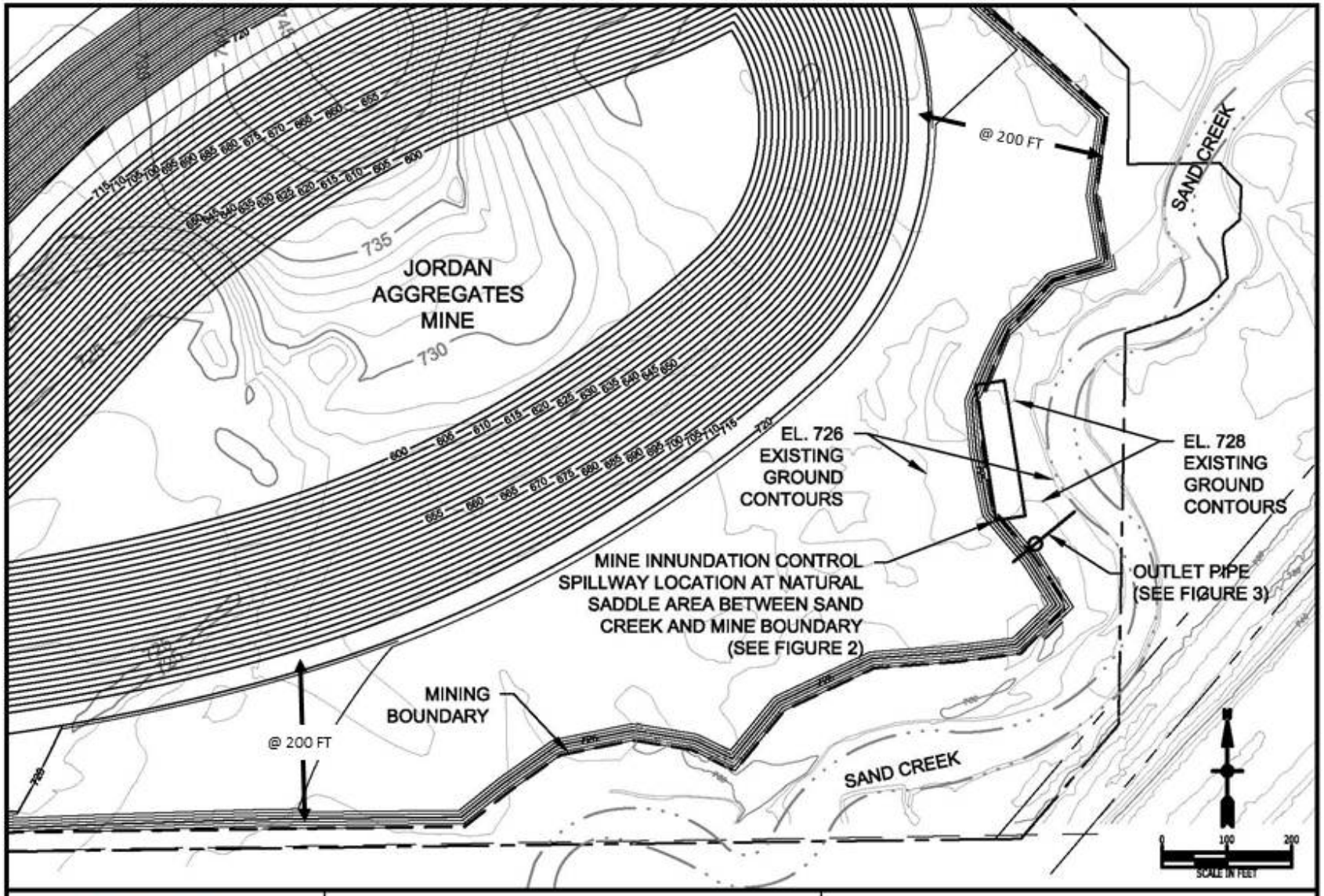
begin to flow at high velocities along the low point from the channel to the floodplain/mine area (e.g., in the areas where previous deposition of flood water was noted, as shown on Figure 3-2. Depending upon the velocity of the water, erosion of the unconsolidated deposits along the low point of the berm may take place, resulting in formation of an erosional channel. This erosional channel, once formed, can further concentrate high-velocity flows, leading to down-cutting, side sloughing and significant failure of the berm. As flood waters recede, the erosional channel would become the primary route for flood water to return back to the Sand Creek, resulting in further down-cutting. Depending on the intensity and duration of the flood event, the resulting condition might be a permanent connection between the mine pit and Sand Creek, which could lead to an overall widening of the Sand Creek channel or channel displacement into and through the mine pit.

3.1.3 Mitigation

The proposed mitigation is to construct a spillway and outlet pipe between Sand Creek and the Jordan Aggregates mine to provide for controlled flow of flood waters into and out of the mine during the rise and recession of Sand Creek flood waters. Providing controlled movement of flood waters between Sand Creek and the mine will mitigate the potential for berm failure during flooding and re-channelization of Sand Creek through the mine. The locations of the spillway and outlet pipe are shown on Figure 3-1.

The spillway is proposed to be located on the mining boundary at a natural saddle location between the mine and Sand Creek as shown on Figure 3-1. The spillway crest will be placed at elevation 726.0 feet, msl, bounded by natural ground at or above elevation 728.0 feet, msl. The spillway length is approximately 200 feet. The spillway drops into the mine on a 5H:1V sloped surface that terminates in a two-foot deep stilling basin. The vertical drop from the spillway crest to the mined bench on the east side of the mine pit is approximately four feet. Design information is shown on Figure 3-3.

The 5H:1V slope extends from the top of the berm to the flatter base of the mined bench at roughly 722 to 720 feet msl and then again into water table surface. The top of the berm is approximately 728 feet msl, meaning the berm is 6 to 8 feet in height. 5H:1V slopes are commonly used for pond embankments and structures such as this. The 5H:1V slope above the bench will be visible under all mining operations except for when Sand Creek is at high flood stage. As such, the constructed slope should be able to be visibly confirmed. The natural water level of the water table by itself will provide substantial energy dissipation if and when the water table rises to equalize the elevation of the flood water.



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JORDAN AGGREGATES
Sand Creek Township
Scott County, MN

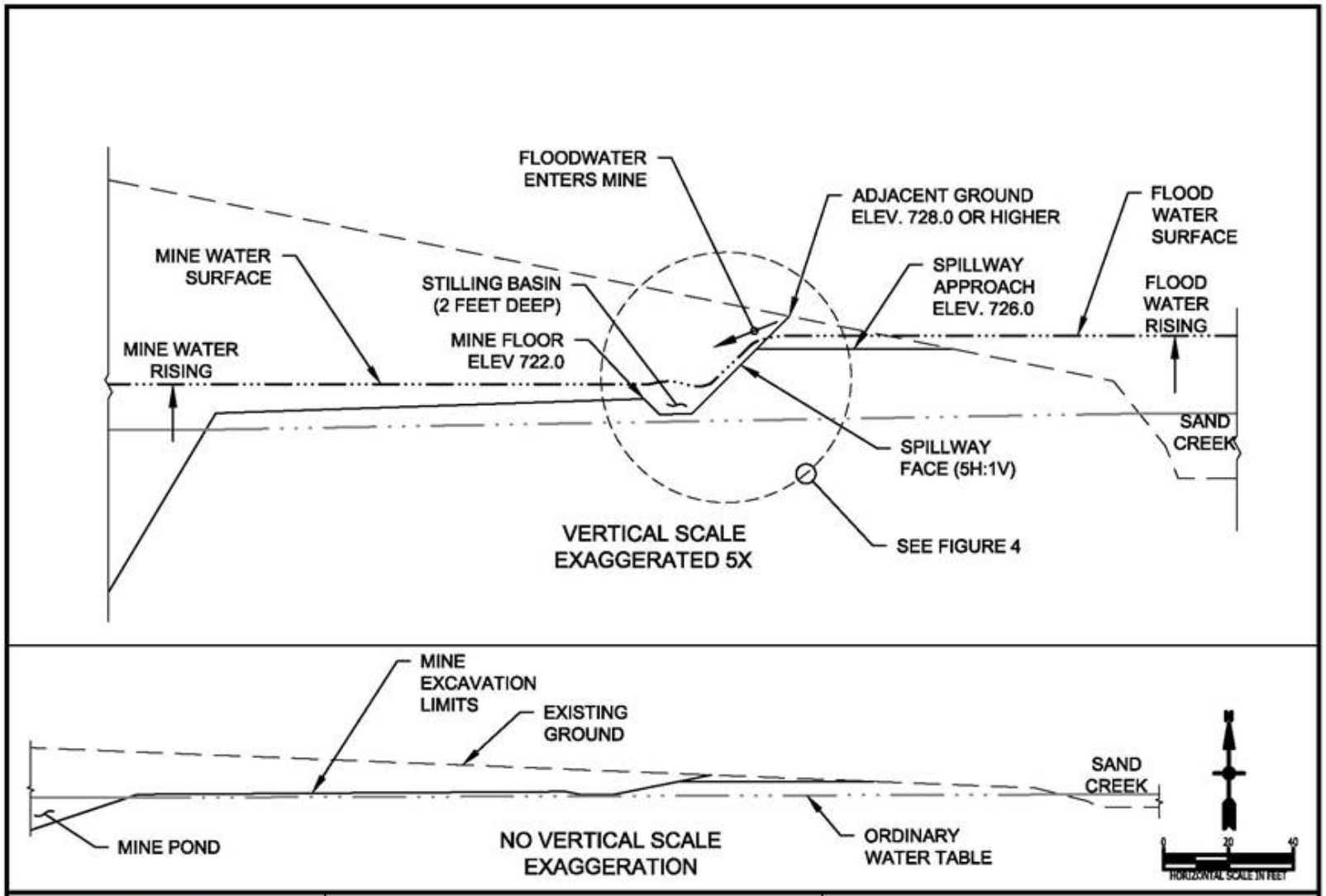
Figure 3-1
PROPOSED SPILLWAY AND BERM
Jordan Aggregates EIS
Scott County, Minnesota

P:\Projects\HDN\HDN001 Kaeb\EIS\Mine inundation x-section.dwg, Figure 1, 4/12/2012 4:36:58 PM

2010 Air Photo (with ground contours, ft, msl)

2011 Air Photo (with ground contours, ft, msl)

Figure 3-2
AIR PHOTOS SHOWING EXTENT OF FLOOD DEPOSITION
ALONG SAND CREEK, SOUTH OF PROJECT SITE
Jordan Aggregates EIS
Scott County, Minnesota



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JORDAN AGGREGATES
Sand Creek Township
Scott County, MN

Figure 3-3
CROSS SECTION OF PROPOSED SPILLWAY AND BERM
Jordan Aggregates EIS
Scott County, Minnesota

The natural angle of repose for sands and gravels is typically closer to 1.5H:1V, or over three times as steep as the slope that is being proposed except when under erosive forces of flowing water. As the proposed slopes are 5H:V1, they are flatter than the angle of repose.

A spreadsheet analysis of the mine inundation process is provided in the Jordan Aggregates Mine Inundation Spillway Memo (Carlson-McCain, 2012). The spreadsheet calculates floodwater movement into the mine through the spillway for a flood scenario where the water surface elevation is rising at a rate of 5 feet per day during the flood. The calculations demonstrate that the water elevation in the mine equilibrates with the flood elevation outside the mine while the flood water is still contained within the spillway (i.e. flood elevation below 728.0 feet, msl). Once the water levels are equal, the erosive force on the 100-foot wide buffer ground between Sand Creek and mine will be insignificant, thus mitigating the potential for re-channelization of Sand Creek into the mine area.

The inundation analysis performed by Carlson-McCain (2012) assumes that the water entering the mine pit through the spillway (and causing the water level in the mine pit to rise) does not account for seepage from the mine pit into the surrounding surficial deposits. Seepage losses from the mine pit into the surficial deposits while water is entering the mine pit through the spillway will result in water elevations in the mine pit that will be somewhat lower than those estimated in the Carlson-McCain (2012) analysis. The groundwater-flow model developed for this EIS evaluation was used with conservative assumptions to evaluate how significant the effect of seepage into the aquifer would be on Carlson-McCain's analyses. The modeling results indicate that seepage into the aquifer would result in approximately a mine-pit water elevation that is 0.07 feet/per day lower than the values calculated by Carlson-McCain. These results indicate that neglecting the effects of seepage into the aquifer from the pond during mine filling throught the spillway during a flood is a reasonable assumption.

An 18-inch diameter concrete pipe outlet is proposed for draining floodwater from the mine back to Sand Creek (once the water level in the mine has receded below the spillway crest elevation). The pipe will be equipped with control valves to prevent creek water from entering the mine through the pipe and to prevent higher sediment laden pit water from being released from the mine into Sand Creek via this pipe. However, as noted above, during some flood events there is the possibility of pond water from the mine pond having a higher turbidity caused by the dredging operation than the flood water from Sand Creek and once the flood water begins to recede turbid waters from the mine pond could flow back into Sand Creek via the 200 foot constructed spillway.

Design information is shown in Carlson-McCain (2012). The spreadsheet also calculates water flow through the mine outlet pipe for a flood water recession rate of 1 foot/day. The calculations indicate a maximum discharge rate of 12 cubic feet per second and a discharge velocity of 6.8 feet per second.

The entire spillway crest, face, and stilling basin, and also the discharge end of the outlet pipe, will be armored with a vegetated 3-dimensional turf mat. Flow velocities will be less than 7 feet per second across the spillway crest with a corresponding shear stress of 0.6 lbs. per square foot. Flow will accelerate to a velocity of 8 to 12 feet per second on the spillway face (depending upon the water surface elevation in the mine) with a corresponding shear stress of 4.4 to 6.6 lbs. per square foot.

The proposed turf mat is rated for a maximum shear stress of 12 lbs. per square foot with mature vegetation and thus has a minimum safety factor of 1.8 for this application.

Vegetation establishment is generally not a problem with these types of systems, particularly with the lower frequency of usage (i.e.: this is not a ditch that will have flow every time it rains). Mature vegetation can be in place within a few months of initial planting. Typically the materials used can withstand periodic inundation. The mats have been used with good success in many applications in the area. In general, the life expectancy of the type of turf material proposed for this application is permanent, i.e.: 50 years or greater. Maintenance generally consists of ensuring adequate vegetation exists in the spillway, removing any debris to minimize local sheer stresses, and removing any undesired vegetation such as weeds or trees. It is recognized that the timing of establishment of mature vegetation is critical. Most applications of this type are installed and never require additional maintenance. During mine operations, the Proposer will be responsible for maintenance of the turf mat and spillway structure. After mining, the new property owner would be responsible for maintenance. The fiscal security required for the IUP should include consideration of spillway and outlet culvert maintenance costs in the event that the mine closes prematurely or there are no responsible parties willing to assume this responsibility once the mine closes. Such a responsibility would need to be stipulated with the title for the property.

The 200-foot long spillway is sufficient to substantially reduce the potential for blockage from flood debris and/or ice jams. Ice and debris should pass over the spillway with minimal disruption of flow. See also Section 4.1.2: Ice Jams for a discussion on the installation of pylons in the spillway.

3.1.4 No-Build Alternative

Under the No-Build Alternative, a berm would not be present and would not be subject to erosion beyond normal channel erosion during flood events. A mine pit would not be present that could alter the configuration of the channel of Sand Creek during flood events.

3.2 Increased Potential for Ice Jams on Sand Creek

3.2.1 Affected Environment

How Ice Jams Form

Ice jams are accumulations of ice and debris in a flowing stream that form where (1) the slope of a river changes from steeper to milder, (2) where moving ice and debris meets an intact ice cover—as in a large pool or at the point of outflow into a lake, or (3) where moving ice and debris are lodged in a structure (such as a bridge). Ice jams can lead to localized and regional flooding in the area behind the blockage, and the sudden failure of an ice jam can release large quantities of water and ice that may cause damage to nearby structures, croplands, and wildlife habitat downstream. The phenomenon is commonly associated with blockages of ice that prevent the late winter or early spring drainage of rain and melting snows in colder regions.

In late winter, as air temperatures rise above the freezing point, river ice begins to melt because of heat transfer from above and the action of slightly warm water flowing beneath. As occurs in lake or pond ice, river ice also may deteriorate and rot because of absorption of solar radiation. On the undersurface, the action of turbulent flowing water causes a melt pattern in the form of a wavy relief, with the waves oriented crosswise to the current direction. Eventually, if the ice cover is not subjected to a suddenly increased flow, it may melt in place with little jamming or significant rise in water level. However, the ice may be moved, resulting in the potential to form ice jams.

During the spring in very northern areas, and during periods of midwinter thaw in more temperate areas, additional runoff from snowmelt and rain increases the flow in the river. The increased flow raises the water level and may break ice loose from the banks. It also increases the forces exerted on the ice cover. If these forces exceed the strength of the ice, the cover will move and break up and be transported downstream. At some places the quantity of ice will exceed the transport capacity of the river, and an ice jam will form. The jam may then build to thicknesses great enough to raise the water level and cause flooding.

Because of the larger quantities of ice present, spring breakup jams (that is, ice jams composed of stacked and clustered ice that accumulates downstream) are usually more destructive than freeze-up jams (that is, ice jams that form as a result of water freezing where lake outlets begin or in narrow stretches of rivers). They can cause sudden flooding, and the ice itself may collide with structures and cause damage, even to the point of taking out bridges. Sometimes a jam forms, water builds up above it, and the jam breaks loose and moves downstream only to form again. This process may

repeat itself several times. In northerly flowing rivers, such behavior is typical, since the upstream ice is freed first and moves toward colder, more stable ice covers.

Historical Ice Jams on Sand Creek

The winter of 2010-2011 went on record as the 5th snowiest Minnesota winter. On March 18, 2011, ice jams formed on the main reach of Sand Creek, near Jordan. The largest of these ice dams formed about a half-mile north of Jordan at a bridge crossing and another smaller ice jam formed further downstream at 173rd Street. The latter location is adjacent to the proposed Project Site. The ice jams formed when ice in and along Sand Creek from upstream areas became dislodged and floated downstream, where the ice mixed with debris in the Creek and lodged in the supports and infrastructure of the bridges. Additional debris and ice backed up behind the bridges for up to one mile. The up-stream ice jam caused Sand Creek to rise three feet in 45 minutes, causing concerns of flooding in the Valley Green Mobile Home Park (although the Creek would have needed to rise several more feet to cause flooding). Farm fields upstream of the ice jams were temporarily flooded. A contractor was brought in to break up the ice jams using a backhoe.

3.2.2 Environmental Consequences

Ice Jam Formation from the Mine Pit

Ice is likely to form on the proposed mine-pit's water surface during the winter. Depending on the severity and duration of the winter, the thickness of snow cover on the ice, and the amount of ablation melting in late-winter/early spring, maximum ice thickness on the pit's water surface could range from less than one foot to up to four feet. In late-winter/early spring, the ice on the mine pit will remain as an in-tact, nearly continuous ice sheet as it begins to thin both from the top and from below. Ice on the pit's water surface will either (1) melt in-place or (2) break up in response to a current. There are two potential sources for a current – flood waters flowing in from Sand Creek and wind-induced current.

The mine pit will not be a concern for ice jams unless there is flooding of Sand Creek that inundates the mine pit. As described in the previous section, a 200-foot wide spillway is proposed with a crest elevation of 726 feet, msl. If ice floes are present or develop within the mine during a flood event, they may be carried to the spillway during flood recession or by wind action and could plug the spillway. If ice and/or debris in the spillway causes the berm to be overtopped, the flow over the berm materials will be at low velocities and erosion potential will be small.

Ice Jam Formation from Sand Creek

Ice jams have been known to form along this reach of Sand Creek during spring melt after extremely high snow-fall winters, such as the winter of 2010-2011. Ice floes and debris will be carried along the current of Sand Creek. When the creek has risen out of its banks, the current flow direction and inertia of the moving ice floe will carry the floe in a northeasterly to northerly direction across the floodway, away from the spillway that is proposed for the mine berm.

The location of the spillway is "behind" the direction of current flow, given the meander of the creek bed. Current flow through the spillway will be localized and will be the product of slow-moving side currents. The potential for ice jams to form within the spillway under these conditions is deemed to be minimal.

Ice jams may form in the Sand Creek channel downstream of the mine pit area (e.g., the bridge at 173rd Street). Downstream ice jams have the potential for backing up flood waters and building ice and debris up to the mine area and the proposed spillway. Under this condition, the mine area can become inundated with flood waters as the stage of Sand Creek reaches the spillway crest elevation (726 feet, msl). Ice floes and debris will then be carried over the spillway and into the mine pit area. If an ice jam develops in the spillway, there is the potential for the berm to be overtopped, which could lead to erosion and channelization.

3.2.3 Mitigation

Recession of flood waters typically results in discharge rates from the mine back to the creek that are much lower than the input flow rate into the mine when flood waters are rising. The spillway is designed for the high input rate and has significant excess capacity to handle the discharge rate. So a significant portion of the spillway could be clogged and the spillway would still be able to handle the discharge. More importantly, flood waters will be discharged overland, away from the spillway, at low, non-erosive rates until the flood level falls to elevation 728.0 feet, msl. At that point, all further discharge would occur through the spillway and pipe. If the spillway becomes jammed with ice at that point, flood water is simply retained in the mine pit, discharges slowly through gaps in the jam and through the pipe.

There is much less likelihood for the formation of ice jams in the spillway occurring from rising waters in Sand Creek because of the location of the spillway with respect to channel flow. The length of the spillway (200 feet) should be sufficient to prevent ice jams from cutting off all flow through the spillway. A worst-case situation would involve (1) existing ice on mine pond; (2) rapid

inundation of the mine pit during spring flooding, lifting the pond ice up via buoyancy forces; (3) high winds that drive the floating ice toward the spillway; (4) ice in Sand Creek backing up into the spillway; and (5) the flood stage of Sand Creek staying below the elevation of the berms so that the berm would not be overtopped by inundating flood water. In order for the ice to block the spillway and cause overtopping of the berm by receding flood waters in the mine area a nearly continuous wall of ice and debris would have to fill the 200-foot length of spillway to a height of two feet and not break up due to the flowing water. There would, also be the the possibility for ice from the pond flowing over the spillway during flood events where flood elevations were higher than the elevation of the spillway (or being pushed by wind) and contributing to ice jams under the 173rd Street bridge.

In the event that there is a large ice jam under the 173rd Street bridge, response to that jam will need to be coordinated with County and Township officials.

In order to reduce the potential for ice sheets that form on the mine pond from flowing offsite and downstream of the mine towards Sand Creek during flood events, steel piles are proposed to be installed in the spillway and perimeter berm along the east edge of the mine pit where floodwater would exit the pit. Installation of piles will occur once the open water area of the pond phase of the mine reaches 10 acres in size. The piles will be installed a minimum of 10 feet into the ground 30 feet outside of the top of the berm, and at a spacing of 30 feet along the berm as shown in Figure 3-4. The piles will be installed such that the top of the piles will be at a minimum elevation of 734 feet, which is 1.5 feet above the average 100-year flood elevation of 732.5 feet. Details are provided on Figures 3-4 and 3-5.

It is important to note that while this mitigative method appears to be applicable in concept, no details have been provided to justify the rationale for pile spacing and size, nor have examples of similar designs used in similar settings been presented. Analyses to inform a detailed design of the ice-jam mitigation approach described above will need to be presented as part of the IUP process before it can be implemented

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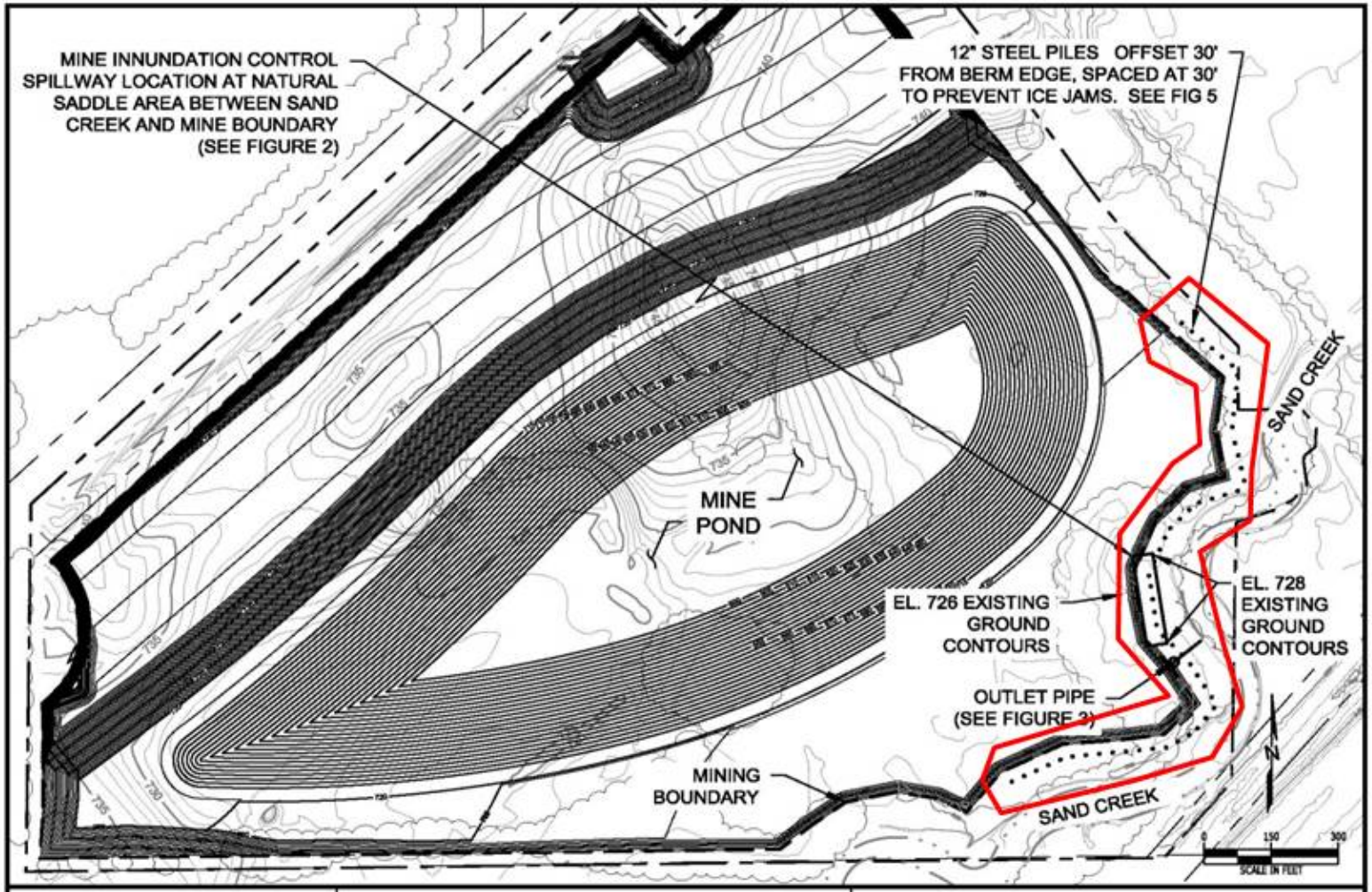

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JORDAN AGGREGATES
Sand Creek Township
Scott County, MN

Figure 3-4
PROPOSED LOCATION OF STEEL PILINGS TO MITIGATE ICE JAMS
Jordan Aggregates EIS
Scott County, Minnesota

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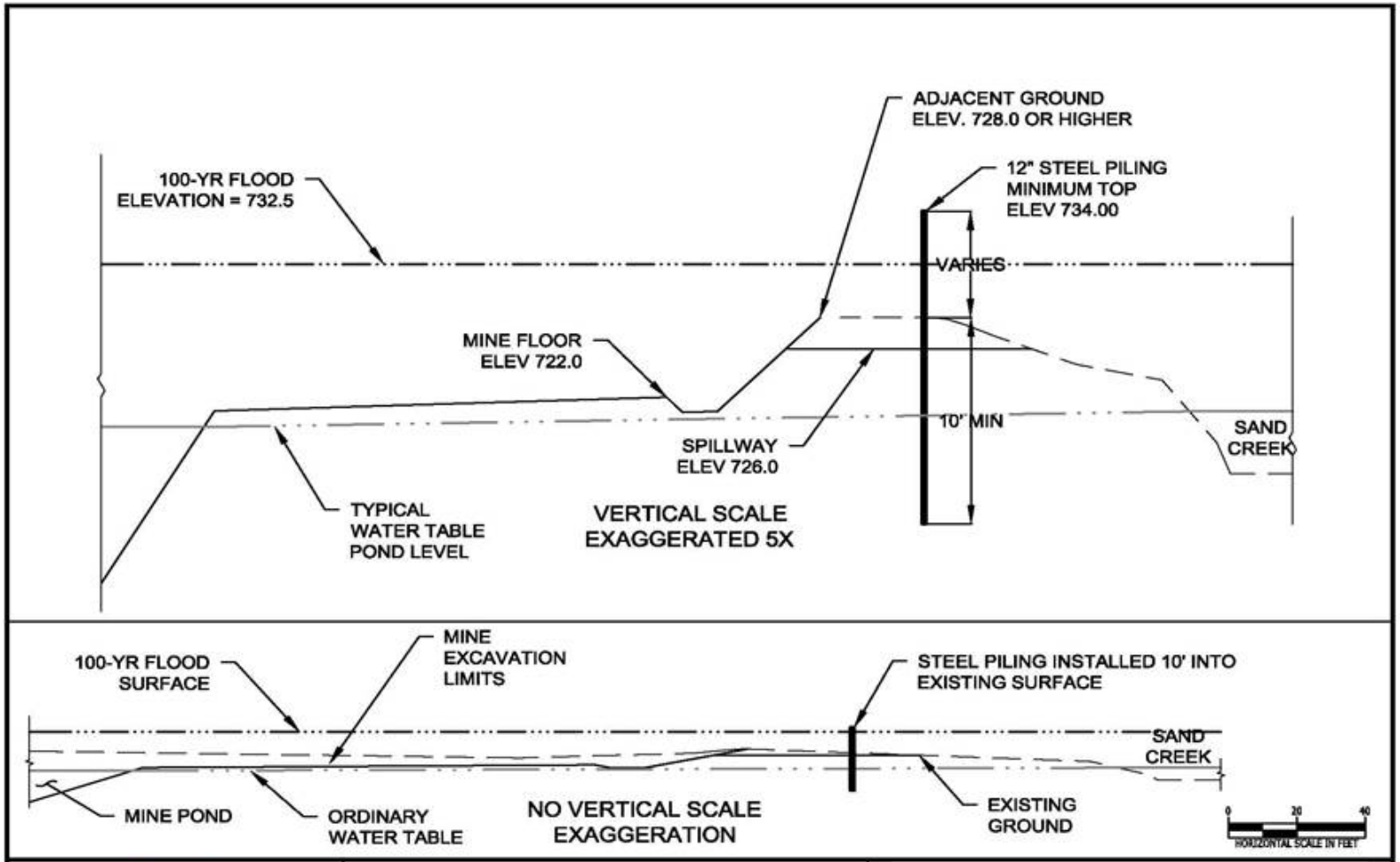

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JORDAN AGGREGATES
Sand Creek Township
Scott County, MN

Figure 3-5
CROSS-SECTIONAL DETAIL OF STEEL PILINGS TO MITIGATE ICE JAMS
Jordan Aggregates EIS
Scott County, Minnesota

3.2.4 No-Build Alternative

Under the No-Build Alternative, a berm and a spillway would not be present and would not be subject to erosion during flood events and there would be no spillway to jam with ice and debris. A mine pit would not be present that could contribute ice floes to Sand Creek.

3.3 Changes in Groundwater Levels During and After Mining

3.3.1 Affected Environment

Aggregate mining will be performed below the water table by dredging. Within the mining limits sand and gravel will be excavated down to the water table, which is anticipated to be encountered at approximately elevation 720 feet, msl. Based on site topography, the excavation depths will range from 4 to 49 feet. In the center of the site, excavation will extend below the water table to an approximate elevation 640 feet, msl or approximately 10-30 feet above the top of bedrock. A pond of approximately 36 acres and 80-100 feet deep will be formed as a result of mining into the aquifer. The water level in the pond will be the surface expression of the water table.

Water Withdrawals due to Mining and Evaporation During Mining

During mining, approximately 2,700 tons of sand and gravel will be excavated daily. The removal of the material from the mine has an effect that is similar to pumping water because sand and gravel is taken out and the resulting "void" space is filled by groundwater flowing into the pit. Assuming an approximate bulk density of sand 1.67 tons/m^3, and a standard void ratio for sand and gravel of 0.3, approximately 1,134 m^3 of solid material will be removed from the mine pit each day. This value of 1,134 m^3/day can be thought of as the "pumping rate" due to sand and gravel extraction.

In addition to the removal of sand and gravel, there is removal of water from the pit due to evaporation. The average pan evaporation rate in the Twin Cities metropolitan area for the period 1972 to 2008 is 36.91 inches. During this same period, the average precipitation was 29.41 inches. The difference between evaporation and precipitation (E-P) is 7.5 inches (0.191 meters). This equates to an average "loss" to the atmosphere of water from the 36 acre (145,687 m^2) mine pit of 27,753 m^3/year or 76 m^3/day (13.9 gallons per minute).

The total equivalent mine pumping rate due to extraction of aggregate and evaporation is 1,210 m3/day (222 gallons per minute).

Water Withdrawals for Aggregate Washing

One new well will be installed and completed in the sand-and-gravel unit below the water table to provide water for aggregate washing operations as well as dust control. The exact location of the well will be determined as part of the IUP application and MDNR appropriation permitting processes, however it is expected that the well will be located within the proposed plant processing area.

A Water Appropriation Permit will be required for the operation of this wash well. Water usage at the Project Site will vary based on a number of factors including precipitation, rate of aggregate excavation, silt content of aggregate, and product demand. The Project includes a lined sedimentation/ recirculation pond for wash water discharge. Clarified water from the sedimentation pond would be reused as wash water, thus reducing the groundwater pumping requirement. The anticipated annual water requirement for the site is estimated at 500,000 to 2 million gallons (average pumping rate of 1 to 4 gallons per minute) and peak rate water use of 200 gallons per minute (i.e. the wash water well will be operated at a maximum rate of 200 gpm for a short period of time, resulting in an annually averaged rate of 1 to 4 gpm).

Development of Groundwater Flow Model and Pumping Test

In order to evaluate the changes on groundwater levels during and after mining, a three-dimensional, finite-difference computer groundwater model was developed for the Project area using the U.S. Geological Survey's groundwater modeling code, MODFLOW (McDonald and Harbaugh, 1988). This groundwater flow model incorporates both regional- and local-scale hydrologic features, including hydrologic values measured at the Project Site using a number of different methods. The model was calibrated to existing groundwater flow conditions. The calibrated model was then used to predict the effects of the mine on groundwater levels (among other conditions). The model development and calibration is described in detail in Barr (2102) and is summarized below.

The basis for the groundwater flow model used in this EIS evaluation is the Metro Model 2, developed for the Metropolitan Council by Barr Engineering Co. (Metropolitan Council, 2008). The Metro Model 2 covers the entire seven-county metropolitan area of the Twin Cities and includes all major bedrock and surficial aquifers (and most aquitards) as separate computational layers. The Metro Model 2 underwent extensive calibration and peer review by a Technical Advisory Committee of experts in State and Federal agencies, the University of Minnesota, Counties, and experts in private consulting. This Technical Advisory Committee was formed by the Metropolitan Council.

The Metro Model 2 is at an appropriate scale and level of detail to evaluate certain regional groundwater problems. However, in order to use it for site-specific problems, such as the Jordan Aggregates EIS, it must undergo additional refinement, incorporation of site-specific detail, and site-specific calibration to existing conditions. In order to accomplish this, a smaller, localized groundwater flow model is "extracted" from the regional model through a process called "telescopic mesh refinement" (TMR). Even though this local model is of smaller scale, it covers a large portion of Scott County and includes all of the major aquifers and aquitards in the area.

Initial refinements to the local model include: increased horizontal grid discretization from 500 meters by 500 meters (Metro Model 2) to 31 by 31 meters (in the vicinity of the Project site); re-interpretation of the width and course of Sand Creek and the Minnesota River in the vicinity of the Project site to more accurately reflect existing conditions; minor adjustments to the elevation of the bedrock layers to reflect local well and boring information; inclusion of wetlands features in the Minnesota River valley near the Project site; and precise location of existing wells near the Project site.

Slug test and specific-capacity test data, collected during the EAW investigations that provide site-specific information on the hydraulic conductivity (i.e. permeability), were incorporated into the model for the sand and gravel unit. In addition to these data, a pumping test (i.e. and "aquifer test") was performed by Carlson-McCain, Inc. in 2012, using existing on-site wells completed in the Franconia-Ironton-Galesville (also known as the "Tunnel City-Wonewok") aquifer. Carlson-McCain staff coordinated with Barr Engineering Co. staff during the test and the test data were analyzed by Barr Engineering Co. staff. The data and analyses results of the pumping test are included as an attachment in Barr (2012b). Drawdown observations from this test were also used as calibration targets for a detailed re-calibration of the groundwater model.

Simulation of Mine Pit and Wash-Water Well

The mine pit, which is projected to have a maximum depth of approximately 120 feet, was included in the calibrated groundwater flow model by incorporating the proposed mine-pit geometry of the ultimate pit extent. The mine encompasses two model layers (both representing differing elevations of the sand and gravel unit). The pit was represented by a zone of high hydraulic conductivity and a storage value of 1.0 (this is a common practice used to simulate the effects of a lake or mine pit that is a surface expression of the water table and was suggested by Anderson et al. 2002). A "dummy" extraction well was placed within the mine pit to withdraw the water represented by average rates of

aggregate extraction and net evaporation. The wash-water well was located in the vicinity of the proposed plant processing area. Withdrawal rates are described above.

The inclusion of the mine pit, aggregate extraction, net evaporation, and wash-water pumping represent the maximum withdrawal condition during mining.

3.3.2 Environmental Consequences

The model's prediction of the change in the water-table elevation, resulting from the presence of the preferred mine pit (and its water losses) and the presence of the wash well is shown on Figure 3-6. The maximum predicted water-table drawdown (i.e. lowering of the water table compared to existing conditions) is 2.82 feet, which takes place along the southeast edge of the mine pit. The model predicts that the water-table elevation will increase (compared to existing conditions) by 0.2 feet at the approximate midpoint of the downgradient perimeter of the mine pit. These results are entirely consistent with expectations for a mine pit, which creates a flat surface expression of the water table.

As shown on Figure 3-6, the greatest amount of drawdown beyond the mine area is to the south – extending to the rail line that parallels TH169. However, the magnitude of this drawdown is less than about 1.2 feet. As shown on Figure 3-6, to the north and northwest, the maximum predicted drawdown is approximately 0.2 to 0.4 feet. The model predicts that the average drawdown near the wash water well will be approximately 0.8 feet. For deeper hydrostratigraphic units, such as the Franconia-Ironton-Galesville (FIG) aquifer, the drawdown is less – the maximum drawdown in the FIG aquifer is 1.13 feet.

The model predicts that the mine pit and maximum, steady-state pumping of the wash water well will produce a combined drawdown in individual wells that are the following:

Table 3 Drawdown of Nearby Wells

Unique Well Number	Predicted Drawdown (feet)
211711	0.18
150106	0.71
216747	0.56
595225	0.37
404675	0.33
510414	0.18
498564	0.20
443648	0.38
760017	0.58

235532	0.29
474684	0.33
271816	0.36
777320	0.30
777297	0.29
271924	0.30

None of these drawdown values would be expected to measurably affect the ability for the wells to yield at their current rates.

The groundwater-flow model was used in conjunction with the USGS's particle-tracking code, MODPATH (Pollack, 1989) to evaluate the potential for changes in the direction of groundwater flow in the vicinity of the City of Jordan's wastewater ponds (located southwest of the project site). Of possible concern is whether or not the groundwater-flow changes caused by the mine pit, the wash water well, and other proposed project features would result in a condition whereby potentially contaminated groundwater near the wastewater ponds would migrate towards the mine pit or nearby wells. The modeling results (shown on Figure 3-7) indicate that the proposed project conditions will have no discernible affect on groundwater flow paths or contaminant migration pathways (if any) emanating from the wastewater ponds (i.e. the flow paths with and without the mine pit, wash water well, etc. were virtually identical).

3.3.3 Mitigation

Predicted changes in groundwater levels resulting from the preferred mine alternative are deemed to be very small and will not adversely affect the ability of existing water-well users to continue to obtain adequate quantities of water. Changes in groundwater levels will be caused by two sources of groundwater withdrawal: (1) the combined effects of aggregate removal and evaporation from the mine pit and (2) pumping of the wash water well. Aggregate removal does not involve active dewatering of the mine pit by pumping and therefore, cannot be further mitigated. Evaporation losses are deemed to be very small. The wash water from the on-site well completed in the sand-and-gravel unit will be used intermittently and the water from the washing process will eventually return to the aquifer (minus evaporation losses) through seepage beneath the ground surface.

As part of the IUP process, the Project Proposer will be required to implement and fund a groundwater monitoring plan acceptable to the County that will include measurement of groundwater levels in wells and periodic collection of groundwater samples for analysis. The results of this monitoring will be submitted to Scott County on a quarterly basis for review. A groundwater monitoring and mitigation plan was prepared by Barr Engineering and distributed for review and

comments by the state agencies who provided comments on the FEIS relative to this issue. That monitoring and mitigation plan is attached as Exhibit A. The Project Proposer has also reviewed this monitoring and mitigation plan and has generally agreed with the monitoring provisions, though ongoing financial assurance to ensure continued perpetual monitoring will still need to be resolved either through the Individual NPDES Permit required by the Minnesota Pollution Control Agency or by the County's IUP. However, the Project Proposer has not accepted the groundwater mitigation plan proposed by the County, which requires mitigation for groundwater degradation that has been modeled to be an issue associated with inundation of the proposed mine pit by floodwaters from Sand Creek. Please see Exhibit B letter from the Project Proposer dated June 9, 2014. This issue also remains unresolved. The MPCA has required and received an Individual NPDES Permit for this project and could proactively require financial assurance for any mitigation plan as part of their NPDES permit. The MPCA, however must consider the findings of this EIS when issueing their NPDES Permit for this project.

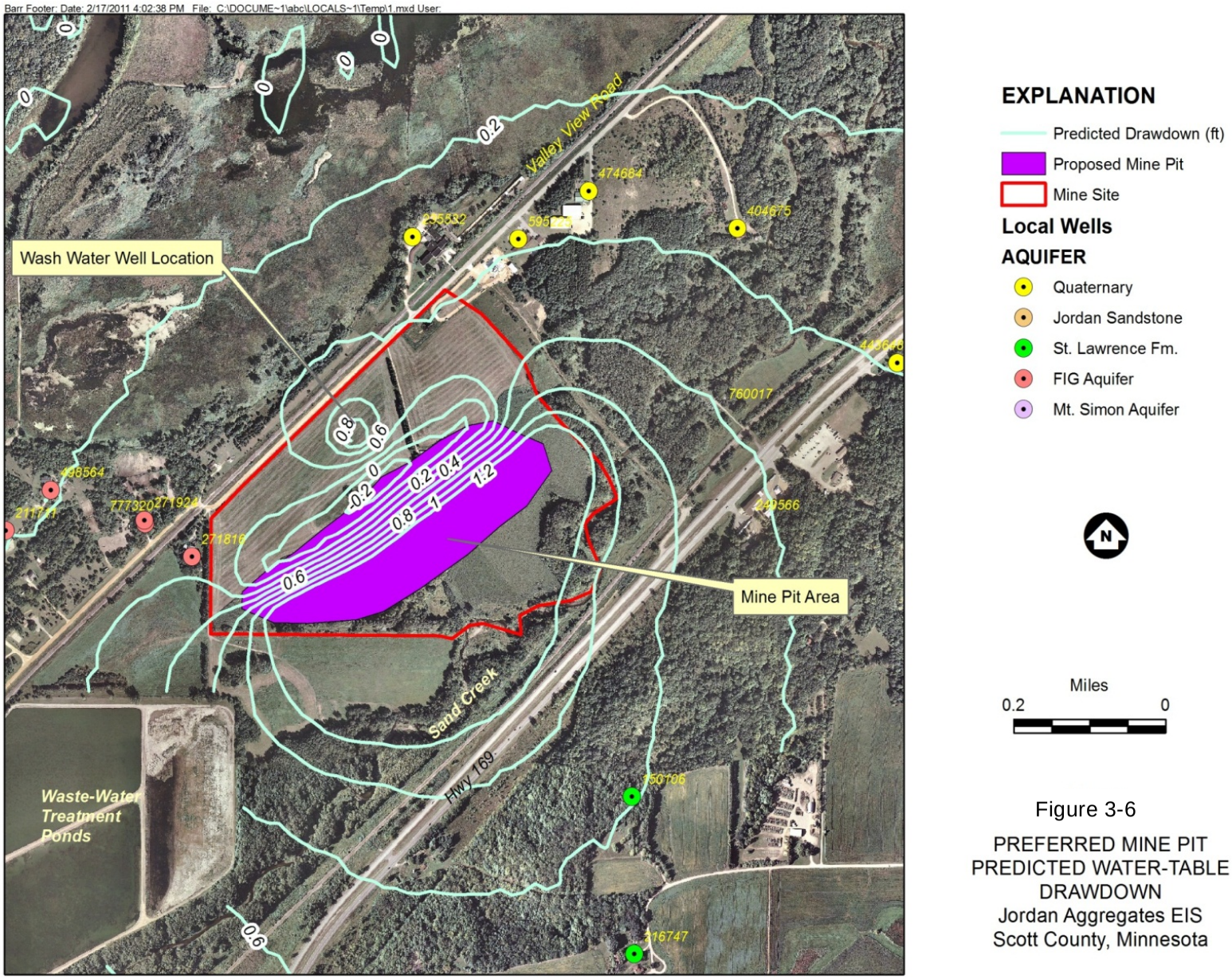
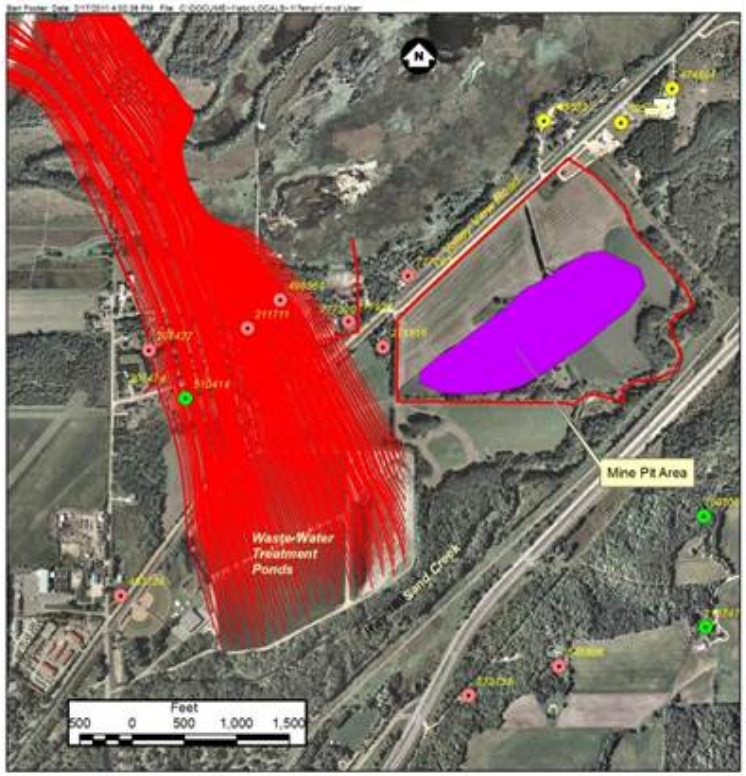
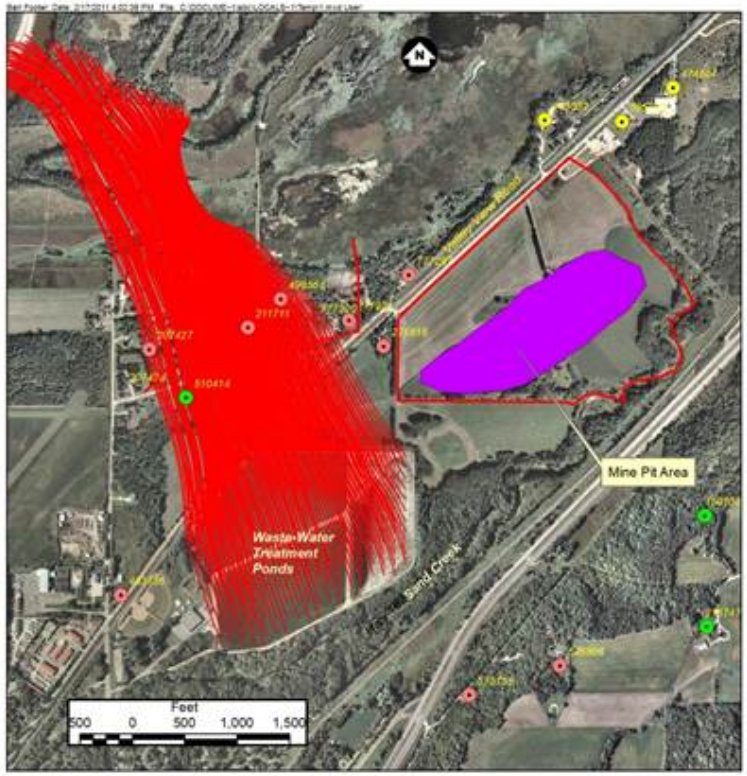


Figure 3-6

PREFERRED MINE PIT
PREDICTED WATER-TABLE
DRAWDOWN
Jordan Aggregates EIS
Scott County, Minnesota



Groundwater Flow Paths from Wastewater Ponds Without the Proposed Mine Project



Groundwater Flow Paths from Wastewater Ponds With the Proposed Mine Project

EXPLANATION

- Groundwater Flow Path
- Proposed Mine Pit
- Mine Site

Local Wells

AQUIFER

- Quaternary
- Jordan Sandstone
- St. Lawrence Fm.
- FIG Aquifer
- Mt. Simon Aquifer

Figure 3-7

GROUNDWATER FLOW PATHS FROM THE CITY OF JORDAN WASTEWATER PONDS - PREDICTED BY THE GROUNDWATER MODEL WITH AND WITHOUT THE PROPOSED PROJECT
Jordan Aggregates EIS
Scott County, Minnesota

3.3.4 No-Build Alternative

Under the no-build alternative, there would not be changes in groundwater levels caused by aggregate removal, pumping of a wash-water well, or altering of the hydraulic gradient because of the open-water source of the mine pit.

3.4 Changes in the Base Flow of Sand Creek Caused by Mining

3.4.1 Affected Environment

Flow discharge in Sand Creek in the vicinity of the City of Jordan and the Project Site is seasonally highly variable, with the largest flows occurring during the spring and early summer. Winter base flows at Jordan average about 1.8 cubic feet per second (cfs) (Metropolitan Council, 2004). Water level relationships at the Project Site indicate that the reach of Sand Creek adjacent to the Project site is a losing stream (i.e. stream water leaks into the surrounding groundwater system) but it appears that Sand Creek becomes a gaining stream further downstream from the Project Site (Barr, 2011). The presence of "losing" and "gaining" reaches of a stream are natural processes that reflect the interaction between surface water and groundwater. It is common for streams to have alternating losing and gaining reaches. During the course of a year, a losing stream can become gaining and vice versa. Mining and other groundwater withdrawals can cause some changes to these natural conditions.

Groundwater withdrawals from the mine pit (aggregate removal and evaporation), pumping effects from the wash-water well, and the altering of the hydraulic gradient both upgradient and downgradient of the mine pit (the result of creating a surface-expression of the water table) change the elevation of the water table in the vicinity of Sand Creek, where it flows past the Project Site. If the water table is lowered in the vicinity of Sand Creek, the hydraulic gradient between Sand Creek and the water-table aquifer is also increased and a potential exists for increased stream-flow losses in Sand Creek due to increased seepage. The overall result may be a reduction in the base flow of Sand Creek, which, in turn, may result in lower stream flows during the winter months and extended drought periods.

The groundwater flow model was used to predict the effects of mining operations on the base flow of Sand Creek. The cumulative groundwater withdrawals, described in the previous section, were included in the model and the stream losses along the reach of Sand Creek from the wastewater treatment ponds (southwest of the Project Site) to 173rd Street were calculated. The model was also used to calculate the stream losses (or gains) along this same reach without the mine activities.

3.4.2 Environmental Consequences

The model predicted that under existing conditions, Sand Creek is currently losing approximately 0.16 cubic feet per second (cfs) along the reach from the City's wastewater treatment ponds to 173rd Street during low-flow (winter) conditions. These losses are the result of the water-table elevation being slightly lower than the elevation of Sand Creek. The model predicts that the inclusion of the mine and ancillary features will result in a condition in which there is a stream loss of 0.25 cfs along this reach of Sand Creek (an increased stream loss of 0.09 cfs). The average winter base flow in Sand Creek is 1.8 cfs (Metropolitan Council, 2004) near Jordan. Therefore, the model predicts that the Proposed Project will result in a potential reduction in base flow of Sand Creek of 0.09 cfs, which may result in an overall winter or drought base flow along this stretch of Sand Creek of 1.7 cfs. However, base flows likely increase further downstream (which is typical of many streams as they approach their mouth).

The Minnesota DNR's sampling of Sand Creek indicated that the stream does not support habitat for cold-water aquatic species and of the 28 fish species identified in Sand Creek, all were warm-water tolerant (Inter-Fluv, 2008).

3.4.3 Mitigation

The wet portion of the mine pit will be offset from the channel of Sand Creek by at least 200 feet. This offset provides some reduction in the effect of the mine pit on steepening the hydraulic gradient between Sand Creek and the mine pit. It would not be practical to increase this buffer space without substantially reducing the overall size of the mine. Mining "in the wet" (i.e. dredging below the water surface rather than dewatering) is the major mitigation of the reduction in the base flow of Sand Creek.

The predicted reduction in the base flow of Sand Creek due to this Project is a contributor to the overall reduction in stream flow of the Creek but these reductions are not deemed to impair the ecological functions of Sand Creek along the reach adjacent to the Project Site. For most conditions, the reduction in stream flow will be an insignificant portion of the total flow in the stream.

If Sand Creek were to erode a channel into the mine pit and the channel was not restored, the hydrologic conditions of Sand Creek along this stretch would likely be altered by increased storage. Stream stage and the elevation of the mine pit would reach a new equilibrium level, controlled primarily by the elevation of the water table. Under this condition, Sand Creek would likely become

a losing stream in the vicinity of the mine pit, which would result in diminishment of stream flow downstream of the mine pit area.

3.4.4 No-Build Alternative

Under the no-build alternative, the base flow of Sand Creek will likely be slightly higher (0.09 cfs higher) than it would be without the Project and there would be no risk of the stream flowing into a water-table controlled depression that might result in stream-flow loss through infiltration into the surrounding surficial aquifer bordering the mine pit.

3.5 Effect of Mining on Wetlands

3.5.1 Affected Environment

Riparian and groundwater-influenced wetland areas are located downgradient (north) of the Project Site, adjacent to the Minnesota River (Figure 3-8). These are areas where the ground surface is at or below the water table and water in the wetlands is a surface expression of the water table. The groundwater-flow model predicts that typical inflows into the wetlands total approximately 3.20 cfs.

Groundwater withdrawals from the mine pit (aggregate removal and evaporation), pumping effects from the wash-water well, and the altering of the hydraulic gradient both upgradient and downgradient of the mine pit (the result of creating a surface-expression of the water table) change the elevation of the water table and represent a groundwater sink that alters the area's water balance. Drawdown effects may lower the water surface in the wetland areas that could lead to changes in habitat.

3.5.2 Environmental Consequences

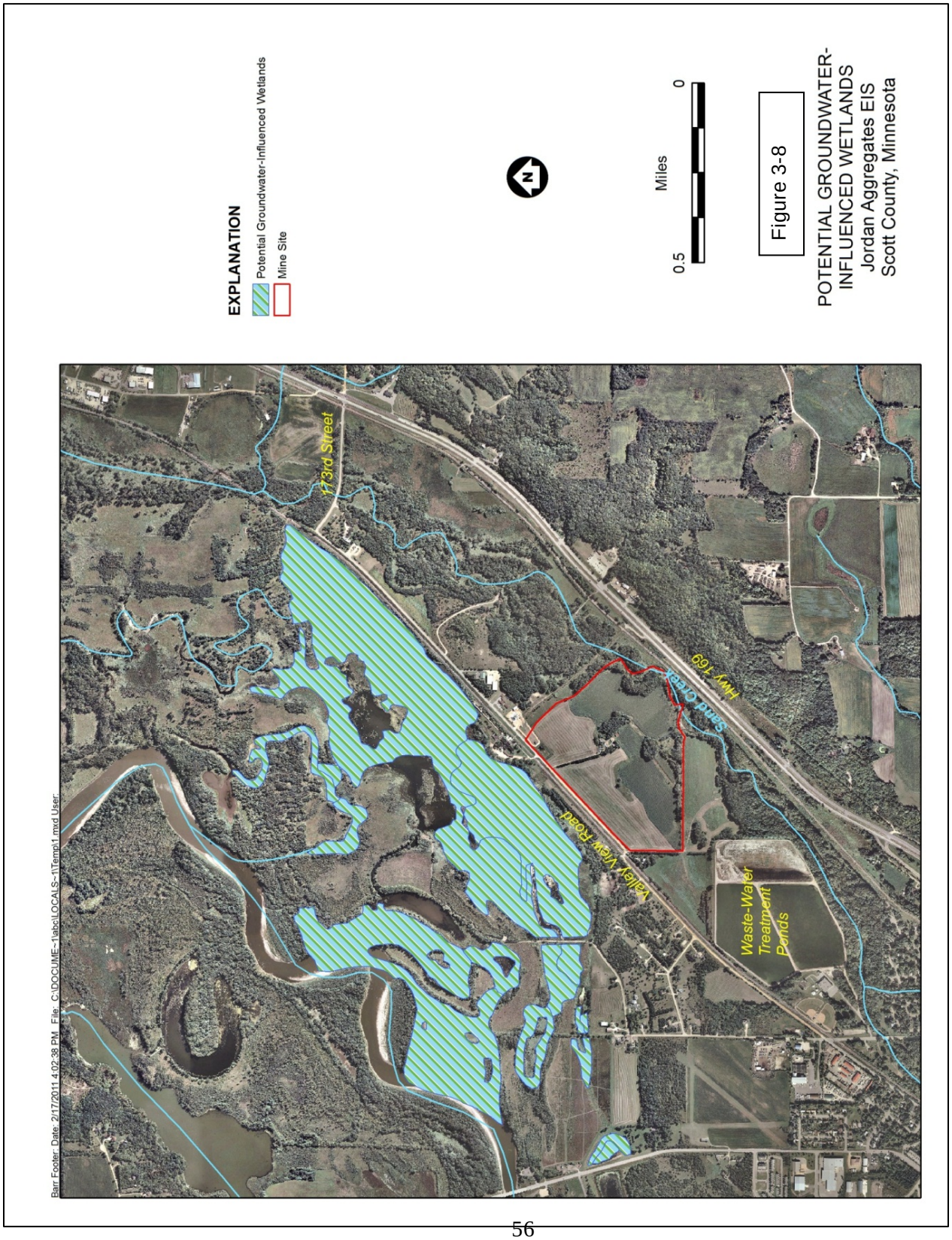
The model incorporates the wetland features as Drain Package elements in the code MODFLOW. Modeling of the mine features predicts that drawdown effects will not extend to the wetland areas. The model predicts that the mine pit and wash water well will result in a net reduction in groundwater inflows into all wetlands of 0.10 cfs – a reduction of about 3 percent. The model does not predict that drawdown induced from mining operations will measurably affect the stage elevation of the wetlands.

3.5.3 Mitigation

The very minor nature of the predicted effect on the nearby wetlands indicates that mitigation is not required and the wetlands will be preserved in their current state.

3.5.4 No-Build Alternative

Under the no-build alternative, the wetlands will continue to be preserved in their current state.



3.6 Water Quality Impacts to Aquifers and Nearby Wells as a Result of Mine-Pit Inundation During and After Flooding

3.6.1 Affected Environment

The mine pit area is expected to be inundated with flood water from Sand Creek during some higher flooding conditions. A proposed spillway in the berm will begin to let water into the mine pit area when flood waters in Sand Creek reach elevation 726 feet, msl which is about 2 feet lower than current stream bank elevation along the stretch of Sand Creek adjacent to the Project Site. As a result, there will likely be inflow of stream water more frequently than would otherwise have resulted in flooding over the Project site under current topography. Stream guage monitoring results obtained from the Metropolitan Council for 2013 suggest that such inflow through the proposed spill way would have occurred at least four times in 2013, before August 1, 2013. A review of historical stream flow suggests a 50-67% probability of flooding above current stream bank elevation in the area of the Project Site in any given year. Inundation of the mine pit through the constructed spillway, which is proposed to be 2 feet lower than stream bank elevation will occur more frequently. Inundated water will flow back into Sand Creek after flood waters begin to recede over the same spillway until an elevation of 726 feet, msl is reached. At that point, flood water will dissipate through infiltration into the surrounding sand and gravel water-table aquifer and through the culvert to elevation 722 feet msl.

Flood waters from Sand Creek that are retained in the mine area behind the spillway have the potential to temporarily alter the groundwater flow direction (because of temporarily elevated hydraulic head in the mine pit). The flood waters may also contain contaminants and water-borne pathogens, that may adversely affect the water quality of the water-table aquifer and could impact nearby wells. Chemical contaminants carried in flood waters may include nitrates, pesticides, volatile organic compounds, and metals. The 236.3 square miles of upstream watershed for Sand Creek (Figure 3-9) includes primarily agricultural land, but also includes urban runoff from Montgomery, New Prague and Jordan along with their treated wastewater discharges. Jordan's wastewater treatment plant discharges immediately upstream of the Project site.

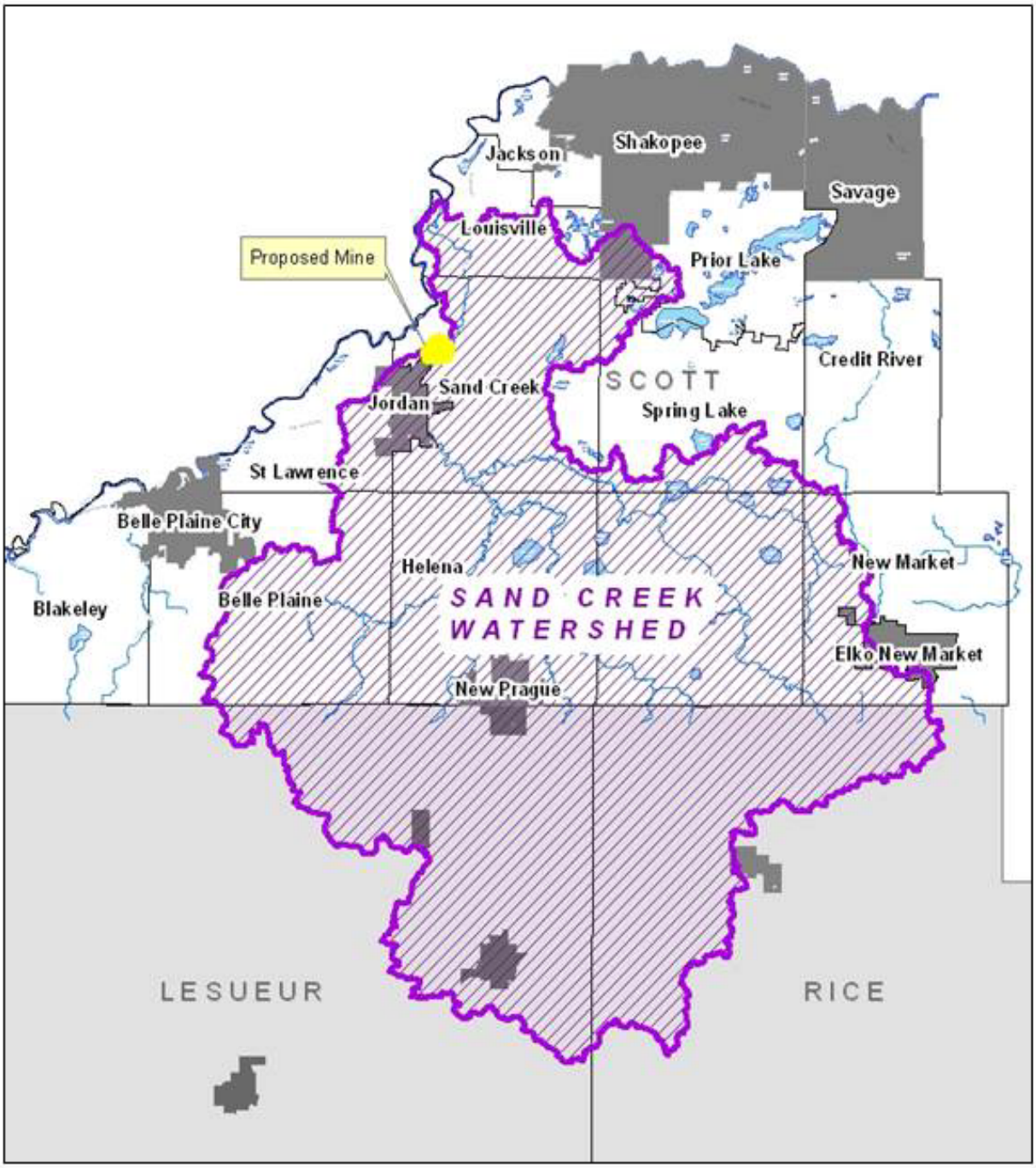


Figure 3-9

SAND CREEK WATERSHED
Jordan Aggregates EIS
Scott County, Minnesota

The effects of mine-pit flooding were evaluated using the groundwater flow model in a transient simulation, along with the solute transport model MT3DMS (Zheng and Wang, 1999). The following procedures were used:

- The flood water is simulated using advective, non-dispersive flow (i.e. dispersion is assumed to be negligible).
- The water level in the mine pit was simulated at elevation 728 feet, msl and allowed to reach a steady-state condition. This simulation forms the starting point for a transient simulation.
- A transient simulation is performed in which the water in the mine pit, beginning at elevation 732.5 feet, msl (the 100-year flood elevation) is allowed to re-equilibrate to a new steady-state condition over time. The model simulates the reduction in the flood water. A storage value of 0.15 is used for the unconsolidated aquifer.
- The flooded mine pit is assigned an initial concentration of 100 in the MT3DMS simulation, signifying that 100 percent of the mine-pit water is flood water. (This value has no relationship to the concentration of any contaminant). As the flood water in the mine pit percolates into the surrounding sand and gravel, MT3DMS track the direction and relative concentration (as a percent) of the flood water.

The intent of the MT3DMS solute transport simulation is not to simulate a specific contaminant with a specific initial concentration. Rather, solute-transport modeling was used to track the migration of flood water in the pit as it moved out into the water-table aquifer. The initial concentration in the mine pit was set equal to 100, which represents 100% flood water. The flood water migration in the aquifer is then simulated using advective, non-dispersive transport. These simulations allow for the prediction of the movement of the flood water (i.e. the time-of-travel) as well as the attenuation of the concentration through hydrodynamic processes. The model was run with the original proposed mine depth extending to bedrock. The depth of mine excavation was changed during the preparation of the FEIS in an effort to conceivably reduce the potential for contamination of the FIG aquifer but the model was not re-run with this change. The correspondence on the need to re-run the model for the new proposed mine depth is in the supplemental technical studies.

3.6.2 Environmental Consequences

The solute-transport model was used to predict the movement of flood water in the water-table aquifer as a "non-reactive tracer" (i.e. if a dye was mixed in with the flood water and tracked through the aquifer over time).

Non-Reactive Flood Water Migration

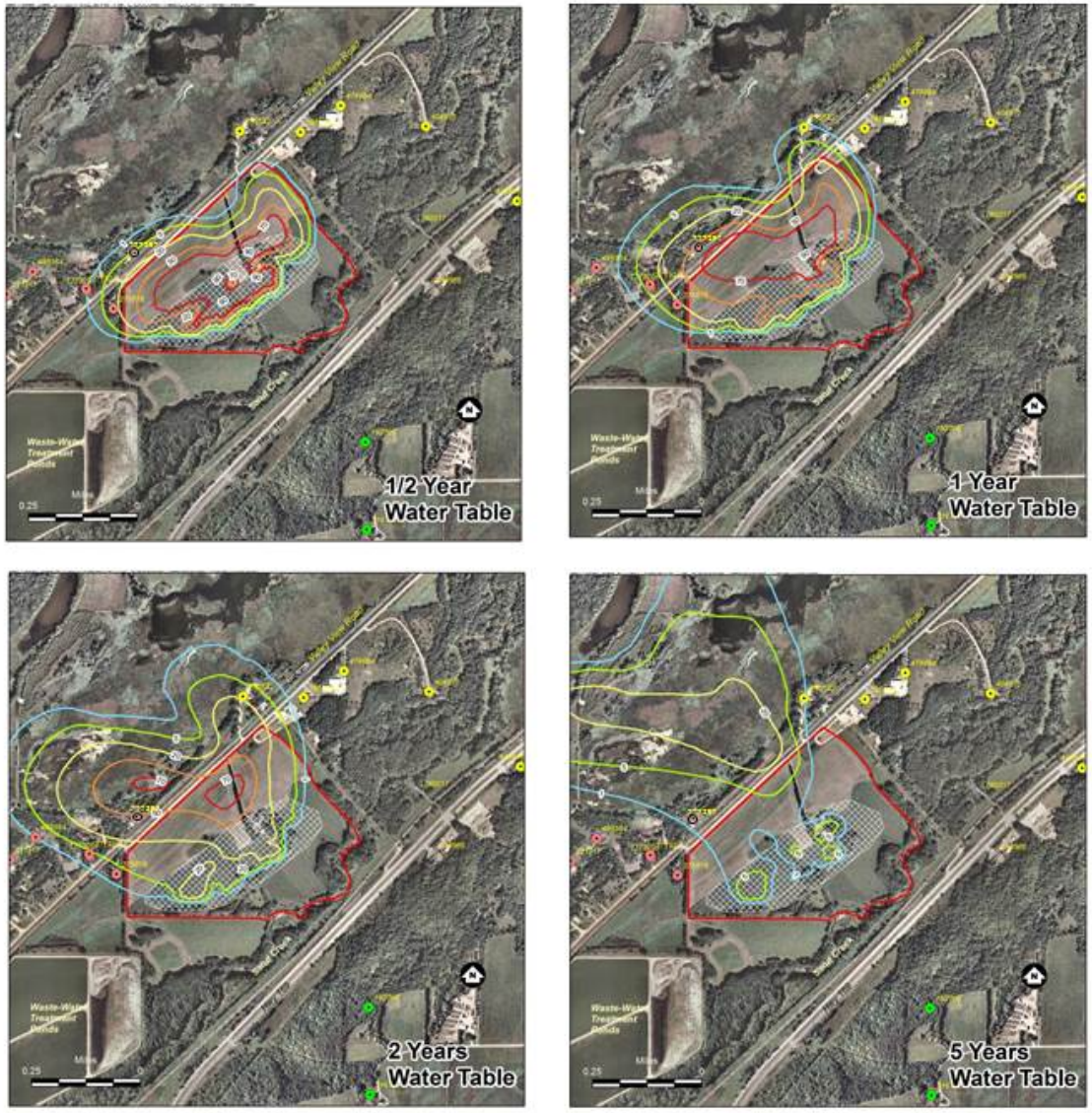
Non-Reactive flood water migration refers to the movement of water and flood-borne contaminants that do not readily attenuate in groundwater. Examples of non-reactive constituents in flood water include nitrate and road salt constituents.

Figure 3-10 shows the results of the modeling of the flood water from the mine pit and into the water-table aquifer. Four "snapshots" in time are shown: one-half year; one year; two years; and five years after a flood event. The contours in Figure 3-10 depict the relative percent of water that is flood water. For example, along contour line "20", 20% of the water is derived from the mine-pit flood waters and the remaining 80% is non-mine-pit groundwater. As the flood waters move to the northwest with the hydraulic gradient, the relative percent of flood water decreases in the aquifer through attenuation processes such as mixing, dispersion, and advection.

The only water-table (i.e. Quaternary) well that appears to be affected by the migrating flood water is the Scott County Association for Leadership and Efficiency Regional Training Facility (SCALE) well, located northeast of the Project Site, across from Valley View Drive. The model predicts that flood water would reach this well in two years at a relative "strength" of 20% of the original flood water. The frequency of such an occurrence will depend upon the frequency of flood waters entering the pit. The scale of each flood may be more or less than the modeled flood event, therefore, it cannot be predicted with any accuracy what the percentage of original flood water might be in contact with the SCALE well at any given time.

The model also simulated the relative percent of flood water in the next deepest aquifer – the Franconia-Ironton-Galesville (FIG) aquifer (also referred to as the Tunnel City-Wonewoc aquifer). For this simulation, the mine pit was assumed to be 120-feet deep. There are several wells near the Project Site that are completed in the FIG aquifer. The results of modeling for the FIG aquifer are shown on Figure 3-11 in plan view and on Figure 3-12 in cross section. The relative percent of the flood water that migrates down into the upper Franconia aquifer (Layer 6 in the model) is approximately 5% of the original flood water (or less). The FIG well at the private residence at 18020 Valley View Drive (Unique Well No. 777297) is predicted to receive flood-impacted groundwater at this relative percentage. The model also predicts that the quaternary and FIG aquifers

in the area of proposed replacement wells for the SCALE and JAF may receive flood-impacted groundwater.



EXPLANATION

Local Wells

AQUIFER

- Quaternary
- Jordan Sandstone
- St. Lawrence Fm.
- FIG Aquifer
- Mt. Simon Aquifer

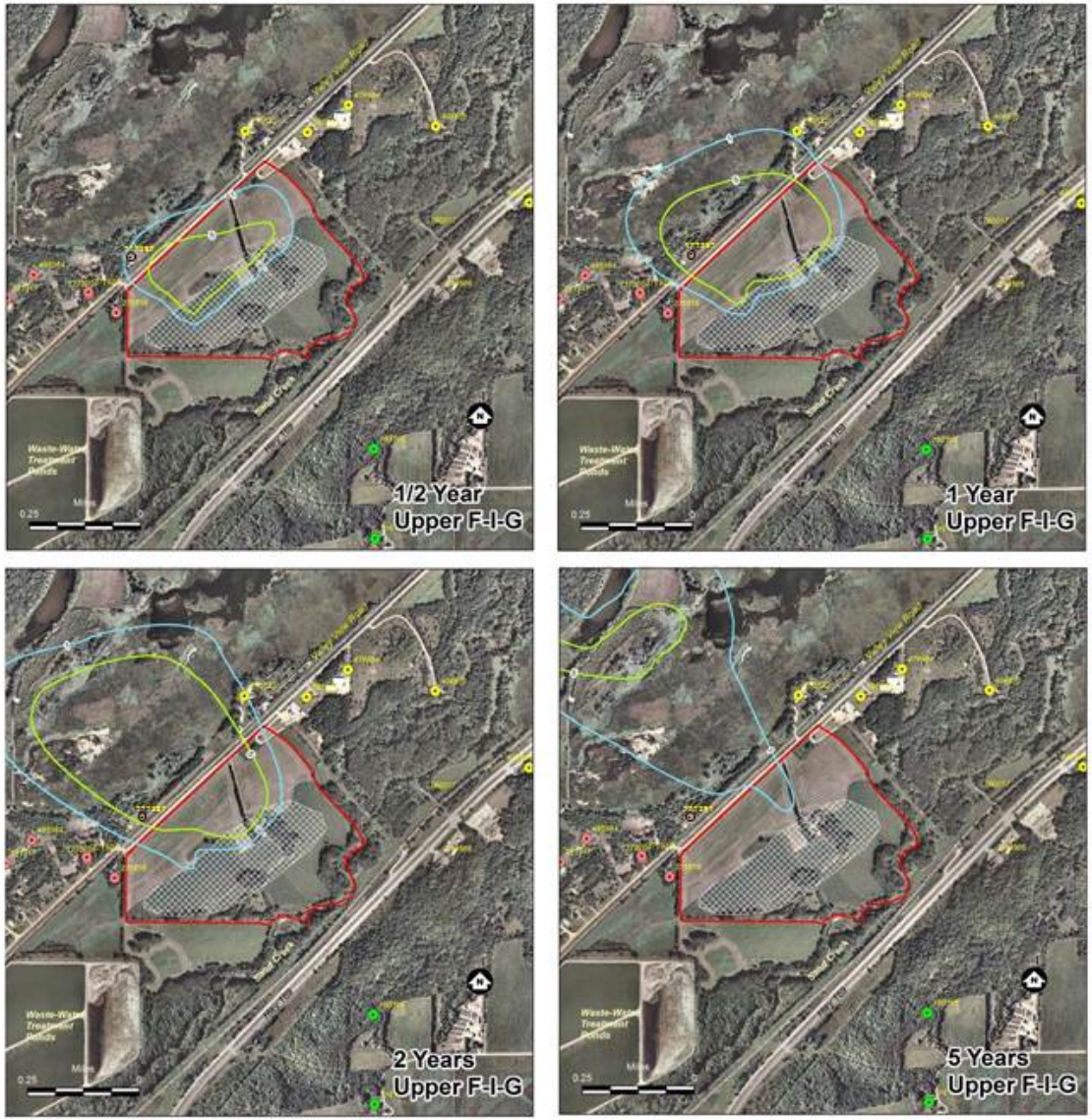
Percent of Flood Water

- 1
- 5
- 20
- 50
- 70

Contours represent the predicted percent of flood water from the mine pit that is present in the groundwater after the specified year(s) since flooding took place

Figure 3-10

PREDICTED PERCENTAGE OF FLOOD WATER IN WATER-TABLE AQUIFER: NON-REACTIVE SOLUTE SIMULATION WITHOUT WASH WELLS
Jordan Aggregates EIS
Scott County, Minnesota



EXPLANATION

Local Wells

AQUIFER

- Quaternary
- Jordan Sandstone
- St. Lawrence Fm.
- FIG Aquifer
- Mt. Simon Aquifer

Percent of Flood Water

- 1
- 5
- 20
- 50
- 70

Contours represent the predicted percent of flood water from the mine pit that is present in the groundwater after the specified year(s) since flooding took place

Figure 3-11

PREDICTED PERCENTAGE OF FLOOD WATER IN UPPER FIG AQUIFER: NON-REACTIVE SOLUTE SIMULATION
Jordan Aggregates EIS
Scott County, Minnesota

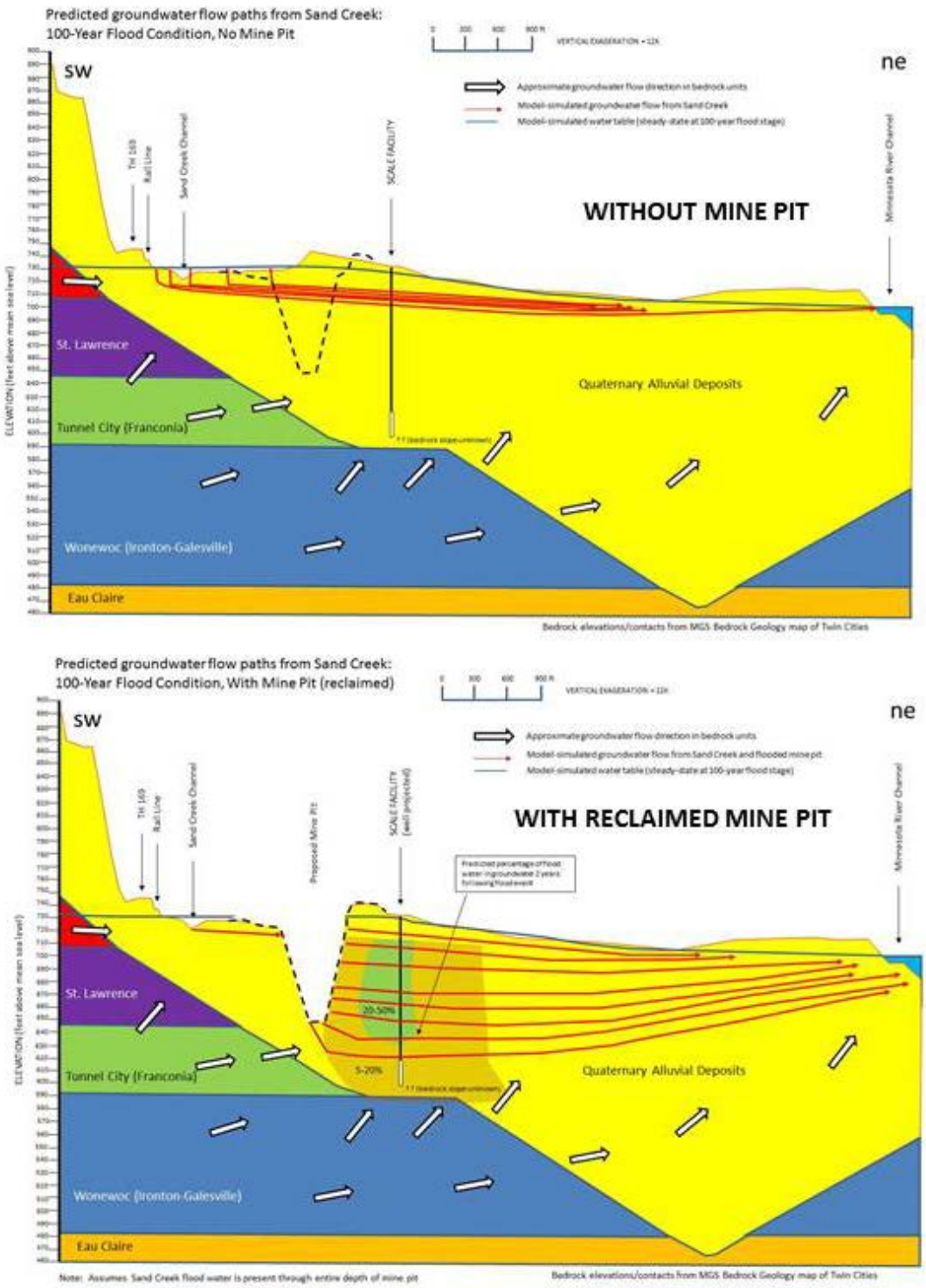


Figure 3-12

CROSS-SECTIONAL VIEW OF SIMULATED GROUNDWATER FLOW PATHS AFTER 100-YEAR FLOOD: WITH AND WITHOUT MINE PIT
Jordan Aggregates EIS
Scott County, Minnesota

Reactive Flood Water Migrations

Many contaminants that might be carried along with flood waters in Sand Creek and enter the aquifer system through the mine pit are attenuated in the aquifer by chemical mechanisms such as adsorption (especially for metals), ion exchange (e.g., some salts), volatilization (many organic compounds, including solvents and petroleum products), and biodegradation (certain organic compounds and biological constituents). It is not practical to model all of the different constituent types. As described above, in the absence of specific microbial organisms in flood water, a conservative, worst-case assumption was used assuming that microbial organism could reach the SCALE and possibly the Juvenile Alternative Facility (JAF) wells. A private well at 18020 Valley View Drive may also be at risk, as it is reported to be constructed at a depth of 205 feet with a casing down to 150 feet.

Biological materials in the flood water would not reach the deeper portions of the FIG aquifer. The upper FIG aquifer did show a 5% impact for solute transport and depending on the pathways through the upper FIG aquifer, it might carry microbial organisms, although groundwater travel times would likely permit natural degradation of microbes from flood water migrating through the aquifer material.

Multiple Flooding Events

Flooding of the mine pit may occur in multiple years or perhaps more than one time per year. The groundwater-flow model indicates that flood waters in the mine pit would dissipate in head over a period of approximately two weeks and water levels in the mine pit would return to pre-flood conditions.

Multiple flooding events have the potential to induce a more extensive downgradient movement of flood waters than predicted by the modeling of a single flood event. To test this possibility, the groundwater model was used to evaluate a situation in which there were three 100-year flood events occurring two weeks apart over a six week period. This was deemed to be a worst-case situation. The results of this simulation at one year following the first flood event were compared to the results of the simulation for a single flood event. These comparisons are shown on Figure 3-13 for the water-table aquifer and for the upper FIG aquifer. The differences in the predicted percentage of flood water in the groundwater after one year are minimal and no additional wells are predicted to be impacted due to the multiple flood event scenario. It should be noted that the frequency of inundation of the pit by flood water will occur whenever Sand Creek stream flow is above the elevation of the spillway, which is two feet lower than the lowest bank elevation between the Project

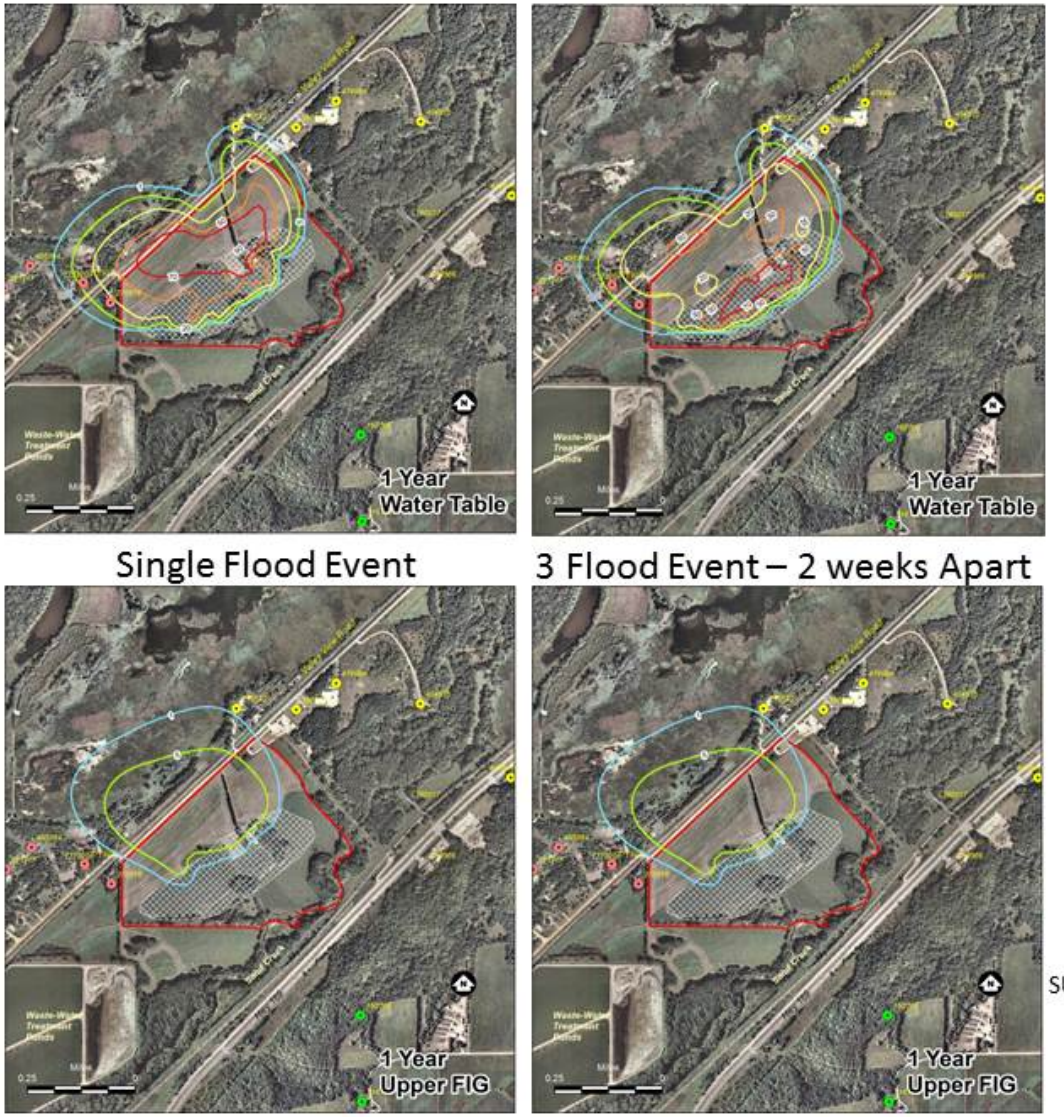
Site and Sand Creek. In early 2013, four events occurred, which would likely have resulted in flooding into the mine pit had it been constructed. The impacts on groundwater from smaller but more frequent flood events have not been modeled.

Flooding at the Scott County Association for Leadership and Efficiency (SCALE) Training Facility

The potential for the Scott County Association for Leadership and Efficiency (SCALE) facility to experience increased flooding conditions during flooding of Sand Creek due to the presence of the mine pit was evaluated. The groundwater-flow model was used to predict the groundwater levels at the SCALE facility for the 100-year flood event of Sand Creek and the Minnesota River (100-year flood elevation of 725.5 feet, msl) with and without the presence of the mine pit.

The majority of the SCALE facility is located at an elevation of approximately 733 to 735 feet msl – slightly higher than the 100-year flood elevation of 732.5 feet msl for Sand Creek. Northeast of the buildings at the SCALE facility, the lowest ground elevation on the SCALE property is at an elevation of approximately 720.4 feet, msl. This area, as well as most of the rear parking lot is below the Minnesota River's 100-year flood elevation of 725.5 feet, msl and would likely be inundated during a 100-year flood event. The elevation of the cover on the municipal sewer lift station serving the SCALE facility is at an elevation of approximately 721.6 feet msl and another access point or vent is at an elevation of approximately 720.9 feet, msl. Both the lift station cover and the vent would likely be under water during a 100-year flood event of the Minnesota River under existing conditions.

Without the proposed Project (i.e. without excavation of the mine pit), the groundwater model predicts that the groundwater elevation at the SCALE facility will range in elevation from 726.50 to 726.55 feet msl during a simultaneous 100-year flood event for Sand Creek and the Minnesota River. This is approximately 9.48 feet higher than non-flood groundwater conditions at the SCALE facility property. With the mine pit present and flooded to an elevation of 732.5 feet msl (as well as flooding along Sand Creek to this elevation), the model predicts that the maximum groundwater elevation will be 727.01 feet msl - an increase of 0.51 feet over flooding conditions without the mine pit. A groundwater elevation of 727.01 feet msl is below the elevations of all of the main building's entrances, with the exception of the northern-most entrance to the northeast building (which is at elevation 725.9 feet msl).



EXPLANATION

Local Wells

AQUIFER

- Quaternary
- Jordan Sandstone
- St. Lawrence Fm.
- FIG Aquifer
- Mt. Simon Aquifer

% Conc. Of Flood Water

- 1
- 5
- 20
- 50
- 70

Proposed Mine Pit

Mine Site

Contours represent simulation results of the percent of flood water in the groundwater for the water table and the FIG aquifer 1 year after the flood event

Figure 3-13

COMPARISON OF MODELING RESULTS FOR A SINGLE FLOOD EVENT AND THREE SUCCESSIVE FLOOD EVENTS, 2-WEEKS APART
Jordan Aggregates EIS
Scott County, Minnesota

In summary, under existing conditions, simultaneous flooding of the Minnesota River and Sand Creek to their respective 100-year flood elevations will result in flood-water inundation of the northern part of the SCALE facility, including most of the rear parking lot, the cover on the municipal sewer lift station serving the SCALE facility, and another access point or vent near the lift station. Under existing conditions, groundwater elevations are expected to rise to approximately 726.50 to726.55 feet msl under the SCALE facility, resulting in a groundwater elevation above one of the north entrances of the north building. The mine pit proposed as part of this Project is predicted to increase the groundwater elevation by approximately 0.51 feet during a comparable flooding event. No additional entrances or structures are predicted to be impacted during flooding as a result of the Project's proposed mine pit.

Under the worst case scenario presented with both the Minnesota River and Sand Creek at 100 year flood elevation the mine would pose an additional six inches of inundation to the north entrances of the north building of the SCALE facility and, of course, to the parking area. Recognizing the uncertainty of the potential frequency of such concurrent events and the fact that the additional increase in flood elevation would be a fraction of the overall impact for such an event this impact is not deemed significant. The mine pit pond might also increase the frequency of parking lot inundation from ground water during minor flood conditions though this was not modeled. No mitigation for the increased risk of flooding of the SCALE facility was proposed, but recognizing the relative risk of such an occurrence this remains a minor low risk unresolved concern.

3.6.3 Mitigation

The solute-transport modeling predicts that there is a possibility that the SCALE well might become contaminated from flood waters. The modeling suggests that the other wells in the area will not be affected by flooding. In particular, those wells completed in the FIG aquifer are likely the least vulnerable because the flood waters have significantly less impact on the upper portion of the FIG aquifer (and almost no predicted impact on the Ironton-Galesville (Wonewoc) portion of the FIG aquifer).

The Project Proposer's suggested mitigation is to install a deep FIG aquifer well to replace the Quaternary well presently serving the SCALE facility. Additional deep FIG aquifer wells would be installed to replace the private shallow FIG well located at 18020 Valley View Drive and other nearby wells if those wells become affected by contaminated flood water entering the mine pit. The

proposed replacement SCALE facility well and private well at 18020 Valley View Drive would be completed in the Ironton-Galesville Sandstone (the Wonewoc or lower portion of the FIG aquifer) to ensure that contamination from flood water is minimized. Because the Juvenile Alternative Facility (JAF) well is just outside of the predicted impacted area, and recognizing that modeling is not 100% accurate, it was proposed by the Project Proposer that either a second FIG well be drilled for the JAF or a distribution pipe be jacked underneath the railroad tracks and Valley View Drive to connect the new FIG well at the SCALE facility with the JAF.

A proposed location for the well is shown on Figure 3-14. For purposes of evaluation, this well was modeled with a continuous pumping rate of 150 gallons per minute (0.2 MGD). This rate is far above that required to furnish domestic water needs at the SCALE facility.

Water quality characteristics of FIG aquifer groundwater can be different from the water quality characteristics of a surficial aquifer well. Some FIG aquifer wells contain natural levels of radium, derived from the aquifer's rocks, which are primarily marine in origin. The nearest FIG aquifer wells for which there is recent water-quality data are the City of Jordan FIG aquifer wells, located approximately one mile southwest of the Project Site. In 2005, analyses of water from these wells indicated that all water-quality constituents were below EPA Maximum Contaminant Levels, including radium (2.25 pCi/L with an MCL of 5.4 pCi/L), alpha emitters (2.83 pCi/L with an MCL of 15.4 pCi/L) and nitrate (0.53 mg/L with an MCL of 10 mg/L). Therefore, the water quality of a FIG aquifer well installed near the SCALE facility will likely be acceptable for use as a community water supply without any additional treatment. However, there may be need for additional water treatment to address water chemistry concerns for boiler operation and aesthetic concerns.

The Minnesota Department of Health requires an analysis of the water from a new community water-supply well prior to its use in order to verify that the water quality meets all drinking water standards. There may also be aesthetic differences in the quality between the current aquifer and the lower FIG including taste, odor, higher iron, calcium and magnesium concentrations that may be objectionable though meeting primary drinking water standards. Because water from the existing SCALE and JAF wells likely have better aesthetic characteristics than untreated water from a FIG aquifer well, provisions should be made for treating water from a new well to address objectional minerals, taste and odor issues. Point-of-use water softening may be the most effective and least costly alternative for treatment to address concerns for boiler operation but will require the installation of a softener of appropriate capacity and regular maintenance. Additional treatment to address aesthetic concerns objectional minerals, taste and odor would involve additional treatment.

Water treatment will result in increased waste water discharge but the SCALE and JAF facilities are connected to municipal sewer via a lift station.

The FIG aquifer's ability to yield water was evaluated through a pumping test conducted by Carlson-McCain Inc. in early 2012 and analyzed by Barr Engineering Co. A memorandum, summarizing the results of the analyses is included as an attachment to Barr (2012). The drawdown data from this test was used in the calibration of the groundwater model. The arithmetic mean value for the hydraulic conductivity of the FIG aquifer was calculated to be 14 ft/day (4.2 m/day). This value was also incorporated into the groundwater flow model.

The hydraulic conductivity of the FIG aquifer (14 ft/day) suggests that this unit should be sufficiently transmissive to supply usable quantities of water for private residential wells, lower demand commercial wells, and small community water-supply wells. It is less likely to be able to yield at sufficient rates to be used as a municipal water supply.

A proposed replacement well, completed in the lower portion of the FIG aquifer (i.e. the Ironton-Galesville Sandstones), was evaluated at a location northwst of the mine site to serve the SCALE facility, shown on Figure 3-8. The well was assumed to be pumped continuously at 150 gpm. This pumping rate is far above that required to furnish domestic water needs at the SCALE facility. This rate should be sufficient to supply the SCALE facility with its water needs as well as other potential water users in the vicinity of the Project Site.

A "worst case" evaluation was performed on this well by evaluating the potential for the well to pump migrating flood water from the mine pit without the benefit of biological inactivation. MT3DMS was used to simulate the migration of flood waters through the aquifer units and to predict the percentage of flood water that would be pumped by this hypothetical well. A plot of the percent of flood water predicted to be pumped by this well is shown on Figure 3-14. The maximum percent of flood water pumped by this well is predicted to be 0.7% and is predicted to take place approximately one-half year after a flood event. Based on these results, a FIG well installed at this location and completed in the Ironton-Galesville (Wonewoc) Sandstone should be able to provide water that is not adversely impacted by flood or mining activities. Periodic monitoring of on-site monitoring wells in the FIG to detect possible impacts from the mine in the FIG and nearby off-site private wells should be a part of a monitoring plan submitted as part of the IUP.

3.6.4 No-Build Alternative

Under the no-build alternative, the mine pit would not be present and would not be a potential source for flood water to enter the water-table aquifer and possibly cause contamination of existing wells completed in the water-table (Quaternary) aquifer necessitating replacement wells into the lower FIG. Flood waters from Sand Creek would continue to periodically inundate the agricultural land that currently occupies the Project Site and this flood water will infiltrate into the water-table aquifer. However, flood water from the ground surface generally will not migrate deep into the water-table aquifer and it is unlikely that flood water infiltrating from the ground surface will reach the well screens of the existing quaternary aquifer wells serving the SCALE and JAF facilities.

3.7 Impacts to Future City of Jordan Water-Supply Wells

3.7.1 Affected Environment

The City of Jordan currently obtains its water supply from four water supply wells (one of which is used for emergency purposes). Two of the wells are completed in the Ironton-Galesville Sandstone (with a combined maximum capacity of 900 gpm) and two are completed in the Mt. Simon-Hinckley aquifer (with MDNR-imposed restrictions of 75 gallons per day per capita). All four wells are within the City limits. The City operates a water-treatment facility that was recently expanded. The daily water demand in 2010 was 0.72 million gallons per day (MGD) with a firm system capacity of 1.40 MGD. The 2030 projections for water demand include an average daily demand of 1.50 MGD and a peak demand of 3.38 MGD (Bolton and Menk, 2007).

The wellhead protection area and drinking water management zone for the existing wells, developed by the Minnesota Department of Health, do not encompass the Project Site. The Minnesota Department of Health has classified these wells as having a low vulnerability to contamination because of their geological setting (Bolton and Menk, 2007).

The existing wells are capable of meeting 2030 demand (Bolton and Menk, 2007). However, additional water-treatment capacity will be needed by 2027 and the current water-treatment facility site does not have sufficient expansion area. A second water-treatment site is proposed for the Scott County Fairgrounds, located approximately 1.75 miles west of the City's current well field. Because it is not feasible to pump raw water from the existing wells to this new treatment facility site, three new wells are proposed for construction in the vicinity of the County Fairgrounds in 2027 (Bolton and Menk, 2007). Although not specified, these wells will have to be completed either in the FIG aquifer or in the Mt. Simon-Hinckley aquifer because these are the only two available groundwater supplies in the vicinity of the County Fairgrounds.

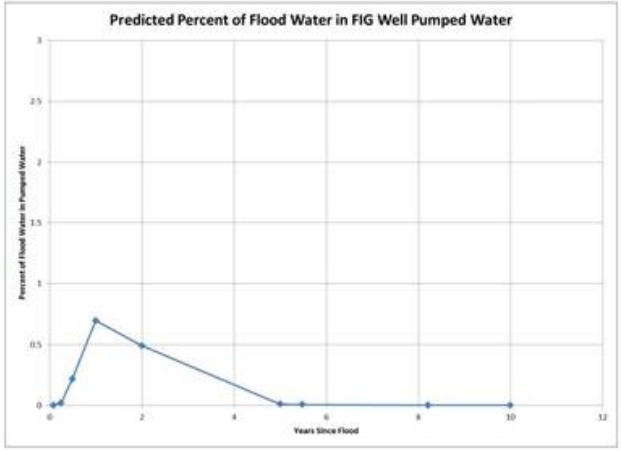


Figure 3-14

LOCATION OF POTENTIAL FUTURE FIG AQUIFER WELL AND PREDICTED MAXIMUM PERCENT OF FLOOD WATER PUMPED BY WELL
Jordan Aggregates EIS
Scott County, Minnesota

The proposed active mining at the Project Site will take place for approximately 25 years (to approximately 2037). Therefore, there will be some overlap between the proposed mining and installation of new wells for the City of Jordan (approximately 10 years).

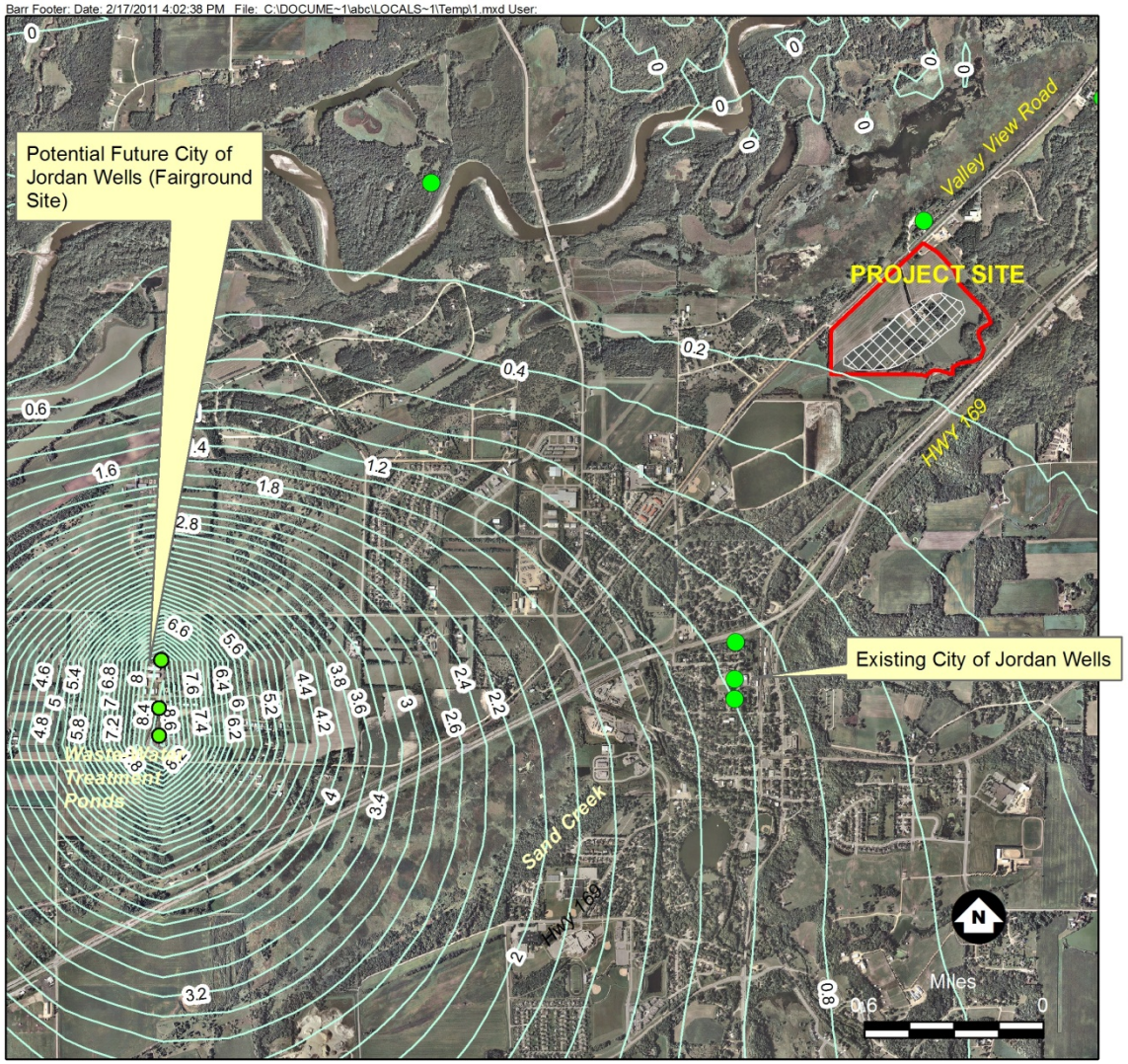
3.7.2 Environmental Consequences

The three proposed wells will be installed either in the FIG aquifer or the Mt. Simon-Hinckley aquifer. The preferred aquifer will be the FIG aquifer because pumping from this aquifer does not have regulatory restriction on capacity, whereas the MDNR limits pumping from the Mt. Simon-Hinckley aquifer within the seven-county metro area. The maximum capacity of the FIG aquifer at the Fairground site will likely be limited because the FIG aquifer in northern Scott County does not typically yield high quantities of water and there is typically significant well-interference effects between wells (as is the case with the two existing City of Jordan FIG wells).

The projected capacity for the new treatment plant at the Fairground Site is 5.6 MGD peak demand, with a peaking factor of 2.25 (resulting in an average daily demand of 2.5 MGD). A 5.6 MGD demand from three wells would amount to 1,300 gpm per well – a rate that might be sustainable with three Mt. Simon-Hinckley wells but a nearly impossible rate to achieve with FIG wells in this area. The more likely well configuration will be to install two FIG wells and one Mt. Simon-Hinckley well. The three wells would supply 575 gpm per well on an average day and the Mt. Simon-Hinckley would be used for peaking purposes. A combined yield from two FIG wells would be 1,150 gpm, which is similar to the yield of the two existing FIG wells currently operated by the City.

A groundwater-modeling simulation was performed using the projected average day pumping rate of 575 gpm, distributed between two FIG wells and one Mt. Simon-Hinckley well at the County Fairground site. The predicted drawdown in the FIG aquifer resulting from the average-day pumping of these three wells is shown on Figure 3-15. The predicted drawdown in the FIG aquifer at the Project Site is 0.18 feet. The predicted drawdown in the water-table aquifer (not shown) at the Project Site is 0.10 feet.

The model was used to predict the effects of the existing City of Jordan wells on the Project Site groundwater conditions. This was accomplished by “turning off” these wells in the model (which are set to pump at average appropriated values). The model predicts that the existing City of Jordan wells are causing a drawdown in the FIG aquifer at the Project Site of 0.16 feet and a drawdown of 0.12 feet in the water-table aquifer.



Contour Interval = 0.2 feet

Figure 3-15

PREDICTED DRAWDOWN (FT) IN THE FIG AQUIFER RESULTING FROM THREE PROPOSED CITY OF JORDAN WELLS AT THE SCOTT COUNTY FAIRGROUNDS
Jordan Aggregates EIS
Scott County, Minnesota

Based on these results, it is highly unlikely that the Proposed Project will adversely affect future City of Jordan wells or that the future City of Jordan wells will have an effect on the Proposed Project. The groundwater model was used to determine if these new City of Jordan wells would affect groundwater flow directions at the Project Site. As shown in Figure 3-16, groundwater flow paths were found to be identical both with and without the future City of Jordan wells pumping. Therefore, it was concluded that the future City of Jordan wells would not affect groundwater flow at the Project Site.

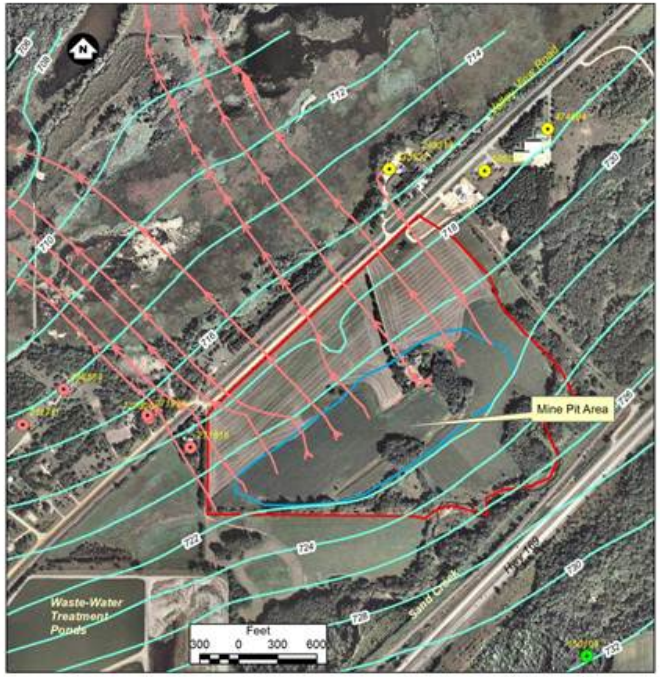
The model predicts that average daily pumping of future City of Jordan wells located at the Scott County Fairgrounds will result in a decrease in base flow of the reach of Sand Creek between the wastewater treatment ponds and 173rd Street of 0.08 cfs. This effect on decreasing base flow along this reach of Sand Creek is only slightly smaller than the predicted effect of the Proposed Project (0.09 cfs reduction). [As a comparison, the model predicts that the existing City of Jordan wells are causing an average reduction base flow in this reach of Sand Creek of 0.16 cfs.] Together, the effects of the Project and the future City of Jordan wells could cause base flows to be reduced from approximately 1.8 cfs to 1.64 cfs during low-flow periods. Sand Creek is not a cold-water fishery and does not contain aquatic species that cannot adapt to short periods of low base flow.

3.7.3 Mitigation

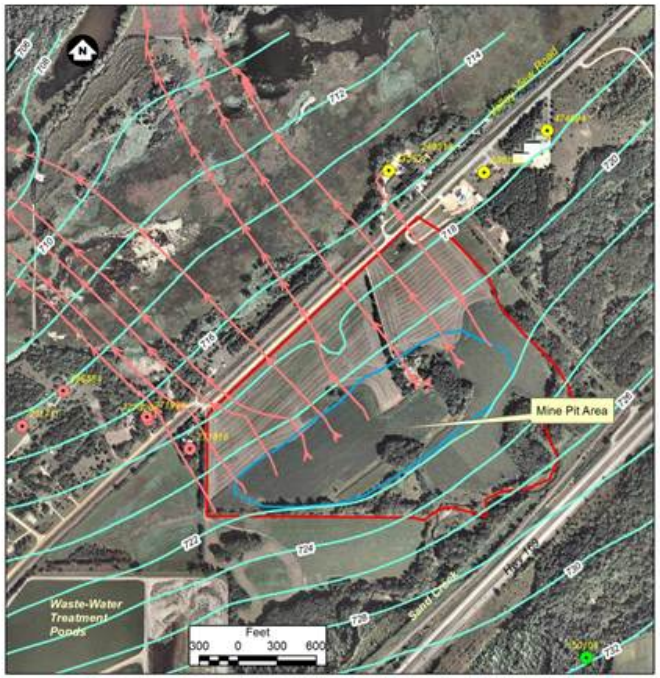
The results of the groundwater-flow modeling indicate that the Proposed Project will not affect the future planned City of Jordan water-supply wells. Because Sand Creek is not a protected cold-water fishery, there is no current regulatory basis to preclude the City of Jordan from installing wells that would affect the base flow of Sand Creek. No additional mitigation has been suggested.

3.7.4 No-Build Alternative

Under a no-build alternative, the future City of Jordan wells will cause minor (less than about 0.2 feet) drawdown in wells located near the Project Site and a reduction in the base flow of the reach of Sand Creek adjacent to the Project Site of about 0.08 cfs. These effects may be offset by reductions or discontinuation of pumping of the City of Jordan's current wells, which are located closer to the Project Site.



Groundwater Head and Flow Paths:
Without Future City of Jordan Wells



Groundwater Head and Flow Paths:
With Future City of Jordan Wells

EXPLANATION

- Predicted Groundwater Flow Path
- Predicted Groundwater Level (ft, MSL)
- Proposed Mine Pit Perimeter
- Mine Site

Contour Interval = 2 ft

Figure 3-16

MODELED WATER TABLE ELEVATION AND GROUNDWATER FLOW PATHS AT PROJECT SITEWITH AND WITHOUT FUTURE CITY OF JORDAN WELLS
Jordan Aggregates EIS
Scott County, Minnesota

3.8 Impacts to Traffic

A Traffic Evaluation was prepared by CH2M Hill (2012) and is summarized in a technical memorandum, which is available for review as supplemental information to this EIS. The purpose of the Traffic Evaluation is to examine the effects that gravel-hauling trucks will impose on the supporting roadway system and key intersections. Included in the Traffic Evaluation is a documentation of the safety, operational and functional system issues for the Proposer's preferred access and six access alternatives for the Proposed Project along TH169.

MnDOT was provided with a draft of the Traffic Evaluation for comment prior to final preparation of the draft EIS. A copy of MnDOT's response (Sherman, 2012) is an attachment to this EIS. Also attached is follow-up correspondence from MnDOT suggesting and providing preliminary designs for another alternative option to accommodate north bound trucks onto TH169.

Traffic Evaluation in EAW and Scoping Decision Document

Traffic was not originally identified in the Scoping Decision Document (SDD) as an affected environment. As detailed earlier, the Project Proposer, as described in the EAW, originally planned to utilize Valley View Drive to access the Project Site. Valley View Drive is a township road under the jurisdiction of Sand Creek Township where it abuts the Project Site. Valley View Drive to the south of the Project site continues into the City of Jordan 1.5 miles where it intersects with County Highway 9. To the north, the site has access to TH169 via 173rd street.

In the EAW, it was proposed that loaded truck traffic would access TH169 at the controlled/ signalized intersection of TH169 and County Highway 9 south of the mine site. Trucks would turn left out of the site and travel southwest along Valley View Drive to the intersection of Valley View Drive and County Highway 9 (Quaker Avenue). Trucks would then turn left and proceed south on Quaker Avenue to the controlled intersection of County Road 9 and U.S. Highway 169. The primary traffic route for trucks returning to the mine site (based on the anticipated 80% – 20% traffic split) would be 173rd Street north of the site. Southbound trucks on TH 169 would turn right onto 173rd Street, proceed west to Valley View Drive, turn left onto Valley View Drive and proceed south to the site entrance. Northbound trucks on TH 169 would either turn left onto County Highway 9 (Quaker Avenue), proceed west to Valley View Drive, turn right onto Valley View Drive and proceed north to the site entrance; or proceed north on TH169 to 173rd St, turn left to Valley View Drive and on to the mine site.

The original truck routing plan was predicated on the understanding that the portion of Valley View Drive to the south of the proposed mine site (which includes approximately one mile of unpaved, aggregate surface in Sand Creek Township with a current load limit of 5 tons) would be paved. These improvements were planned for the summer/fall of 2011. Traffic and noise were not identified as substantive environmental issues requiring further study and were not included as part of the SDD though recommendations to address concerns were proposed for consideration during the IUP process.

Sand Creek Township decided not to fund paving this section of Valley View Drive and may post it for 5 tons. Therefore, the original traffic plan needed to be modified by the Project Proposer to not include traffic southbound from the mine onto the unpaved portion of Valley View Drive.

Summary of Proposer's Revised Traffic Plan

In response to Sand Creek Township's decision to not go forward with improvements to Valley View Drive, the Project Proposer plans to route all outbound traffic (destined north and south) to 173rd Street and right (south) on TH169. Northbound trucks are prevented from turning left onto northbound TH169 because the 173rd Street-TH169 intersection is a ¾ left-in-right-in-right-out intersection only. Therefore, it is proposed that both north and southbound trucks would turn right (south) on TH169 and northbound trucks will need to head south on TH169 and turn around at some point to proceed north on TH169.

3.8.1 Affected Environment

3.8.1.1 Current Conditions

Regional Highway Routes

The primary regional highway route proposed to be used for distributing the product to the intended market is TH169. TH169 is a principal arterial on the Metro Highway System plan and a High Priority Interregional Corridor on the state highway system. County Highway 9/282 is the primary east-west regional corridor in the vicinity of the proposed mine. It is designated as an A Minor roadway on the Metropolitan transportation system. CH 9 to the west provides access across the Minnesota River into Carver County on Carver County Road 45. The road directly serving this site is Valley View Drive. Valley View Drive to the south of the Project Site continues into the City of Jordan 1.5 miles where it intersects with County Highway 9. To the north, the site has access to TH169 via 173rd Street. The locations of these principal roads are shown on Figure 3-17.

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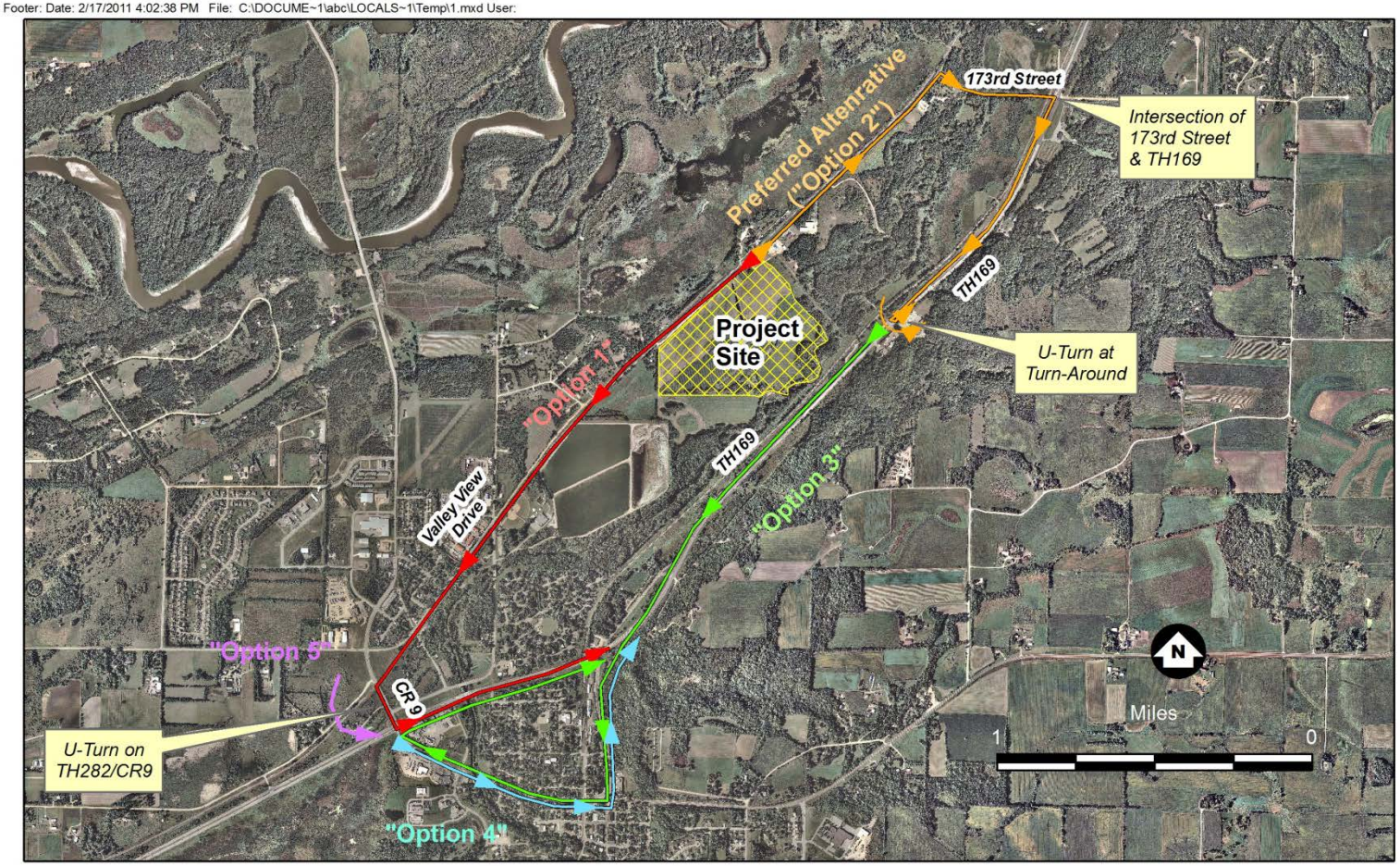


Note: "Option" numbers are the designation routes used in the CH2M Hill Traffic Evaluation Memorandum

Figure

LOCATION OF ALTERNATIVE HAUL ROUTES FOR LOADED TRUCKS WITH NORTH AND WEST DESTINATIONS ACCESSING TH169 NB
Jordan Aggregates EIS
Scott County, Minnesota

Intersection of 173rd Street and TH169

The nearest access location to the Project Site is north of the site at 173rd Street, which is a ¾ access intersection. Hauling trucks headed southbound on TH169 will be able to use this access point to access TH169. However, because of the ¾ access configuration, left turns from 173rd Street to northbound TH 169 are not allowed.

The intersection currently has a 450 foot left turn lane for northbound TH169 and a 410 foot right turn lane for southbound TH169. There is a railroad crossing located 80 feet from the TH169 travel lane on 173rd Street west of TH169. The intersection is shown on Figure 3-18.

Valley View Drive

An approximately one-mile portion of Valley View Drive to the south of the Project Site is not paved and may be posted for a maximum load of 5 tons. Similarly, Valley View Road north of the Project Site to 173rd Street requires additional paving before use. As currently configured, this road cannot be used by trucks hauling from the Project Site. Paving would be required to increase the load capacity to 10 tons from 173rd street to Mendoza Street. Changes to the geometric alignment at the railroad crossing would also likely be required (a signal has been installed but the alignment has not been completed).

South of the Project Site, Valley View Drive intersects CR 9. This intersection currently has no separate turn lanes on any approach. To continue to northbound TH169, hauling trucks would make a left turn onto CR 9 followed by another left turn onto TH169 at the signalized intersection. The CR 9 approach for the intersection with TH169 currently has a 350 foot left turn lane. Valley View Drive is shown on Figure 3-19.

Turnaround on TH169 Southwest of 173rd Street

There is a median opening (turnaround) located 4,720 feet south of the 173rd Street access. Southbound vehicles can complete a U-turn maneuver to continue northbound on TH169. The median opening access has a 315 foot left turn lane in the southbound lanes. The median opening provides access to commercial property on the east side of TH169 and a residential property on the west side of TH169. The turnaround is shown on Figure 3-20.

Figure 3-18

¾ INTERSECTION AT
173 STREET AND 169
Jordan Aggregates EIS
Scott County, Minne

Valley View Drive North of Project Site

Valley View Drive South of Project Site

Figure 3-19

VALLEY VIEW DRIVE
NORTH AND SOUTH OF PROJECT SITE
Jordan Aggregates EIS
Scott County, Minnesota

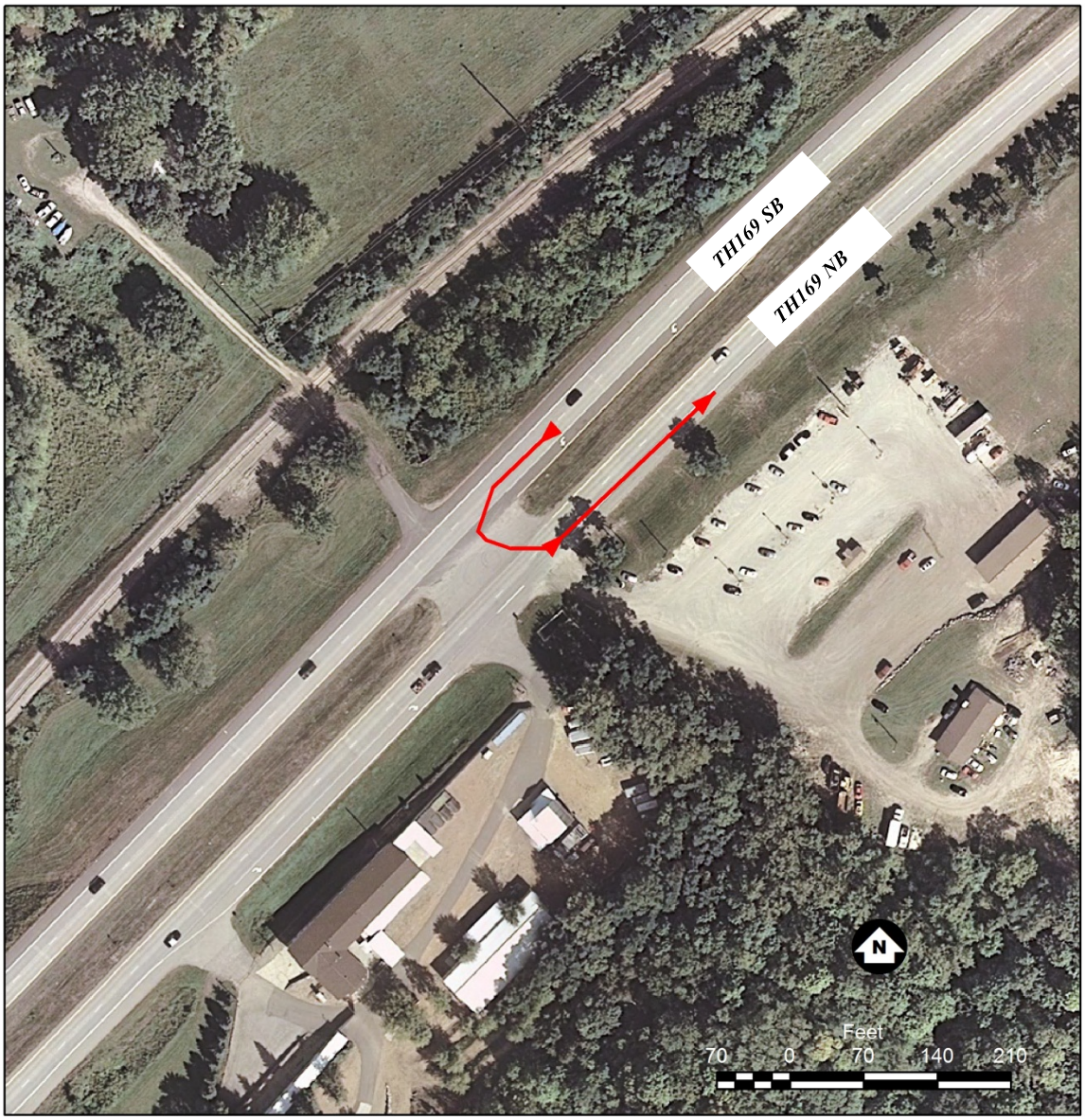


Figure 3-20

TURN-AROUND ON TH 169
SOUTH OF 173rd STREET AND
TH 169 INTERSECTION
Jordan Aggregates EIS
Scott County, Minnesota

Turnaround on TH21

There would be a new median opening (turnaround) located approximately 2,800 feet south along the TH 21 exit ramp from TH 169 (Broadway Street). Southbound vehicles can complete a U-turn maneuver to access northbound TH 169 entrance ramp from TH 21. The median opening access would have a 350 foot left turn lane in the southbound lanes. The turnaround is shown on Figure 3-21.

TH 21 Access into Jordan

Southbound vehicles on TH169 use the TH21 access into Jordan. The access has a 400 foot right turn lane with an exit ramp design, as shown on Figure 3-22. Vehicles follow TH21 for 4,400 feet to the signalized intersection of TH21 and TH282 (shown in Figure 3-23). Vehicles turn right onto westbound TH282. The TH21 and TH282 intersection currently has a 50-foot right turn lane with development constraints including St. John the Baptist Church and School on both sides of TH21. Vehicles continue westbound on TH282 for 3,800 feet to the TH282/CR 9 and TH169 signalized intersection (Figure 3-24). Vehicles are able to make a right turn and proceed northbound on TH169. The TH 282 approach currently has a left turn lane and two through lanes with no separate right turn lane. The TH169 and TH 282/CR 9 intersection has a 370 foot left turn lane for southbound TH169. This turn lane is constrained in length by a structure just north on TH169.

Existing Traffic at Signalized Intersections

The operation of signalized intersections is a function of three items – (1) peak hour traffic volumes, (2) roadway approach geometry, and (3) signal operations (cycle lengths and phasing). Traffic counts for existing conditions were performed by CH2M Hill (2012).

<u>Intersection TH 169 and TH 282/CR 9</u>

Existing peak hour turning counts were collected at the intersection of TH 169 and TH 282/CR 9 in August 2012 and are shown on Table 4. Signal timing and phasing were provided by MnDOT with eight phases and an actuated cycle lengths averaging between 90 and 120 seconds.

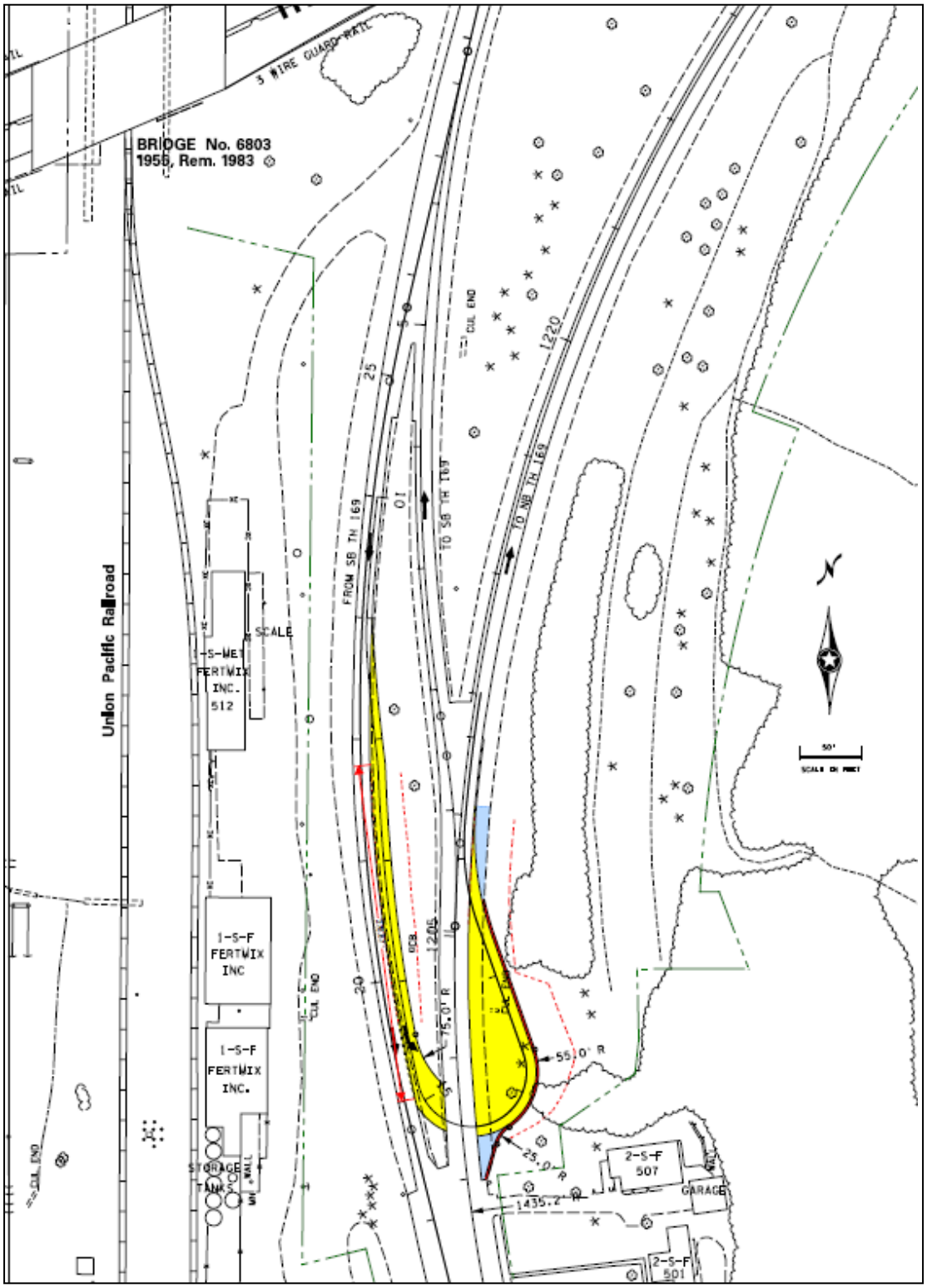


Figure 3-21

TH-21 U-TURN CONCEPT

Jordan Aggregates EIS

Scott County, Minnesota

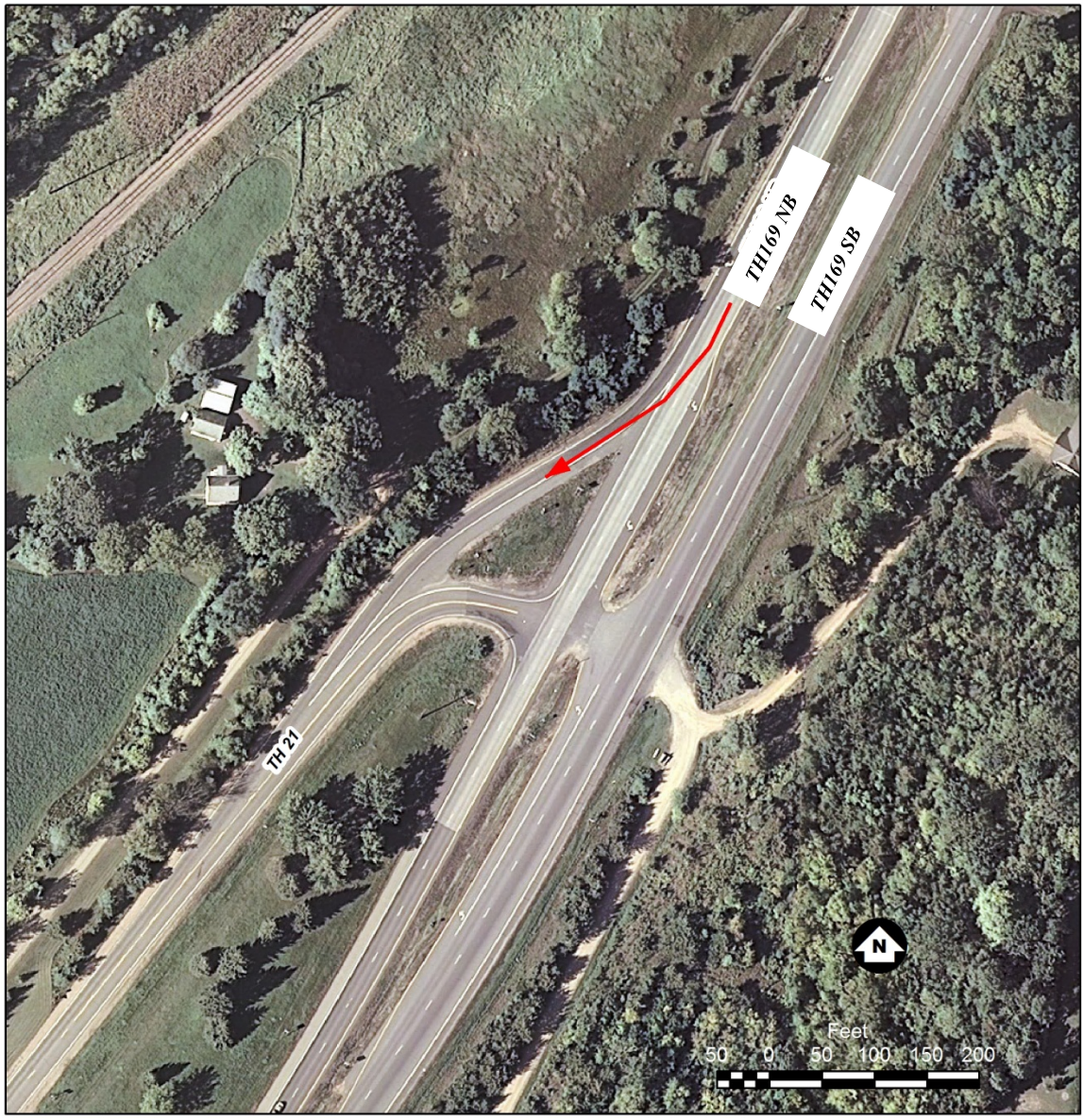


Figure 3-22

EXIT TO TH 21 FROM TH 169 SB
Jordan Aggregates EIS
Scott County, Minnesota

Figure 3-23

INTERSECTION OF TH 21 AND
TH 282
Jordan Aggregates EIS
Scott County, Minnesota

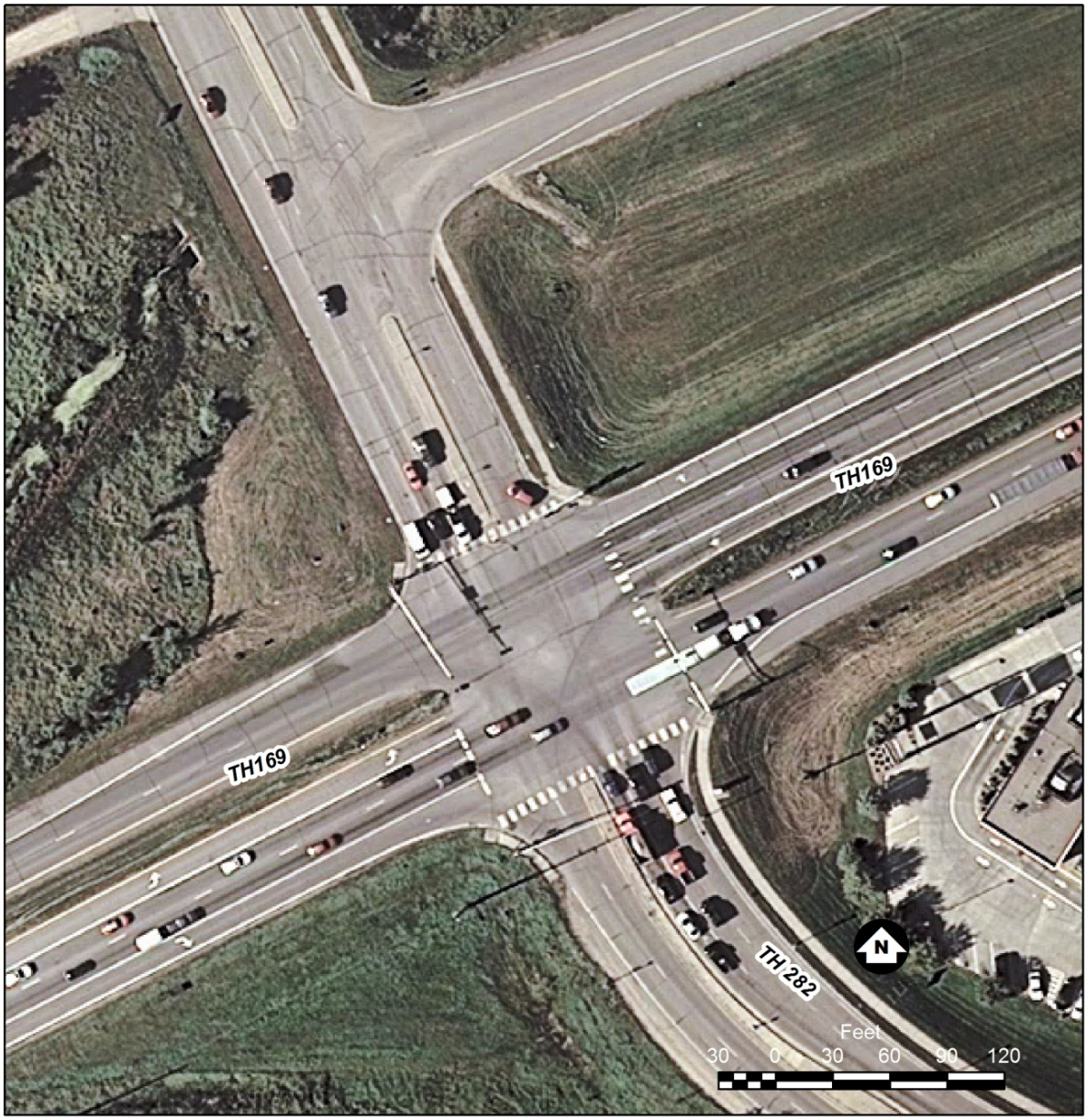


Figure 3-24

INTERSECTION OF TH 282 AND
TH 169
Jordan Aggregates EIS
Scott County, Minnesota

Table 4 Peak Hour Turning Volumes – TH169 and TH282/CR 9 Intersection – Year 2012

	CR 9 Eastbound			TH 282 Westbound			TH 169 Northbound			TH 169 Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes	1	2	shared	1	2	shared	1	2	1	1	2	1
AM Peak Hour (6:30-7:30)	130	183	42	.128	243	34	91	762	128	90	502	14
PM Peak Hour (4:30-5:30)	73	433	76	235	240	45	44	656	162	122	941	43

Roadway operations were estimated by CH2M Hill (2012) using a Level of Service (LOS) measure that is based on the amount of delay experienced by motorists. Congestion is rated from A to F, with LOS A representing little to no delay at the intersection and LOS F representing high levels of congestion with very long delays and slow speeds. The LOS D/E boundary was used as the performance measure for Level of Service. LOS congestion ratings are illustrated on Figure 3-25.

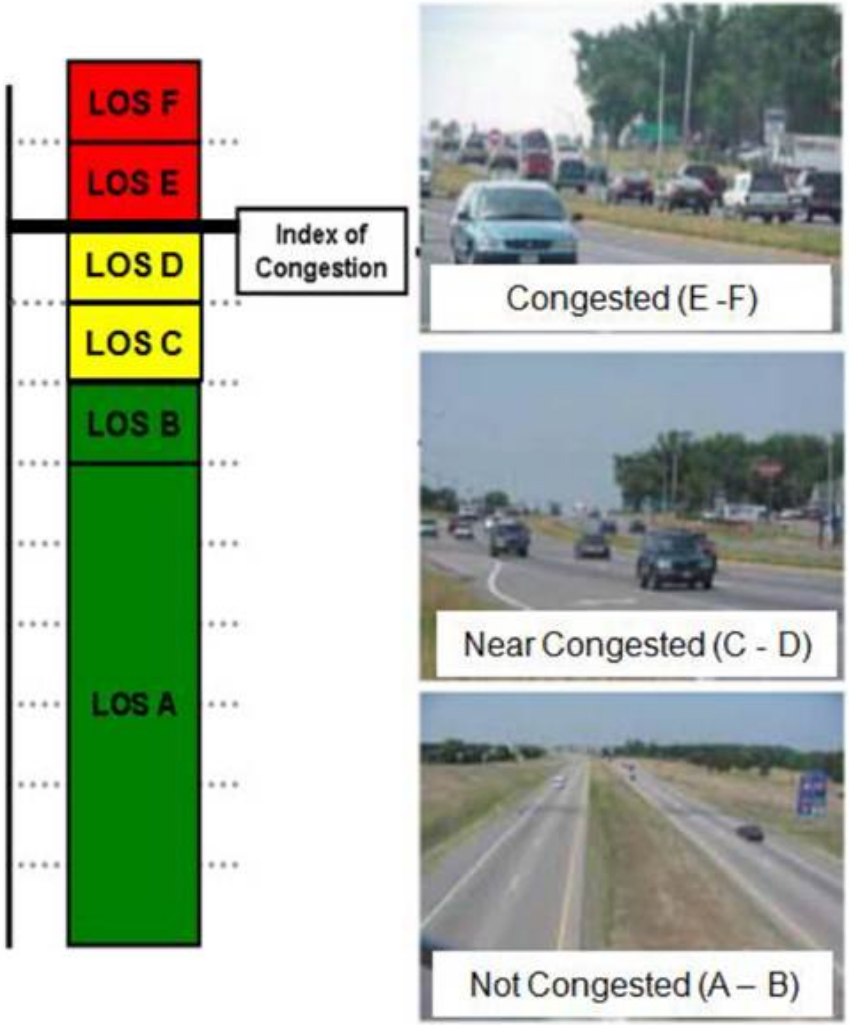
Table 5 LOS and Delay for the TH 169 and TH 282/CR 9 Intersection

	Overall Intersection LOS/Delay	Approach LOS / Delay			
		South (TH 169 NB)	North (TH 169 SB)	East (TH 282 WB)	West (CR 9 EB)
2012 AM Peak Hour	LOS C (30 sec)	LOS C (28 sec)	LOS C (27 sec)	LOS D (37 sec)	LOS D (35 sec)
2012 PM Peak Hour	LOS D (38 sec)	LOS D (37 sec)	LOS D (39 sec)	LOS C (33 sec)	LOS D (44 sec)

The TH169 and TH282/CR9 intersection operates at LOS C during the AM peak hour and LOS D during the PM peak hour with all approaches having similar level of service varying between LOS C and LOS D.

Intersection TH 21 and TH 282

Peak hour turning counts from 2007 were used for the intersection of TH 21 and TH 282 within the downtown Jordan (CH2M Hill, 2012); daily volumes on all approaches are equal or less than conditions in 2007, so new counts were not necessary. The traffic turning volumes are shown in Table 6.



LOS: "Level of Service"

(from Figure 10 in CH2M Hill, 2012)

Figure 3-25

LEVEL-OF-SERVICE AND
TRAFFIC CONGESTION RATINGS
Jordan Aggregates EIS
Scott County, Minnesota

Table 6 Peak Hour Turning Volumes – TH 21 and TH 282 Intersection – Year 2012

	TH 21 Southbound			TH 21 Northbound			TH 282 Eastbound			TH 282 Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes	1	1	1	1	2	1	1	2	1	1	2	Shared
AM Peak Hour (7:15 – 8:15 AM)	12	97	32	94	435	55	78	184	55	47	193	53
PM Peak Hour (4:30 – 5:30 PM)	34	429	53	96	130	39	15	164	84	69	235	14

The TH21 and TH282 intersection operates at a Level of Service of LOS B for both the AM and PM peak hour.

Three-Quarter (3/4) Access at 173rd Street and TH 169

No traffic volumes are available for the ¾ intersection/access at 173rd and TH169, but based on a field review of the site, the roadway experienced less than 100 vehicles during the peak hour providing access to a Public Safety Training Facility and a retirement community (CH2M Hill, 2012). Based on the CH2M Hill (2012) analysis, including adjusting to have the correct mix of passenger and truck traffic (20%), the eastbound right turning vehicles experience a delay of between 12 seconds in the AM (LOS C) and 19 seconds (LOS C) in the PM waiting for a gap in traffic in order to turn onto TH169.

3.8.1.2 Analysis of Existing Safety

Crash Records

Five years of crash records (from 2007 to 2011) were used to complete the safety analysis, which included development of crash rates, severity rates, critical crash rates, distribution of crash type, road surface conditions, light conditions, day of week/time of day, and driver age for each intersection. Details of the safety analyses are presented in (CH2M Hill, 2012).

Crash rates for roadway segments are measured as crashes per million vehicle miles, while intersection crash rates are measured as crashes per million vehicles entering an intersection. The critical crash rate is a statistical quality control technique that is used to identify those locations most

at-risk, segments or intersections, with crash rates statistically significantly higher than the statewide average for similar facilities. The expected crash rate, based on the state average, for a 4-lane divided rural roadway is 0.7 crashes per million vehicles miles and 2.7 crashes per million vehicles miles for urban sections.

The segments of TH169 between 173rd Street and TH282/CR 9 experienced higher than critical crash rate in the last five years and TH282 between TH169 and TH21 in Jordan also experience higher than the critical crash rate suggesting safety concerns for these two segments.

173rd and TH169 Intersection Risk Analysis

None of the key intersections had higher than the critical crash rates; however, new analysis methods used in the Minnesota Department of Transportation County Road Safety Plans suggest that this does not mean there is no risk at these intersections. In addition to reviewing crash history at the 173rd Street intersection, a new systemic method to safety analysis was completed. This approach has been added to the safety planning process in Minnesota to better address the over-representation of severe crashes in rural areas at expressway intersections, the very low density of these crashes in rural areas, and to complement the "black spot" component of the safety program to address the challenge associated with identifying candidates for safety investment in rural areas with low densities of severe crashes applies to both the state and local highway systems where severe crashes are almost equally divided.

The objective of the systemic method is to identify candidates for the deployment of safety improvement projects. This systemic method is based on the assumption that the absence of crashes does not equate to no risk. The adoption of this premise about risk presented one very significant challenge – MnDOT previously had no method to assess risk using any measure other than crashes. In order to support the development of a new approach that defines risk based on crashes plus a variety of surrogate measures, research was conducted that identified rural segments and intersections with crashes and then documented the geometric and traffic features that were common among the various locations. This research identified a series of risk rating factors that could then be applied to the analysis of the key elements of rural systems in order to help distinguish those elements that are most at-risk.

The risk factors associated with rural intersections include:

- Geometry of Intersection - Previous research has shown that skewed intersections have a higher risk of crashes.
- Geometry of Roadway - Previous research has shown that intersections located on or near a horizontal curve are subject to a higher level of risk.
- Commercial Development in Quadrants - Previous research has shown that intersections with commercial development located in one or more of the intersection quadrants have a higher level of risk. Private residences or farms were not included in this category.
- Distance to Previous STOP Sign - Previous research has shown that drivers lose attention when traveling for longer distances without a STOP sign. Therefore, intersections with minor leg approaches without a STOP sign within 5 miles have a higher level of risk.
- Average Daly Traffic (ADT) Ratio - There is a range of ADT ratio (minor/major) on the County system that is more susceptible to severe crashes than others. Intersections with an ADT ratio between 0.6 and 1 have a higher level of risk.
- Railroad Crossing on Minor Approach - Intersections on or near a railroad line are subject to an increased level of risk. Drivers must navigate the railroad tracks while approaching the intersection.
- Crash History – Intersection has experience crashes in the last five years.

Based on these risk factors, the intersection of 173rd Street and TH169 has four of the seven risk factors, indicating the intersection to be a high risk location because it has the characteristic (roadway and traffic) of similar intersections with severe crashes. These risk factors include:

- Geometry of Intersection: Skewed Intersection.
- Commercial Development in Quadrants: Commercial Vehicles accessing the Jordan Aggregate site.
- Railroad Crossing on Minor Approach: There is a railroad crossing located on the eastbound approach
- Crash History: There were a total of 15 crashes in the last five year period.

However, the change of the intersection to a ¾ access in 2012 is one step toward addressing the risk factors. A ¾ access eliminates the movement that has the highest percent of severe crashes, the minor road crossing the major roadway. With the ¾ access, this movement is eliminated, along with

the ability for minor road vehicles to make a left onto TH 169. This access configuration has a lower expected crash rate than the previous full access.

Railroad Crossings

There are two freight routes through the study area, as shown in Figure 18 of the Traffic Study. Both rail lines are owned by Union Pacific with the western track having an average of 5 trains per day at 40 mph. The western track would be crossed by trucks using route Option 1 on Valley View Drive. The eastern track averages 2 trains per day with a track speed of 10 mph. The eastern track would be crossed by hauling trucks in all other alternatives using the northern portion of Valley View Drive to 173rd Street. It has been noted that with the potential increase of mining facilities along this corridor and their potential use of these railroad corridors for their movement of goods, increases in train traffic is expected.

A review of train/vehicle crashes found one fatal crash at the crossing of the western rail corridor on Syndicate Street near the intersection of Valley View Drive and Syndicate St/Mendoza Ave intersection in 2006. This crash did involve a tractor trailer heading south on Syndicate that was struck by a train.

3.8.2 Environmental Consequences

This section describes the potential environmental consequences of the Proposer's preferred option for traffic, as well as potential options (i.e. alternative) hauling routes. These alternative routes were chosen for analysis of environmental consequences, based on discussions with the Proposer, Scott County, MnDOT, Sand Creek Township, and the City of Jordan. The alternatives represent logical options for hauling, based on the available routes in the area. Figure 3-17 is a map showing the approximate routes of the various alternatives. The No-Action alternative is described at the end of this Traffic section. The evaluation of environmental consequences in this section is limited to the effects on traffic and traffic safety. Noise effects associated with traffic are addressed in a subsequent section.

3.8.2.1 Traffic Consequences of Alternative "Option 1"

Description of Option 1

Traffic alternative "Option 1" (as designated in the CH2M Hill (2012) traffic analysis) is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):

a. Leave the Project Site onto southbound Valley View Drive,
b. Proceed southwest on Valley View Drive for 1.71 miles to the unsignaled intersection with CR 9,
c. Turn right or left on CR 9 and proceed southwest to destination and or regional arterial routes.

2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto southbound Valley View Drive,
    b. Proceed southwest on Valley View Drive for 1.71 miles to the unsignaled intersection with CR 9,
    c. Turn left on CR 9 and proceed southwest to destination and or regional arterial routes,
    d. Merge left onto a 350-foot long left-turn lane at the signaled intersection with TH169,
    e. Proceed northbound on TH169 to destination or regional arterial routes.
3. Empty Trucks from northbound destinations:
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.
4. Empty Trucks from southbound destinations:
    a. Turn either left or right from CR 9 onto northbound Valley View Drive,
    b. Proceed northeast on Valley View Drive for 1.71 miles to Project Site,
    c. Turn right onto mine site.

This alternative is identical to the route originally proposed in the EAW. In order for this alternative to be implemented, the 1.71-mile stretch of Valley View Road between CR 9 and the Project Site will need to be paved and possibly correct the railroad crossing alignmnet, in order to accommodate hauling trucks. This is in addition to the additional paving needed for all options for that portion of Valley View Road to 173rd St. north of the Project Site.

Benefits of Alternative

This option has the least impact on TH169 traffic operations with trucks accessing the expressway using local street connections and a signalized intersection. Trucks arriving from northbound destinations would access the Project Site at the intersection of 173rd Street and TH169 but they would also have the option of proceeding to CR 9 and entering via Valley View Drive. Hauling trucks would not be entering TH169 from the 173rd Street intersection.

Consequences of Alternative

The adjacent land use of the local street connection along Valley View Drive is residential and commercial. There is also limited intersection sight distance at CR 9 and Valley View Drive. The stretch of Valley View Drive between the Project Site and the intersection with CR 9 would require paving. The Option 1 route alternative does not affect the Level of Service (LOS) at any intersections.

3.8.2.2 Traffic Consequences of Alternative "Option 2"

Description of Proposer's Preferred Alternative

The Proposer's preferred alternative for traffic is designated as "Option 2" in the CH2M Hill (2012) traffic analysis. The Proposer's preferred alternative for traffic is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169 and proceed southwest to destination and or regional arterial routes.
2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,

d. Turn right (southwest) onto TH169,
e. Merge into the left southbound lane of TH169,
f. Merge left into a left-turn lane 315 feet long (plus taper) beginning 4,405 feet southwest of the 173rd Street Intersection,
g. Execute a U-turn in a median opening access (turn-around) 4,720 feet southwest of the 173rd Street Intersection. The median opening provides access to commercial property on the east side of TH 69 and a residential property on the west side of TH169,
h. Proceed northbound on TH169 to destination or regional arterial routes.

3. Empty Trucks from northbound destinations:
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.
4. Empty Trucks from southbound destinations:
    a. Turn left onto 173rd Street from northbound TH169 via a 410-foot (plus taper) left-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.

Benefits of Alternative

The Proposer's preferred route alternative keeps all truck traffic (northbound and southbound) in the TH169 corridor. Truck traffic on secondary roads with residences is kept to a minimum (i.e. the portion of Valley View Drive and 173rd Street required to access TH169). Northbound trucks (approximately 80% of hauling trucks) do not have to enter the City of Jordan to turn around.

Consequences of Alternative

The median opening location also provides access to an existing commercial site and the uncontrolled U-turn relies on gaps in the traffic to complete the maneuver. Also, the primary point of access (173rd Street) to TH169 is an intersection that is currently considered to be at risk for safety based on the presence of roadway characteristics. Improvements would need to be made to northbound Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection. The left-turn lane on TH169 at the U-turn location will likely need to be lengthened to 690 feet (plus 180 foot taper) to accommodate deceleration and storage. A wider shoulder at the U-turn location is recommended to accommodate U-turning trucks. A 1,670-foot long acceleration lane would likely be needed on TH169 north of the U-turn location.

MnDOT (Sherman, 2012) has commented that this option may not be compatible with future MnDOT access and safety projects, which will eliminate median openings and reduce direct access. The Proposer has noted that MnDOT would likely be required to provide an alternative access to the commercial properties on the south side of northbound TH169 if the median is closed at this loction. MnDOT's letter on the traffic analysis is an attachment to this EIS.

This alternative does not affect the Level of Service (LOS) at any intersections compared to the LOS for the No-Build Alternative.

3.8.2.3 Traffic Consequences of Alternative "Option 3"

Description of Option 3

Traffic alternative "Option 3" (as designated in the CH2M Hill (2012) traffic analysis) is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169 and proceed southwest to destination and or regional arterial routes.

2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169,
    e. Take TH 21 access into Jordan. The access has a 400 foot right-turn lane with an exit ramp design,
    f. Follow TH 21 for 4,400 feet to the signalized intersection of TH 21 and TH 282,
    g. Merge right into a 50-foot long right-turn lane at the intersection with TH 282 and turn right onto westbound TH 282. St. John the Baptist Church and School is on both sides of TH 21 at the intersection,
    h. Continue westbound on TH 282 for 3,800 feet to the TH 282/CR 9 and TH 169 signalized intersection. TH 282 approach currently has a left-turn lane and two through lanes with no separate right-turn lane,
    i. Turn right onto TH169 and proceed northbound on TH169 to destination or regional arterial routes.
3. Empty Trucks northbound destinations:
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.
4. Empty Trucks from southbound destinations:
    a. Turn left onto 173rd Street from northbound TH169 via a 410-foot (plus taper) left-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.

Benefits of Alternative

This utilizes the existing regional highway road system for the hauling truck route.

Consequences of Alternative

The Option 3 route alternative does not affect the Level of Service (LOS) at any intersections compared to the LOS for the No-Build Alternative.

Longer turn lanes at the TH 21 and TH 282 intersection would be desirable. However, an adjacent land use constraint (i.e. the existing church) limits the ability to lengthen these lanes. Improvements would need to be made to northbound Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection. Right-of-way for expanded turn lanes at TH 21 and TH 282 would need to be obtained. Also, the primary point of access to TH169 is an intersection (with 173rd Street) that is considered to be at risk for safety based on the presence of roadway characteristics.

3.8.2.4 Traffic Consequences of Alternative "Option 4"

Description of Option 4

Traffic alternative "Option 4" (as designated in the CH2M Hill (2012) traffic analysis) is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169 and proceed southwest to destination and or regional arterial routes.
2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169,
    e. Turn left onto eastbound TH 282 at the TH 282/CR 9 intersection,

f. Continue on TH 282 to the TH 21 intersection,
g. Turn left to go northbound on TH 21 to the TH 169 entrance ramp,
h. Proceed northbound on TH169 to destination or regional arterial routes.

3. Empty Trucks from northbound destinations:
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.
4. Empty Trucks from southbound destinations:
    a. Turn left onto 173rd Street from northbound TH169 via a 410-foot (plus taper) left-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.

Benefits of Alternative

This alternative utilizes the existing roadway system for the hauling truck route.

Consequences of Alternative

The Option 4 route alternative does not affect the Level of Service (LOS) at any intersections compared to the LOS for the No-Build Alternative.

The route includes going through downtown Jordan. Also, the primary point of access to TH169 (at 173rd Street) is an intersection that is considered to be at risk for safety based on the presence of roadway characteristics. Longer turn lanes at TH 21 and TH 282 intersection would be desirable, but due to the existing constraints the financial cost of acquiring the right of way and impacting downtown Jordan would be extensive and therefore not financially feasible. Improvements would need to be made to northbound Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street. Also, the primary point of access to TH169 is an intersection (with 173rd Street) that is considered to be at risk for safety based on the presence of roadway characteristics.

3.8.2.5 Traffic Consequences of Alternative "Option 5"

Description of Option 5

Traffic alternative "Option 5" (as designated in the CH2M Hill (2012) traffic analysis) is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169 and proceed southwest to destination and or regional arterial routes.
2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169,
    e. Turn left onto eastbound TH 282 at the TH 282/CR 9 intersection,
    f. From the left-hand turn lane, trucks would make a U-turn onto northbound TH169,
    g. Proceed northbound on TH169 to destination or regional arterial routes.
3. Empty Trucks from northbound destinations:
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.
4. Empty Trucks from southbound destinations:
    a. Turn left onto 173rd Street from northbound TH169 via a 410-foot (plus taper) left-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,

c. Turn left (southwest) on Valley View Road and proceed to Project Site,
d. Turn left into mine site.

Benefits of Alternative

This alternative keeps the hauling route all within the TH 169 corridor and provides a protected phase at the signal for the U-turn maneuver to be completed without the need for additional acceleration lanes.

Consequences of Alternative

The Option 5 route alternative does not affect the Level of Service (LOS) at any intersections compared to the LOS for the No-Build Alternative.

The current location of the signal mast arm at the TH169 at TH 282/CR 9 does not provide enough room for the U-turn maneuver. The signal mast would need to be moved 15 feet along with the edge of roadway. Improvements would need to be made to northbound Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street. Also, the primary point of access to TH169 is an intersection (with 173rd Street) that is considered to be at risk for safety based on the presence of roadway characteristics.

3.8.2.6 Traffic Consequences of Alternative "Option 6"

Description of MnDOT's Preferred Alternative

Traffic alternative "Option 6" (as designated in the CH2M Hill (2012) traffic analysis) was identified as an additional option by the Minnesota Department of Transportation (MnDOT) following their review of the Draft EIS. MnDOT has identified this as the option they prefer. Option 6 is as follows:

1. Hauling Trucks with Southbound and Westbound Destinations (approximately 20% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169 and proceed southwest to destination and or regional arterial routes.

2. Hauling Trucks with Northbound and Eastbound Destinations (approximately 80% of all hauling trucks):
    a. Leave the Project Site onto northbound Valley View Drive,
    b. Turn right (southeast) onto 173rd Street,
    c. Cross the railroad tracks on 173rd Street, proceed 80 feet, and approach intersection of 173rd Street and TH169,
    d. Turn right (southwest) onto TH169,
    e. Take the TH 21 exit ramp,
    f. Proceed southbound on TH 21 (Broadway Street) ½ mile to a new U-turn location,
    g. Make the U-turn and proceed north on the TH 21 northbound ramp to access TH 169 northbound.
3. Empty Trucks
    a. Turn right onto 173rd Street from southbound TH169 via a 410-foot (plus taper) right-turn lane,
    b. Proceed west on 173rd Street, crossing railroad tracks 80 feet from TH169 intersection,
    c. Turn left (southwest) on Valley View Road and proceed to Project Site,
    d. Turn left into mine site.

Benefits of Alternative

This alternative keeps most of the hauling route within the TH 169 corridor and provides a U-turn location on a lower volume and lower speed roadway (TH 21).

Consequences of Alternative

Improvements would need to be made to northbound Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street. Also, the primary point of access to TH169 is an intersection (with 173rd Street) that is considered to be at risk for safety based on the presence of roadway characteristics. A U-turn median opening location would need to be constructed on TH 21 along with a 300-foot left turn lane plus taper for southbound TH 21 left turn lane at the median opening.

3.8.3 Mitigation

Mitigation would likely be required for each of the six options (the Preferred Alternative and the other five alternative haul routes that were evaluated). The Traffic Analysis (CH2M Hill, 2012) did

not find that any of the issues affect the Level of Service at any intersections. However, each alternative requires some mitigation in order to safely accommodate hauling trucks. Table 7 is a summary of mitigation and estimated cost for each alternative (CH2M Hill, 2012).

Table 7 Summary of Mitigation and Estimated Cost for Each Alternative

Alternative	Identified Mitigation	Estimated Mitigation Cost
Option 1	• Pave Valley View Drive from Project Site to CR 9 • Widen railroad crossing on Valley View Drive	$ 1.5-million*
Option 2 (Proposer's Preferred Alternative)	• Bring northbound Valley View Drive to 10-ton standard • Acceleration Lane on TH169 SB at 173rd Street • Lengthen left turn lane on TH169 SB at turn-around • Widen shoulder at turn-around	$ 300,000*
Option 3	• Bring northbound Valley View Drive to 10-ton standard • Acceleration Lane on TH169 SB at 173rd Street • Longer turn lanes at the TH 21 and TH 282 intersection • ROW access	Over $ 2-million*
Option 4	• Bring northbound Valley View Drive to 10-ton standard • Acceleration Lane on TH169 SB at 173rd Street • Longer turn lanes at the TH 21 and TH 282 intersection • ROW access	Over $ 2-million*
Option 5	• Bring northbound Valley View Drive to 10-ton standard • Acceleration Lane on TH169 SB at 173rd Street • Move signal mast arm at the TH169 at TH 282/CR 9	Over $ 2-million*
Option 6 (MnDOT Preferred	• Bring northbound Valley View Drive to 10-ton standard	$ 400,000*

Alternative)	• Acceleration Lane on TH169 SB at 173rd Street • Construct left turn lane and median for u-turn on TH 21	
* The cost includes $100,000 for the upgrade of the northern portion of Valley View Drive to 10-ton standard.		

3.8.3.1 Mitigation for Alternative "Option 1"

The stretch of Valley View Drive between the Project Site and the intersection with CR 9 is currently a gravel road and would require paving in order to increase the maximum load to accommodate hauling trucks. The sight distance at the intersection of CR 9 and Valley View Drive may need to be improved with the acquisition of an easement to remove obstructions. The railroad crossing on Valley View Drive has difficult geometry with tight curves and may require changes to the crossing and signaling. The estimated cost for paving mitigation and widening the signaled crossing of the railroad on Valley View Drive is approximately $1.5-million.

3.8.3.2 Mitigation for the Proposer's Preferred Alternative ("Option 2")

Improvements would need to be made to northern Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection. The left-turn lane on TH169 at U-turn location will likely need to be lengthened to 690 feet (plus 180 foot taper) to accommodate deceleration and storage. A wider shoulder at the U-turn location is recommended to accommodate U-turning trucks. An acceleration lane would likely be needed on TH169 north of the U-turn location. Total cost of all mitigation is estimated to be approximately $300,000.

3.8.3.3 Mitigation for Alternative "Option 3"

Improvements would need to be made to northern Valley View Drive to bring it up to a 10-ton standard. Longer turn lanes at the TH 21 and TH 282 intersection is a mitigation action. However, adjacent land use constraint (i.e. the existing church) limits the ability to lengthen these lanes. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection at an estimated cost of $83,500. The total estimated cost for mitigation (including addressing right-of-way issues at the TH 21-TH 282 intersection is estimated to be over $2-million.

3.8.3.4 Mitigation for Alternative "Option 4"

Longer turn lanes at TH 21 and TH 282 intersection would be a mitigation measure, but would require the acquisition of the right-of-way. Improvements would need to be made to northern Valley View Drive to bring it up to a 10-ton standard. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection at an estimated cost of $83,500. Total estimated cost for this option (including longer turn lanes and right-of-way issues at the TH 21-TH 282 intersection is estimated to be over $2-million.

3.8.3.5 Mitigation for Alternative "Option 5"

The current location of the signal mast arm at the TH169 at TH 282/CR 9 does not provide enough room for the U-turn maneuver. Mitigation would require that the signal mast be moved 15 feet along with the edge of roadway. Longer left turn lanes for southbound TH 169 would require the expansion of the TH 169 bridge just north of the TH 282/CR 9 intersection. Improvements would need to be made to northern Valley View Drive to bring it up to a 10-ton standard. Mitigation would also include the construction of an acceleration lane on southbound TH169 at the primary point of access with 173rd Street.

The estimated cost for improvements includes: $100,000 to move mast arm signal plus and additional $20,000 for roadway work at the intersection; $83,500 for acceleration lane at 173rd Street and $1.5 million for reconstruction of 0.5 miles of roadway and widening of structure for a total of over $2-million.

3.8.3.6 Mitigation for MnDOT's Preferred Alternative "Option 6"

Improvements would need to be made to northern Valley View Drive to bring it up to a 10-ton standard. A left turn lane on TH 21 along with the U-turn median would need to be constructed in order to accommodate hauling trucks making the U-turn to go northbound on TH 169.

The estimated cost for improvements includes: $100,000 for upgrade of northern Valley View Drive to 10-ton, $83,500 for acceleration lane at 173rd Street and $200,000 for the construction of the median opening and left turn lane on TH 21.

MnDOT (Sherman, 2012) reviewed the Traffic Evaluation report (CH2MHill, 2012) and provided preliminary comments; MnDOT noted that:

- Option 1 (access to CR9 via southbound Valley View Drive) should not be eliminated from consideration because of residences along Valley View Drive. The note that Valley View

Drive "has a mix of commercial/industrial, and also abuts a rail corridor" and that "future land use map along Valley View shows areas of Commercial-Highway and Industrial use."

- The U-Turn option through the median (Option 2 – the Proposer's Preferred Alternative) is not compatible with MnDOT's access management and safety project. MnDOT may eliminate median openings when deemed unsafe.
- MnDOT also suggested two additional haul routes. These route options were not formally evaluated in this EIS.

3.8.4 No-Build Alternative

Under a no-build alternative, traffic patterns and use would remain unaffected by the addition of approximately 110 round trips of trucks hauling to and from the mine site per day. The segments of TH169 between 173rd Street and TH282/CR 9 would likely continue to experience higher than critical crash rates as recorded in the last five years and TH282 between TH169 and TH21 in Jordan would also experience higher than the critical crash rates. The intersection of 173rd Street and TH169 would continue to be classified as a high risk location. Valley View Drive would remain unpaved between the Project Site and CR 9. There would not be increased numbers of gravel-hauling trucks on Valley View Drive. Mitigation improvements that would be made (assuming they were required and funded by the Project Proposer as a condition for the IUP) as part of a selected alternative would not be implemented and ancillary benefit to the public, if any, would not be realized.

3.9 Impacts to Noise

An evaluation of the noise impacts associated with hauling trucks was prepared by Al Perez of AGC Developments, Inc. (2012) and is summarized in a technical memorandum, which is available for review as supplemental information to this EIS. The purpose of the noise analysis was to study the potential noise generation from the truck traffic that could be expected from the subject mining operations. The noise analysis is included in the EIS because of changes to the original truck hauling routes that were made after publication of the EAW and Scoping Decision Document. Other noise issues related to the Project were evaluated during review of the EAW and it was determined that these issues did not warrant further evaluation in the EIS. Therefore, the evaluation of impacts to noise is limited to truck noise.

3.9.1 Affected Environment

Three sites that could be affected from the traffic from the Project Site were chosen by AGC Developments, Inc. after examining the proposed route options. These included:

1. The church and school in Jordan at the intersection of TH 282 and TH 21 in Jordan. This is a location where hauling trucks with northbound and eastbound destinations would be stopping and turning as part of making their way to northbound TH169 under traffic Options 3 and 4 (see Impacts to Traffic section for an explanation of this route). This site was selected for evaluation because stopping and accelerating trucks have the potential for elevating noise levels for school-age children.
2. A nursing/senior home located in the southwest quadrant at the intersection of Valley View Drive and 173rd Street. Four of the five options evaluated as part of Impacts to Traffic (including the Proposer's Preferred Alternative) would pass by this location with loaded trucks bound for both north/east and south/west destinations.
3. Along Valley View Drive, which has residences and where loaded trucks would pass under the Option 1 alternative.

The Project Proposer anticipates truck volumes will result in an average of five round trips per hour with a maximum of 11 round trips per hour during peak export. In other words, there is projected to be between 10 to 22 truck passes per hour.

3.9.2 Environmental Consequences

3.9.2.1 Noise Level Rules

Minnesota's noise pollution rules are based on statistical calculations that quantify noise levels according to duration over a one-hour monitoring period. The L10 calculation is the noise level that is exceeded for 10 percent, or six minutes, of the hour and the L50 calculation is the noise level exceeded for 50 percent, or 30 minutes, of the hour. There is not a limit on maximum noise.

Sounds can be perceived as pleasant or annoying, and as loudness, in terms of decibels (dBA). Changes in loudness are described on a logarithmic scale because the human ear can hear such a wide variety of sound levels. The human ear can usually tell the difference when sound changes by 3 dBA, and a 5 dBA change is clearly noticeable. Because of the logarithmic scale, an increase of 10 dBA sounds twice as loud.

A jackhammer at a distance of one meter has a typical decibel level of 100 dBA. A business office has a typical decibel level of 70 dBA and conversational speech is typically measured at 60 dBA. A library setting has the equivalent sound level of 50 dBA.

The statutory limits for a residential location are L10 = 65 dBA and L50 = 60 dBA during the daytime (7:00 a.m. – 10:00 p.m.) and L10 = 55 dBA and L50 = 50 dBA during the nighttime (10:00

p.m. – 7:00 a.m.) (Minn. State Noise Pollution Control Rules 7030.0040). This means that during a one-hour period of monitoring, daytime noise levels cannot exceed 65 dBA for more than 10 percent of the time and cannot exceed 60 dBA more than 50 percent of the time. No local governing unit is allowed to set standards describing the maximum levels of sound pressure which are more stringent than those set by the Minnesota Pollution Control Agency.

3.9.2.2 Noise Level Measurements

Noise measurements of trucks similar to those that will be used to haul to and from the Project Site were taken by AGC Development Inc. (2012) on August 27, 2012. The trucks participating in the study were chosen by Scott County Staff (3 trucks) and the Project Proposer provided one truck.

Noise measuring procedures require that the noise source being measured should be at least 10 dBA above the background noise level. In areas with high ambient noise levels (such as busy roads), it may not be possible to measure the effects of truck noise. Measurement locations must also be kept at least as far away from any large reflecting object as from the source being measured. If this is not possible, the measurement location must be at least 30 feet from structures. And all measurements should be made with the microphone at least three feet above the ground, in relatively calm weather.

Three locations were monitored: (1) at the intersection of TH 282 and TH 21 in Jordan; (2) at a nursing/senior home located in the southwest quadrant at the intersection of Valley View Drive and 173rd Street; and (3) along Valley View Drive. Measurements at these locations were collected in the following manner:

1. Intersection of TH282 and TH21. This site was chosen to observe stop and go operations; however, on the day of the study the site had excessive ambient background noise for the test and due to the route chosen, the separation time between the trucks allowed for the trucks to turn around and run behind each other, therefore unacceptably driving by in pairs a number of times.
2. Nursing home and residential area along Valley View Drive. Quality data was collected but some truck pass-bys were affected by the local traffic. The trucks were tested driving in both directions near these sites. For the nursing home site, two pass-bys were driving south, therefore on the lane further away from the property. For the residential site the opposite was true, with the truck pass-bys being closer to the property.
3. At the nursing home. The trucks were tested under a more demanding acceleration condition when leaving the corner and therefore, the noise was more influenced by the truck drivers'

operating procedures than for the residential site, where a steady pass-by at about 30 mph was documented.

Data were acquired by three methods: (1) two observers clocked the time above 50, 55, 60, and 65 dBA using 4 stop watches while observing two separate sound level meters' displays; (2) one meter was also storing the statistical distribution of the sound separately for each site; and (3) a third meter was exclusively logging the average sound level in 5 seconds increments (AGC Developments, Inc., 2012).

Analyses of the data for locations (2) and (3) above and combining these results, yielded the following conclusions regarding noise levels of the trucks:

1. The daytime L10 standard would likely be exceeded if there are 34 or more hourly truck pass-bys and would almost assuredly be exceeded at 41 or more pass-bys. This is substantially more by-passes than the maximum of 22 projected by the Proposer.
2. The nighttime L10 standard would likely be exceeded if there are 15 or more hourly truck pass-bys, and would almost assuredly be exceeded at 26 or more pass-bys.

Due to the high noise levels encountered at the intersection of TH 282 and TH 21 for the above tests, County staff requested an additional test documenting the levels at that intersection for the one hour survey required by Minnesota's noise standards. During this one-hour measurement period, there were 53 truck pass-bys (which is twice as many pass-bys as the Proposer anticipates). The residential daytime standard of the 65 dBA L l0 limit was exceeded by 3 dBA (the measured value at this intersection was 68 dBA).

Based on the above data collection and analyses, it was determined that the hauling trucks to and from the Project Site would not exceed Minnesota’s L10 daytime standard for residential areas but would add to any existing exceedance at the intersection of TH 282 and TH 21.

3.9.3 Mitigation

A recommended mitigation for noise is to limit hours of hauling to daytime hours of between 7:00 a.m. and 10:00 p.m. to avoid the potential for exceeding Minnesota residential noise standards for nighttime hours. The Proposer has stated that operation hours will be limited to between 7:30 a.m. to 9:30 p.m., eliminating the possibility of nighttime violation of the noise standards. This would have to be further studied if the Proposer requested issuance of temporary permits allowing the mine to operate 24 hours per day. Since a noise assessment has not been prepared as part of the EAW or this

EIS for potential additional equipment to accommodate a hot mix plant or portable concrete plant relative to the closest receptor sites at the mine (the JAF and adjacent residences) this would have to be examined as to whether night time mine operations would be able to comply with state noise standards anyway. It is noted that the truck related noise at the Valley View Assisted Living Facility has been demonstrated by the noise study conducted by the County's noise consultant to likely exceed the state's night time noise standards should trucking be conducted after 10:00 PM and before 7:00 AM. Whether or not concrete or asphalt processing should be allowed in the future should also consider the need for night time trucking and subsequent impacts to potentially affected receptors.

Another potential mitigation identified by AGC Developments Inc. (2012) is for the Project Proposer to institute a simple noise check of the trucks transporting the aggregate by testing their noise generation using the stationary run-up procedure for diesel powered trucks with governors. The test takes a few minutes and requires an inexpensive sound level meter. For a truck that exceeds the State's motor vehicle noise limit, measures should be required to correct their problem prior to returning to the Project Site and be re-tested to insure compliance. Whether or not this suggestion could be effectively implemented and monitoried, however, is questionable. Trucks accessing the mine would not be limited to those owned by the mine operator.

3.9.4 No-Build Alternative

Under a no-build alternative, trucks would not be hauling to and from the Project Site and would not pass by the nursing home, residences on Valley View Drive, or the TH 282-TH 21 intersection. There would be no additional noise impacts from additional hauling trucks under the no-build alternative.

3.10 Cumulative Potential Effects

3.10.1 Background

This section describes the potential for cumulative potential effects, both direct and indirect, from the Jordan Aggregates Project in combination with other past, present, and reasonably foreseeable future actions. A cumulative potential effects analysis takes into account other known or reasonably foreseeable actions and their potential impacts that are unrelated to the proposed action, except to the extent that their impacts may, in combination with the impacts from the proposed action, result in adverse impacts.

This cumulative potential effects analysis is structured around the following 11-step process developed by the Council on Environmental Quality (CEQ).

3.10.2 Scoping for Cumulative Potential Effects

Step 1 – Identify the significant effects associated with the proposed action and define the assessment goals

The purpose of this step in the assessment is to identify the cumulative potential effects on environmental resources that may result from operation of the Jordan Aggregates Project and other past and reasonably foreseeable future projects in the Cumulative Potential Effects Study Area (CPESA) as defined in Step 2 below. This assessment is based on information compiled for the Jordan Aggregates EIS, as well as information available for other projects currently proposed or under review that may have environmental impacts of similar nature and scale.

The proposed Jordan Aggregates Project may affect several resources either directly or indirectly. However, the role of the cumulative potential effects assessment is to narrow the focus of the cumulative potential effect analysis to the most important issues identified in the Scoping Decision Document and to the traffic and noise issues resulting from a new Preferred truck hauling route. As a result, this analysis focuses on the primary issues identified during the scoping process that have the greatest potential for adverse impact. These include: groundwater levels/groundwater availability to wells; groundwater quality impacts to aquifers and nearby wells; impacts to Sand Creek and nearby wetlands; impacts to the City of Jordan's future wells; impacts to traffic, and impacts to noise from hauling trucks.

<u>Groundwater Levels/Groundwater Availability</u>

Scott County has constructed a groundwater-flow model that incorporates effects on groundwater at the Jordan Aggregates Project Site and in the surrounding area. The model, as described in Barr (2012), incorporates the major physical aspects of the groundwater-flow system including significant sinks and sources pertinent to groundwater flow within the model domain. The model was found to calibrate well to existing conditions, incorporates site-specific pumping test analyses, and effectively includes virtually all of the significant effects that are anticipated within the current flow system as per step 1 above. The model was run to simulate current conditions including explicit representation of pumping wells and surface water bodies.

As discussed in a previous section, groundwater use for the mine site was evaluated. This analysis showed that the combined removal of aggregate, evaporation from the pond surface, changes to hydraulic gradient resulting from the establishment of a pond, and pumping from the proposed wash-water well in the context of other effects in the model amounts to no significant impact on

groundwater levels. However, because of the modeled impacts to groundwater quality resulting from the creation of a deep excavation into a currently used quaternary aquifer, the effective availability of groundwater to several local well users may be adversely impacted. The Project Proposer has offered to drill deeper wells into the lower FIG to mitigate this impact since the proposed mine pit will effectively render the local quaternary aquifer unreliable for potable water (without close monitoring and appropriate treatment) due to the increased risk of contamination. Therefore the cumulative potential effects of the mining along with the other effects represented by the flow model are significant for groundwater availability to potentially affected existing wells.

Groundwater Quality

The groundwater model that was developed for the EIS evaluations also includes solute-transport capabilities. The model was specifically designed to evaluate the effects of flooding of the mine pit by Sand Creek on nearby well users. Migration of flood water into the surrounding aquifers was simulated for non-reactive compounds (e.g., nitrate, salts) and water-borne pathogens. There are no other known projects in the area that have the potential to impact the groundwater quality of the well users in the vicinity of the Proposed Project. The Project Proposer has not proposed an acceptable monitoring and mitigation plan for the affected quaternary aquifer. In recognition of the long-term cost implications for such monitoring and mitigation the Project Proposer has opted to offer new wells to replace one private well and two non-community public water supply wells in a deeper aquifer not as likely to be impacted as a result of the proposed mine. The RGU acknowledges that several state laws address the issue of groundwater degradation as noted in the response to comments received for the DEIS. The RGU also noted that this mining proposal, which involves deliberate inundation of the excavated mine pit with surface water runoff from hundreds of square miles from two counties is in direct conflict with the County's adopted Ground Water Protection plan specifically with Objective 4.7.3. It was acknowledged that the applicability of these laws, the County's adopted Ground Water Protection Plan and lack of specific mitigation proposed by the Project Proposer to address the potential for groundwater degradation was an unresolved issue and was one of the major factors the County cited ,in addition to comments received to the FEIS, for determining that the FEIS was inadequate. The County subsequently prepared a revised groundwater monitoring and mitigation plan, distributed it for review and comment to the state agencies who had commented on this issue and held a meeting on May 22, 2014. The County had also prepared a cost estimate for addressing the proposed monitoring and mitigation plan, which was also distributed for review and comment. These plans are attached as Exhibit C. The County revised the attached monitoring plan consistent with comments received from the DNR, MPCA and MDH. However, the

Project Proposer has not accepted the responsibility for funding a mitigation plan that involves mitigation of groundwater impacts resulting from flood related contamination introduced via the deep mine pit into the modeled affected aquifers. Rather they (see attached Exhibit B a letter dated June 9, 2014) have maintained a position of substituting modeled affected wells in these aquifers for deeper wells within the Wonewoc (Ironton Galeseville) aquifer. Comments from the MDH, DNR and MPCA related to the issue of groundwater degradation and the need for a mitigation plan for this modeled impact will be solicited via this revised FEIS for consideration during the IUP process.

The MPCA required an Individual National Pollution Discharge Elimination System (NPDES), which has been applied for by the Project Proposer (see attached application Exhibit D) and the application has been deemed complete. However, the MPCA has not yet commenced to review this application in detail and has indicated they will wait for the completion of the EIS for this project. The MPCA has also indicated that they generally wait for monitoring results indicating the occurrence of groundwater degradation associated with a permit before determining what if any mitigation might be required. The RGU finds this position problematic in consideration of the modeled probability of groundwater impacts from floodwater introduced into the aquifer(s) via the proposed mine pit revealed through this EIS and acknowledged by the state agencies. The RGU through an Interim Use Permit establishes conditions associated with permited land uses and requires financial security to ensure that required monitoring, mitigation and site reclamation can be achieved in the event of default by the responsible parties. The RGU, has therefore, prepared a monitoring and mitigation plan incorporating reasonable assumptions and based on generally accepted modeling methods for consideration by permiting authorities in accordances with Minnesota Rules 4410.0300.

Impacts to Sand Creek and Nearby Wetlands

The groundwater model was used to evaluate the impact of mining operations on wetlands in the vicinity of the Proposed Project and the results indicate that there will be no significant impacts to wetlands unless Sand Creek develops a permanent channel meander into the proposed mine excavation. Under such an occurrence, if the channel is not restored, the groundwater-flow model predicts that the mine pit could cause (on a steady-state basis) an estimated 1.1 cubic feet of flow per second (cfs) to flow from Sand Creek into the aquifer. This would result in a reduction in Sand Creek's baseflow along this reach from 1.8 cfs to 0.7 cfs, substantially reducing the basef low that Sand Creek provides to the lower wetland complex within the National Wildlife Refuge that depend upon Sand Creek for maintenance of those wetlands.

The model was also used to predict whether there would be changes to stream flows in Sand Creek from mining and post-mining. The model determined that there would be a reduction in the base flow of Sand Creek of 0.08 cfs due to mining operations and that the overall effect on flows in Sand Creek would be relatively insignificant. The model was also used to evaluate the cumulative effects of future City of Jordan wells on Sand Creek and found that this pumping would have nearly identical base-flow reductions to the reach of Sand Creek adjacent to the Project Site as the Project itself. The cumulative modeled impact of the combined proposed mine and future city well influence is predicted to result in a reduction of 0.17 cfs stream flow during low flow periods such as prolonged summer droughts or mid-winter periods with no runoff occurring.

The risk of a permanent meander of Sand Creek into the mine pit has been addressed by the Project Proposer by the creation of a reinforced spillway and outlet culvert. Long term maintenance of these "facilities" was not addressed in proposed mitigation so remains an unresolved issue. Also a variable is the need to obtain a permit from the MDNR that would be required to restore the channel to its pre-mine location should such a meander event take place. For purposes of this EIS the RGU believes that such a restoration of existing channel characteristics can reasonably be anticipated to be approved by the MDNR. The cost for such restoration could be addressed through a reasonable financial security required of the Project Proposer as a condition for the IUP. Alternatively, a more reliable permanent preemptive approach could be engineered between the existing channel and the mine pit if approved by the MDNR.

Impacts to the City of Jordan's Wells

The City of Jordan has identified an area for development of a new well field (Scott County Fairgrounds, west of Jordan) and identified pumping rates for water demand in 2030. The groundwater model was used to evaluate the effects of pumping these wells on the Project Site, as well as to evaluate what, if any, effect the Project Site might have on the ability of the City to develop this well field. The modeling results indicated that the City's new well field would cause drawdown in groundwater levels of less than 0.2 feet at the Project Site and that the effect of the City of Jordan wells on the Project Site would be insignificant. Furthermore, the modeling showed that the effects of the mining activities at the Project Site would not affect the City's well siting or alter its wellhead protection areas.

Impacts to Traffic

The revised preferred alternative for trucks hauling to and from the Project Site is for both southbound and northbound hauling trucks to access TH169 via a right-turn onto southbound TH169 from 173rd Street. Trucks with a south and west destination (20% of total trucks hauling from the Project Site) would continue to regional arterial routes. Trucks with a north and east destination (80% of total trucks hauling from the Project Site) would merge into the left-hand southbound lane of TH169 and enter a left-turn lane to a turn-around in the median opening approximately 4,730 feet southwest of the TH169-173rds Street. Trucks would then execute a U-turn (right-turn) onto northbound TH169, using both lanes of northbound traffic to complete the maneuver. The traffic analysis indicated that the intersection of TH169 and 173rd Street (a ¾ intersection) has four of seven risk factors, indicating the intersection to be a high risk location because it has the characteristic (roadway and traffic) of similar intersections with severe crashes. The traffic analysis indicated that the proposed U-turn maneuver could be accomplished with some mitigation to the turn-around.

In order to maintain traffic safety conditions at current levels, improvements would need to be made to the 173rd Street-TH169 intersection. – an acceleration lane would need to be constructed on TH169 SB at 173rd Street. At the turn-around, the left-turn lane on TH169 SB would require lengthening and the shoulder at the turn around would require improvements for the turn-around and an acceleration lane would need to be constructed in the northbound lane.

<u>Impacts to Noise</u>

Noise measurements were performed at key locations using trucks similar to the gravel hauling trucks that will be used for the Project. The analysis found that the statutory L10 daytime noise limit would not be exceeded, based on the proposed number of daily roundtrips by trucks.

Step 2 - Establish the geographic scope for the analysis

The geographic area used for the analysis approximately consists of the area bounded on the north by the Minnesota River, on the east by the City of Savage, on the south by the southern boundary of Sand Creek Township, and on the west by the western limits of the City of Jordan. This geographic area allows for the inclusion of large, regional changes in groundwater use now and into the future and encompasses the known or proposed sand or aggregate mining operations.

Step 3 – Establish the time frame for the analysis

A time frame of 2040 was used for the analysis. 2040 is ten years past the year used by the City of Jordan for water demand projections and siting of new wells. At 2040, the mine is proposed to have

reached its maximum size, mining will have ceased, reclamation, would be at or near completion, and the City's new wells should be under production level demand. The mine's proposed life of operation is expected to extend to approximately 2037.

Step 4 – Identify actions affecting resources, ecosystems and human communities of concern

Past, present, and reasonably foreseeable projects were identified based on conversations with Scott County Environmental Health and Inspections Department staff; on projects currently undergoing environmental review; and on the current City of Jordan Comprehensive Plan. The following guidance was used to determine what projects to include in the cumulative assessment of impacts:

1. Past projects are those projects that have been completed within the last year (2012) or are under construction. This is evident by a final plat approval or issuance of a building permit for major commercial developments. There was one such project in the vicinity of the Project Site with environmental issues related to those evaluated in this environmental review. However, a plan by Sand Creek Township to pave 173rd Street between the Proposed Project Site and CR 9 was withdrawn in 2011 after completion of this Proposed Project's EAW, resulting in a change in plans for the routing of truck traffic. Great Plains Sand (recently renamed Shakopee Sand), a silica sand mining operation located 1.9 miles northeast of the Project Site on 140 acres of property owned by two separate entities started production in 2013. This mining operation was shown to have minor impacts on Sand Creek downstream and a monitoring plan was approved to evaluate impacts to groundwater influenced impacts to Sand Creek. Some truck traffic was proposed that may likely add to overall truck traffic in this area. It is also expected that there will be additional rail traffic on the railroad line adjacent to the Proposed Project affecting area noise and impacts to the rail crossing of this main line on Valley View Drive and on CR 9. Additional silica sand mines in Le Sueur and Blue Earth Counties are also expected to contribute to additional train traffic on this same railroad.
2. Present projects that have formal application for environmental review submitted to a local governmental unit (i.e. an EAW or an EIS.) Present projects include the following:
    a. Merriam Junction Sands: a proposed silica sand mining operation located 3.3 miles north of the Project Site on 682 acres of property currently owned by two separate entities: Malkerson Sales, Inc. (Malkerson Sales) and Bryan Rock Products, Inc., (Bryan Rock). A scoping EAW was prepared, a Scoping Decision Document was drafted, and an EIS was under preparation for a larger project including another

adjacent land owner before this project was pulled and has since continued with the two property owners mentioned. The EIS for this project is currently underway.

3. Future projects are projects that have been considered and presented in concept form of a sufficient detail to be able to quantify development related impacts. These may be concept plan submittals, environmental reviews, or comprehensive plan amendments that will contribute to changes in groundwater quality or levels in the vicinity of the Project Site. Two reasonably foreseeable future projects were identified:
    a. City of Jordan municipal well-field development on the Scott County Fairgrounds, located approximately 1.7 miles from the current well field in Jordan and about 2.4 miles southwest of the Project Site.
    b. Gravel Mine proposed in 2008, by S.M. Hentges on land located at 17521 Valley View Drive, an approximately 66 acre parcel which touches the Proposed Project. S.M. Hentges also evaluated an adjoining parcel to the North for potential gravel resources. A Geotechnical Evaluation for sand and gravel resources was prepared for several different parcels and the project proceeded to prepare an EAW on one of the parcels (see S.M. Hentges Proposed Aggregate Mining Operation EAW, July 28, 2008). This project did not progress, but could reasonably be anticipated as a future option for expansion of the gravel mining operations if the Proposed Project is approved and progresses and expenditures are already invested for equipment and to address the major impacts associated with mining in this area such as road improvements and groundwater issues.

3.10.3 Affected Environment

Responses to Steps 5, 6 and 7 have been combined.

Step 5 – Characterize the resources and ecosystems identified during scoping in terms of their response to change and capacity to withstand stress

Step 6 – Characterize the stresses affecting resources, ecosystems, and their relation to regulatory thresholds

Step 7 – Define a baseline condition for the resources and ecosystems

In the vicinity of the Jordan Aggregates Project Site, both human and ecological communities (such as wetlands and surface water) rely on groundwater. Human consumption is supplied by active withdrawal, whereas ecological resources rely on passive inflow to support the habitats and

ecosystems that are dependent directly or indirectly on groundwater. If the supply of groundwater is reduced by excessive drawdown, drought, unwise use, or other factors, supplies for most human uses are generally available at higher cost and/or impact to other resources. Because they are passive receptors, ecological systems cannot find other sources in the face of external stress on water supply.

Sand Creek

The reach of Sand Creek from Jordan (where it crosses Highway 169) and the confluence with the Minnesota River will undergo overall base flow reduction as a result of the cumulative effects of known projects. The base flow reductions calculated along this reach include the following:

1. Great Plains Sands (recently renamed Shakopee Sand)

   Drawdown in the water table aquifer during mining operations is predicted to result in a decrease in Sand Creek baseflow of about 2% from pre-mining baseflow, or approximately 0.27 cfs. Conversely, the reclamation phase produces an increase in head downgradient of the end-use lake, resulting in an estimated 1% increase in Sand Creek baseflow, or approximately 0.06 cfs (Barr, 2011).

2. Merriam Junction Sand

   Groundwater modeling studies to predict the change in base flow of Sand Creek are currently near completion for Merriam Junction Sand (Barr Engineering Co., personal communication, 2012). Preliminary analysis indicates a reduction in base flow of between 0.01 and 0.05 cfs (about a 1% decrease in baseflow). Additional modeling is planned for this project which may change these results but has not been completed.

3. Jordan Aggregates

   As reported in previous sections, groundwater modeling predicts that the Jordan Aggregates Project will result in a reduction in base flow in Sand Creek of 0.09 cfs.

4. Future City of Jordan Well Field

   As reported in previous sections, groundwater modeling predicts that average day demand pumping of the City of Jordan's future well field at the Scott County Fairgrounds will result in a reduction in base flow in Sand Creek of 0.08 cfs in the reach between the wastewater treatment ponds and 173rd Street.

The estimated total reduction in the base flow of Sand Creek that is predicted to result from these four proposed projects is approximately 0.11 cfs. However, the base flow reductions take place along different reaches of Sand Creek (the reductions predicted to result from the Great Plains Sands (recently renamed Shakopee Sand) and Merriam Junction Sand projects are 1.7 to 3.3 miles

downstream from the Jordan Aggregate Project Site where the base flow is estimated to be approximately 14 cfs).

Groundwater Level Reductions

The Great Plains Sands (recently renamed Shakopee Sand) and the Merriam Junction Sand projects are proposing to mine "in the wet" below the water table, similar to the mining that is proposed for Jordan Aggregates (although the mined material is a different geologic deposit). The drawdown effects from Great Plains Sands (recently renamed Shakopee Sand) and the Merriam Junction Sand mining operations are not expected to overlap with the drawdown effects resulting from the Jordan Aggregates Project. Cumulative effects from these operations on groundwater with the Jordan Aggregate Project's effects are not expected to occur.

Drawdown effects of future City of Jordan wells at the Project Site are expected to be less than 0.2 feet and therefore, are not significant except during periods of drought or winter low flow conditions when the combined impact may result in no flow conditions in the vicinity of the Project Site.

Cumulative impacts between the Proposed Project and expanision of mining into the parcels north of this site, which were considered previously by the Project Proposer could result in cumulative impacts on groundwater and surface water features. However, the magnitude of those impacts will depend largely on the scope of such future mining. The project proposed in 2008, did not include mining below the groundwater table. Should mining occur in a similar fashion to what has been proposed by the current Project (dredging deep into the quaternary aquifer) then there may be a potential for cumulative impacts. At such time that that might be proposed there should be a much better understanding of the realized impacts to both groundwater and surface water from mining in the current Proposed Project. An amendment would be required to any approved IUP by the County should that be proposed. If the City of Jordan has annexed this area before that time then the City of Jordan would be the responsible government unit for consideration of such a proposal.

Traffic

The Great Plains Sands (recently renamed Shakopee Sand) project will be transporting product on existing rail lines and some additional truck traffic on TH169 is also proposed, which may utilize the U turn option preferred by Jordan Aggregates or Option 6, which has been proposed by MnDOT depending on which option is ultimately required by the IUP. The Merriam Junction Sand project also plans to haul product using rail lines as well as trucks but their access to TH 169 is unrelated to this Project.

Noise

There are no known new planned projects in the immediate vicinity of the Project that will contribute significant additional noise in the immediate area of the Project mine. The existing SCALE training facility is expected to realize increased training demand for police and fire and there is associated noise with that operation from training activities including from the shooting range.

There is anticipated to be several more trains along the Union Pacific railroad that runs adjacent to the Project Site and which crosses Valley View Drive adjacent to the Project Site. These trains also run past Valley View nursing/senior home at the corner of Valley View Drive and 173rd St. The additional noise from trains combined with the additional truck traffic noise resulting from the Project could result in a combined exceedance of the state's noise standards for this receptor. The noise resulting from additional trains is not subject to a permit from the County and may not be subject to regulation under the state's noise standards. Therefore, this should be considered pre-existing background noise similar to that of the intersection of TH282 and TH21 in Jordan. If the route options through Jordan via TH21 and TH282 are used there may be noticeable increases in the existing periodic noise exceedance.

3.10.4 Environmental Consequences

Step 8 – Identify the important cause-and-effect relationship between human activities and resources

The excavation of the deep mine pit into the quaternary aquifer will create an opportunity for water transmittable contaminants to be introduced and impact the quaternary aquifer downgradient from the mine pit. Potable water aquifers are a natural resource of the state. The state has enacted statutes and rules to protect the waters of the state. Specifically applicable to this Project are the following statutes and rules:

> ***103H.001 DEGRADATION PREVENTION GOAL****: "It is the goal of the state that groundwater be maintained in its natural condition, free from any degradation caused by human activities. It is recognized that for some human activities this degradation prevention goal cannot be practicably achieved. However, where prevention is practicable, it is intended that it be achieved. Where it is not currently practicable, the development of methods and technology that will make prevention practicable is encouraged."*
>
> ***116D.04 Subdivision 6 Prohibitions.****"No state action significantly affecting the quality of the environment shall be allowed, nor shall any permit for natural resources management and development be granted, where such action or permit has caused or is likely to cause*

pollution, impairment, or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, and welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment, or destruction. Economic considerations alone shall not justify such conduct."

CHAPTER 7060, UNDERGROUND WATERS

7060.0100 PURPOSE.

It is the purpose of this chapter to preserve and protect the underground waters of the state by preventing any new pollution and abating existing pollution.

7060.0200 POLICY.

It is the policy of the agency to consider the actual or potential use of the underground waters for potable water supply as constituting the highest priority use and as such to provide maximum protection to all underground waters. The ready availability nearly statewide of underground water constitutes a natural resource of immeasurable value which must be protected as nearly as possible in its natural condition. For the conservation of underground water supplies for present and future generations and prevention of possible health hazards, it is necessary and proper that the agency employ a nondegradation policy to prevent pollution of the underground waters of the state.

7060.0400 USES OF UNDERGROUND WATERS.

The waters of the state are classified according to their highest priority use, which for underground waters of suitable natural quality is their use now or in the future as a source of drinking, culinary, or food processing water. Suitability is to be construed as meaning that the waters in their natural state can be used for such purposes after such purification or treatment processes as may be prescribed by the Minnesota Department of Health or the Minnesota Department of Agriculture. This classification is established to protect the underground waters as potable water supplies by preventing and abating pollution. In making this classification, the agency recognizes that the underground waters of the state are contained in a series of related and often interconnected aquifers, such that if sewage, industrial waste, other waste, or other pollutants enter the underground water system, they

may spread both vertically and horizontally. Thus, all underground waters are best classified for use as potable water supply in order to preserve high quality waters by minimizing spreading of pollutants, by prohibiting further discharges of wastes thereto, and to maximize the possibility of rehabilitating degraded waters for their priority use.

7060.0500 NONDEGRADATION POLICY.

It is the policy of the agency that the disposal of sewage, industrial waste, and other wastes shall be controlled as may be necessary to ensure that to the maximum practicable extent the underground waters of the state are maintained at their natural quality unless a determination is made by the agency that a change is justifiable by reason of necessary economic or social development and will not preclude appropriate beneficial present and future uses of the waters.

7060.0600 STANDARDS.

Subpart 1.

Prohibition against discharge into saturated zone.

No sewage, industrial waste, or other wastes shall be discharged directly into the zone of saturation by such means as injection wells or other devices used for the purpose of injecting materials into the zone of saturation, except that the discharge of cooling water under existing permits of the agency may be continued, subject to review of the permit by the agency for conformance with subpart 3.

Subp. 2.

Prohibition against discharge into unsaturated zone.

No sewage, industrial waste, other waste, or other pollutants shall be allowed to be discharged to the unsaturated zone or deposited in such place, manner, or quantity that the effluent or residue therefrom, upon reaching the water table, may actually or potentially preclude or limit the use of the underground waters as a potable water supply, nor shall any such discharge or deposit be allowed which may pollute the underground waters. All such possible sources of pollutants shall be monitored at the discharger's expense as directed by the agency.

Subp. 3.

Control measures.

Treatment, safeguards, or other control measures shall be provided by the person responsible for any sewage, industrial waste, other waste, or other pollutants which are to be or have been discharged to the unsaturated zone or deposited there, or which have been discharged to the zone of saturation, to the extent necessary to ensure that the same will not constitute or continue to be a source of pollution of the underground waters or impair the natural quality thereof.

Subp. 8.

Natural state of groundwater.

The groundwater may in its natural state have some characteristics or properties exceeding the standards for potable water supplies. Where the background level of natural origin is reasonably definable and is higher than the accepted standard for potable water and the hydrology and extent of the aquifer are known, the natural level may be used as the standard.

7060.0800 DETERMINATION OF COMPLIANCE.

In making tests or analyses of the underground waters of the state, or of sewage, industrial wastes, or other wastes, to determine compliance with the standards, samples shall be collected in such manner and place and of such type, number, and frequency as may be considered satisfactory by the agency from the viewpoint of adequately reflecting the condition of the underground water and the effects of the pollutants upon the specified water uses. The samples shall be preserved and analyzed in accordance with procedures described in the 13th edition of Standard Methods for the Examination of Water and Wastewater, 1971, by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto, or other methods acceptable to the agency.

7060.0900 VARIANCE.

In any cases where, upon application of the responsible person or persons, the agency finds that by reason of exceptional circumstances the strict enforcement of any provision of these standards would cause undue hardship, that disposal of the sewage, industrial waste, or other waste is necessary for the public health, safety, or welfare, or that strict conformity

with the standards would be unreasonable, impractical, or not feasible under the circumstances, the agency in its discretion may permit a variance therefrom upon such conditions as it may prescribe for prevention, control, or abatement of pollution in harmony with the general purpose of these standards and the intent of the applicable state and federal laws.

Statutory Authority: *MS s 115.03; 115.44 ;* ***Posted:*** *October 2, 2007*

The following statute deals with wells and borings with the definition of borings provided. In practice, this law has not been applied to excavations such as an excavation into an aquifer such as a mine that is not used to extract the water within that aquifer but rather to removal the rock, silica sand or sand and gravel, which enables the formation to serve as an aquifer. However, the Proposed Project could be considered to conflict with the intent of this law, which is to protect groundwater from contamination and would if this were a much smaller boring.

Minnesota Statutes Chapter 103I applicable excerpts*:*

103I.005 DEFINITIONS*.*

Subdivision 1.Applicability.

The definitions in this chapter apply to this chapter.

Subd. 2.Boring.

"Boring" means a hole or excavation that is not used to extract water and includes exploratory borings, environmental bore holes, vertical heat exchangers, and elevator shafts.

103I.301 WELL SEALING REQUIREMENTS.

Subdivision 1.Wells and borings.

(a) A property owner must have a well or boring sealed if:

(1) the well or boring is contaminated or may contribute to the spread of contamination;

(2) the well or boring was attempted to be sealed but was not sealed according to the provisions of this chapter; or

(3) the well or boring is located, constructed, or maintained in a manner that its continued use or existence endangers groundwater quality or is a safety or health hazard.

Step 9 – Determine the magnitude and significance of cumulative effects

Sand Creek

Base flow reductions resulting from the cumulative effects of the identified existing and proposed projects in the area are approximately 0.11 cfs. Except for certain times during the winter months,

stream flows are considerably higher than base flow. Estimates of the cumulative effects on Sand Creek base flow do not include consideration of future mining of the adjacent parcels (Stitch & Unger) to the north of the Project Site because the previous proposal for the Stitch parcel did not include mining below the water table. However, recognizing that significant investments in mining into the water table would have been made, should the Proposed Project be approved, such a potential becomes more likely. Unfortunately, it is impossible to determine the impacts on Sand Creek for such an extension of mining in this area without specifics on how that mine might be developed. Therefore, this is noted as a potential without any quantifying details. Should such an expansion be proposed, concerns about this particular cumulative impact could be addressed at that time.

Groundwater

There are no significant cumulative effects on groundwater levels, groundwater quantity, or groundwater availability resulting from the identified projects for the vicinity of the Proposed Project with the exception of the noted mine expansion into adjoining parcels to the north. The Proposed Project is predicted to result in adverse groundwater quality changes in the vicinity of the Proposed Project site that will impact two existing non-community water supply wells serving public facilities and a private residential well proposed by the Project Proposer to be replaced with new wells drilled into a deeper less likley affected aquifer. The Proposed Project in effect eliminates the availability of the existing aquifer serving these facilities, unless mitigation to address the anticipated degradation of the quaternary aquifer serving these wells such as that proposed by the County in Exhibit A is required and funded. It appears that unless such migitation and sufficient financial securities to ensure it are available, the affected areas of the quaternary aquifer cannot be relied upon as a safe source for potable water as they have been. Additional cumulative effects on groundwater quality may occur if mining is proposed in the future on parcels previously explored and proposed for mining were to take place.

Step 10 - Modify or add alternatives to avoid, minimize, or mitigate adverse significant cumulative impacts arising from project activities, and identify opportunities to work with others to avoid, minimize, or mitigate adverse effects caused by non-project activities.

No modification of the preferred alternative has been proposed. Mitigation of identified impacts has been proposed as noted, however the mitigation for groundwater degradation that has been developed by Barr Engineering and proposed by the County is not acceptable to the Project Proposer due to cost. Instead, an alternative water supply option consisting of wells drilled into a deeper aquifer has

been suggested by the Project Proposer. This proposed substitute for mitigation of the direct impacts to the quaternary aquifer have been evaluated with groundwater modeling and some concerns have been noted.

Flooding in the area has the potential for impacting the SCALE facility by inundation of the west parking area and inundation of the north entrance. The Proposed Project has the potential for adding to this impact by a modeled additional 0.51 feet of additional flood elevation during a modeled worst case event. No mitigation has been suggested for this minor cumulative impact.

Step 11 - Monitor cumulative impacts of the selected alternative and apply adaptive management.

Several proposals for a monitoring and mitigation plan to address groundwater impacts were submitted by the Project Proposer. None have been deemed acceptable by the County. Specifically, monitoring of impacts to the surficial sand-and-gravel aquifer are inadequate and the Project Proposer has not submitted a mitigation plan to remediate the the surficial sand-and-gravel aquifer, if adverse impacts are detected. Proposed mitigation to address potential impacts, if detected, to the FIG aquifer were not proposed. The only mitigation proposed was to address the need for potable water for the two public facilities at risk and one private residence by drilling deeper wells. The relative quality of the water between current wells and proposed wells was addressed with a proposal to fund water treatment for a set period of time until it was assumed that municipal water might be available. However, it is recognized that municipal service extensions are generally driven by development. Reducing a substantial area that is currently developable as has been proposed to the equivalent of two residential lots which would be located adjacent to an existing SCALE fire and police training facility is subject to questions about compatibility. Current zoning restricts consideration of more appropriate commercial or institutional development. However, mining the site as proposed will significantly remove options for future development, which will reduce future economics associated with extension of municipal services.

3.10.5 Conclusions

Some of the cumulative potential effects to resources and affected community resulting from the proposed Jordan Aggregates Project and the contribution of incremental effects from other past, present, and reasonably foreseeable future actions within the environmentally relevant area are deemed substantial. The Jordan Aggregate Project's contribution to some of the identified

cumulative potential effects can be reduced by the mitigation efforts that could be required as conditions to an IUP as follows:

1. Traffic safety concerns addressed in the Traffic Report can be mitigated by the construction of the U turn as noted in Option 6 and implementation of the ancillary improvements to Valley View Drive and TH169 as noted. This could be addressed as a condition for IUP approval.
2. Provision of municipal water to identified at-risk public facilities and residence would be an alternative to and would address the need for ongoing treatment costs and monitoring of the proposed option of deeper wells which might still be at risk. As noted in the EAW this should be required as a condition of the IUP if an acceptable monitoring and mitigation plan is not agreed to by the Project Proposer. Substitute deeper wells for the modeled potentially impacted public facilities and private residence do not eliminate the risk of contamination associated with the deep excavation into the quaternary aquifer and the water quality is expected to present additional issues and ongoing costs for the County and private residence.
3. The potential for a meander of Sand Creek to occur during flooding into the mine pit is an ongoing concern that will remain after termination of the mine. This will remain an ongoing future concern that will need to be addressed with financial securities required of the Project Proposer. The DNR has indicated that such a meander into the deep mine pit would likely be required to be corrected. The Project Proposer has suggested placing the burdon of maintenance of the spillway and stream bank adjacent to the mine pit on future property owners. The County agreed with the DNR and found this unacceptable and included this as a recommended mitigation requirement with estimated costs identified in the attached monitoring and mitigation plan and related cost estimates.
4. The potential for increased ice jams resulting from ice originating from the proposed groundwater filled mine pit has been noted. Proposed mitigation is to construct pylons 30 feet apart along the natural berm and through the proposed spill way to presumably contain large ice sheets from being moved by wind into Sand Creek during floods when the pond ice could be lifted by rising flood waters to enable ice to be carried over the berm or spillway. The effectiveness of this proposal has not been demonstrated and no supportive documentation has been provided. A rationale for the final design should be included as part of the IUP process. The pylons may need periodic maintenance to remove accumulated debris. The Monitoring and Mitigation Plan prepared by Barr Engineering with associated

estimated costs (Attachment A and C) addresses ongoing mitigation and costs to address ice jams.

Impacts for which there has been no proposed mitigation:

1. The potential for degradation of the surficial sand-and-gravel aquifer as a result of both surface exposure into deeper portions of the aquifer and flood inundation from Sand Creek is acknowledged. If such degradation were to occur, it would conflict with several state laws. Monitoring of the water quality of the surficial aquifer is necessary to ensure that degradation is not taking place during and after mining. The State of Minnesota, through the Minnesota Pollution Control Agency, has the authority to require investigation of water-quality degradation and to require or otherwise impose a remedy. Barr Engineering prepared a monitoring and mitigation plan to address this at the request of Scott County and it is recommended that this plan and the estimated associated fianancial securities to ensure it can be implemented during and after cessation of mining activities be considered and required by the MPCA for their NPDES Permit.
2. Increased noise and disturbance as a result of increased truck traffic on Valley View Drive and 173rd Street adjacent to residences to the south of the mine and the Valley View senior/nursing care facilty to the north is deemed a potential impact which though not anticipated to exceed the state's daytime noise standards, could be exacerbated by cumulative impacts from rail traffic which is anticipated to increase as a result of increased mining of silica sand that will be transported on the adjacent railroad. There is no proposed mitigation for this impact. There is a proposed mitigation for the more likely exceedance of the state's night time noise standards, which is to limit hours of operation of the Proposed Project associated with truck traffic to daytime hours.
3. The potential reduction of stream flow in Sand Creek resulting from cumulative influences in the vicinity of the Project Site is not deemed a substantial impact.

In the context of the existing regulatory framework and the mitigation activities for the proposed Project impacts, the overall cumulative potential effects to environmental resources are expected to be significant.

3.10.6 No-Build Alternative

Under the No-Build Alternative, it is assumed the remainder of the projects included in the cumulative potential effects assessment would be implemented. The environmental effects of these

projects will be addressed to the extent they are subject to environmental review, governmental approvals, and permitting requirements.

4.0 Summary of Mitigation Measures

The purpose of this section is to summarize the mitigation measures that have been identified for addressing the adverse impacts of the Jordan Aggregates Project. The measures are listed by each technical subject area as presented in Section 3.0.

4.1 Sand Creek

4.1.1 Berm Erosion

The potential for erosion of the berm between the Sand Creek channel and the mine was an issue that required mitigation. The mitigation measure proposed is to construct a 200-foot long earthen spillway (as described in Section 3.1.3 with a vegetated mat in the berm, 200-feet long with a crest elevation of 726 feet, above mean sea level (msl). Details of the proposed spillway are described in Figure 3.1 and Figure 3.2. The spillway is intended to direct inundating flood water into the mine area before the berm can be overtopped. As flood waters recede, the spillway will direct water back into the Creek channel until flood elevations drop below 726 feet, msl. Given the concern about stream migration it would be appropriate to consider, during the IUP process, establishment of suitable securities for monitoring the movement of the stream and to fund any corrective actions.

4.1.2 Ice Jams

The potential for the mine pit to increase the likelihood of ice jams in Sand Creek was partly addressed by the inclusion of the 200-foot long spillway, which will promote the break-up of ice and debris jams and further prevent the potential for berm erosion. Pylons spaced 30 feet apart along most of the side of the site adjacent to Sand Creek was proposed to conceivably restrain ice originating on the mine pond should flood conditions fill the pond and raise ice high enough to be pushed by wind into Sand Creek. A 36-acre pond could contribute a significant amount of relatively thick ice to exacerbate downstream ice jams at 173rd Street. However, no supportive documentation on the efficacy of the proposed pylons was provided to address this potential impact. As noted above, there is a potential for the proposed pylons to act both ways to thwart ice and debris and thus result in ice jams where they have not previously occurred. This was therefore deemed an unresolved issue and was further addressed in the Monitoring and Mitigation Plan prepared by Barr Engineering at the request of Scott County (attached as Exhibit A). This Plan should be considered and required by appropriate permitting authorities.

4.2 Groundwater and Water Supply Wells

4.2.1 Groundwater Levels

The effect of mining on groundwater levels was found to not be a significant effect on well yields or wetlands. The base flow of Sand Creek in the vicinity of the Project Site will be reduced by the Proposed Project's activities (i.e. mining and wash-water pumping). Additional cumulative impacts to the base flow of Sand Creek are predicted in the future from pumping of a new City of Jordan well field that is planned to be located west of the City of Jordan in the Scott County Fairgrounds. Groundwater flow directions and rates are not expected to be significantly altered.

4.2.1 Water Supply Wells and Water Quality

One and possibly two existing non-community public water supply wells and one residential well were shown to be subject to contamination especially resulting from flood events. One well (SCALE facility well) was found to have a greater potential for contamination from flood waters that may inundate the mine and migrate into the water-table aquifer. Replacement wells, completed in the Ironton-Galesville Sandstone of the FIG aquifer was offered by the Project Proposer as an alternative water supply for the affected wells. Wells in this location in the lower FIG aquifer would have a low likelihood of becoming contaminated from the deep aquifer penetration afforded by the mine pit. However, longterm monitoring would still likey be required to ensure safety. Replacement wells in the FIG aquifer may also require additional treatment. A water-quality analyses of the well water will need to be completed at the time of installation and a point-of-withdrawal treatment system would need to be installed if the Maximum Contaminant Levels were exceeded for the well water or if the water needed additional treatment for aesthetic quality or for boiler operatonal concerns.

Because water from the existing SCALE and JAF wells likely have better aesthetic characteristics than untreated water from a FIG aquifer well, provisions should be made for treating water from new deeper wells to address taste and odor issues. Point-of-use water softening may also be needed to address water chemistry concerns for fixtures and boiler use. The Project Proposer has not offered an acceptable monitoring plan to monitor water quality in the upper or lower FIG to detect and respond to contamination. The Project Proposer has not offered an acceptable mitigation plan other than point of use treatment should these wells be shown to be adversely impacted from the deep excavation into the aquifer above them which is hydraulically connected to the FIG aquifer through the buried river valley in this area that has been mapped by the Minnesota Geological Survey to have eroded through the entire FIG and possibly into a lower unit.

The comments received for the DEIS and FEIS noted the concern for aquifer degradation which was a significant issue leading to the determination by the County that the FEIS was inadequate. Subsequently, in the absence of any further acceptable monitoring and mitigation plans from the Project Proposer, at the suggestion of the EQB staff, the County requested that its consultant Barr Engineering prepare an acceptable monitoring and mitigation plan with associated cost estimates for consideration by the County and other permitting authorities. The Project Proposer has not suggested mitigation for the modeled impacts to the surficial sand-and-gravel aquifer and maintains their position that substitute deeper wells is an adequate response (See June 9th 2014 letter from Project Proposer attached). The County acknowledges the need for an environmentally responsible monitoring and mitigation plan to address the identified potential environmental impacts and urges subsequent permiting authorities to consider the findings within this EIS in accordance with Minnesota Rules 4410.0300.

4.3 Traffic

The Project Proposer's preferred traffic route for hauling trucks (Option 2) will require improvements to the intersection of TH 169 and 173rd Street. A 1,670-foot long acceleration lane would likely be needed on TH169 south of the 173rd Street intersection. The left-turn lane on TH169 at U-turn location will likely need to be lengthened to 690 feet (plus 180 foot taper) to accommodate deceleration and storage. A wider shoulder at the U-turn location is recommended to accommodate u-turning trucks and a northbound acceleration lane will need to be extended. Total cost of all mitigation is estimated to be approximately $300,000. Changes to TH169 will require a permit from MNDOT. Improvements to 173rd Street north of the Project site may also be needed to bring this road up to 10 ton capacity. MNDOT has stated that Option 2 is not their preferred alternative and suggested an additional option which has been presented as Option 6. There are remaining concerns about the feasibility of Option 6 and the potential noise impacts to the closest residential property. Funding for designing and constructing this option have not been addressed. Therefore, a safe truck route to serve this Project remains an unresolved issue.

4.4 Noise

A recommended mitigation for noise is to limit hours of hauling to daytime hours of between 7:00 a.m. and 10:00 p.m. to avoid the potential for exceeding Minnesota residential noise standards for nighttime hours at the nursing/senior home. The Proposer has stated that operation hours will be limited to between 7:30 a.m. to 9:30 p.m., eliminating the possibility of nighttime violation of the noise standards. Noise impacts from any future portable concrete or asphalt plant have not been

assessed in this EIS. The Proposer must meet noise standards with the concrete and/or asphalt plant operation both from the operation of the plant and mine relative to the nearby Juvenile Alternative Facility a NAC 1 classified receptor and from associated truck traffic to receptors on Valley View Drive and 173rd Street.. In consideration of the proposed changes to the truck route in addition to the location of the processing area's proximity to the Scott County Juvenile Alternative Facility, the option of any future night time operations are assumed to be precluded unless it can be demonstrated in the future that applicable Minnesota noise standards will not be violated.

Noise testing identified that there are locations associated with truck route options 3 and 4 that may already be experiencing Minnesota Noise Standard exceedance. Should these routes be considered as options, additional assessment in accordance with MnDOT requirements may be needed.

Cumulative noise impacts from the anticipated increase in rail traffic transporting silica sand from several area mines may become a future concern especially for the nursing/senior home. Permitting the Project knowing that noise excedence is possible to occur as a result of the uncontrollable additional rail traffic noise in combination with the Project truck noise may be precluded by state noise rules.

5.0 Public Involvement

5.1 Public Meetings

On January 10, 2011, the Environmental Assessment Worksheet (EAW) for the Jordan Aggregates Project was published in the EQB Monitor and the 30-day public comment period commenced. The first public meeting on the Project took place in front of the Scott County Board on April 5, 2011, summarizing the public comments and the County staff's review of the EAW. A Findings of Fact were presented to the County Board and the Board approved a decision to require an EIS. A draft Scoping Decision Document was prepared and a Public Scoping Meeting was held on October 11, 2011. A Draft SDD was published and underwent a 30-day review period, during which time public comments were received. These comments received during the Public Scoping Period were incorporated into the Final SDD, which was approved by the Scott County Board in November 2011. The final SDD also presented a tentative schedule of the environmental review process.

An EIS progress meeting was held with the Project Proposer, Scott County, representatives from the City of Jordan and Sand Creek Township on April 2nd, 2012, at which the Project Proposer stated that the proposed truck route was being changed. This necessitated follow-up meetings of this same group to discuss and reach agreement on revisions to the scope of the EIS accordingly.

The comments received in the scoping phase of the Project and the information collected to address the comments were used in the preparation of the Draft EIS. This Draft EIS was distributed for a 30-day public comment period on January 21, 2013. A public meeting/public hearing was held during the EIS Comment Period on February 6, 2013 to afford opportunity for public comment. A number of substantive comments were received and responses were prepared by the EIS preparation team during March and April, 2013 and shared with the Project Proposer. Several issues were identified that needed additional response from the Project Proposer relating to ice jams and an updated ground water monitoring and mitigation plan. These needs were discussed with the Project Proposer and the EIS preparation team at a meeting on April 11, 2013. An updated groundwater monitoring and mitigation plan and a mitigation plan to address the ice jam concern were received from the Project Proposer on May 2, 2013. Additional inquiries were needed with MnDOT related to their proposed new Option 6 and final correspondence from MnDOT was received on June 20, 2013. The revised Groundwater monitoring and mitigation plan was reviewed by the EIS preparation team in May and a request for additional information in that regard was sent to the Project Proposer on June 6, 2013. The Project Proposer provided their response to the requests for additional information related to the

groundwater monitoring and mitigation on July 10, 2013. A subsequent meeting was held on July 19, 2013 where the Project Proposer indicated that the County should proceed with their recent groundwater monitoring and mitigation plans despite the EIS preparation team's outstanding concerns. The County's EIS team made final revisions to the draft FEIS and provided the Project Propoer's team this draft and their comments on the submitted groundwater monitoring and mitigation plan on September 18 and 19, 2013. The Project Proposer provided their suggested changes to the draft FEIS and another revised groundwater monitoring and mitigation plan to the County's EIS team on October 22, 2013. The County's EIS team reviewed the Project Proposer's suggested changes and their new groundwater monitoring and mitigation plan and responded back to the Project Proposer on November 11, 2013, with the County's final revisions to the draft FEIS and notified the Project Proposer of their intention to publish notice of availability for public comment in the November 25th edition of the EQB Monitor.

On January 21, 2014, the Scott County Board of Commissioners determined that the FEIS was inadequate based on the State agency comments, and directed staff to work collaboratively with the State agencies to address these inadequacies by preparing an acceptable groundwater monitoring and mitigation and prevention plan. A meeting was held on May 22, with state agencies, the Project Proposer and the EIS Team to discuss the revised monitoring and mitigation plan and other aspects of the project related to the inadequacy determination. The draft revised monitoring and mitigation plan was further revised to reflect state agency comments, please seeattached Exhibit A Groundwater

The availability of the revised FEIS and Groundwater monitoring and mitigation plan will be published in the EQB Monitor. Comments received during the official comment period on the FEIS will be presented to the County Board for determination of adequacy. The revised Final EIS will be circulated for a 10-day business day public comment period. Notification of the County Board meeting for determination of adequacy of this EIS will be published on the County's website, mailed to all interested parties who have commented on this Project or have requested to be notified. Notification of the Adequacy Decision will be published in the EQB Monitor.

5.2 Project Web Site

An information project web site has been established by Scott County on the World Wide Web at http://www.co.scott.mn.us/ParksLibraryEnv/Environment/EnvReview/JordanAggregatesEAW/Pages/home.aspx. The site provides a means for distributing available information. The site is periodically updated to reflect project developments and to address new issues.

6.0 Approvals, Permits, or Consultation

Scott County has identified the relevant local ordinances, permits and approvals otherwise applicable to the proposed Project. None of the approvals, permits or consultation listed will require preparation of a record of decision pursuant to Minnesota Rules 4410.2100, subpart 6D. In order to expedite the processes, coordination and consultation with the City of Jordan, Sand Creek Township, Scott County, and other appropriate jurisdictions has and will continue to occur.

Table 8 Required Permits

STATE:		
Mn DNR	Ground Water Allocation – Water Appropriation Permit	To be applied for
Mn Pollution Control Agency (MPCA)	A MPCA Registration Permit will be required for the proposed asphalt plant for air emissions	To be applied for
Mn Pollution Control Agency (MPCA)	Non-Metallic Mineral Processing General Permit For Air Emissions	To be applied for
MN Pollution Control Agency (MPCA)	Storm Water Construction Activity National Pollutant Discharge Elimination System (Clean Water Act Section 402) Stormwater Pollution Prevention Plan (SWPPP)	Applied For and accepted.
Mn Pollution Control Agency (MPCA)	Air Quality Permit for Asphalt/Concrete Plant	To be applied for
MN Department of Transportation (MNDOT)	Permit(s) for any proposed modifications to TH 169.	To be applied for
Minnesota Department of Health	Well construction permits	To be applied for
LOCAL:		
Scott County	Solid Waste Facility License for Asphalt/Concrete Plant	To be applied for
Scott County	Mining Interim Use Permit	To be applied for
Scott County	Annually an Interim Use Permit needs to be applied for the asphalt or concrete plant	To be applied for
Scott County	Variance from Reclamation Standards	To be applied for

7.0 References

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