University of Minnesota
UMore Park Sand and Gravel Resources

Final Environmental Impact Statement

October 2010

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FINAL ENVIRONMENTAL IMPACT STATEMENT
For
UMORE PARK SAND AND GRAVEL RESOURCES PROJECT

University of Minnesota
Dakota County, Minnesota

RGU and Proposer:	**Regents of the University of Minnesota**
RGU Contact:	**Steven Lott** **Project Manager** **1605 160th Street West** **Rosemont, MN 55068** **651.423.2562** **lottx020@umn.edu**

Abstract: The University of Minnesota has prepared a Final Environmental Impact Statement for the establishment of new aggregate mines and ancillary operations on approximately 1,722 acres of the UMore Park property located in the City of Rosemount and Empire Township, Dakota County, Minnesota.

The Draft EIS comment period opened on June 28, 2010 and extended through August 5 2010. A Draft EIS public meeting was held on July 22, 2010.

The comment period deadline for the Final EIS is October 19, 2010

Approved for Issuance for Public Comment:

9/29/10
Date

Kathleen O'Brien
Kathleen O'Brien, Vice President, University Services

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

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Executive Summary

The University of Minnesota has prepared a Final Environmental Impact Statement (EIS) for the establishment of new aggregate mines and ancillary operations on approximately 1,722 acres of the UMore Park property located in the City of Rosemount and Empire Township, Dakota County, Minnesota. The area proposed for such action is hereafter referred to as the UMore Mining Area (UMA).

Prior to preparation of this Final EIS, a Draft EIS, a Scoping Decision Document (SDD) and a companion Scoping Environmental Assessment Worksheet (SEAW) was prepared for the UMore Park Sand and Gravel Resources Project. Visit www.umorepark.umn.edu to view these documents.

The Draft EIS was prepared and distributed to all members on the current Environmental Quality Board (EQB) document review list as well as other local and regional agencies and interest groups. A Draft EIS Notice of Availability was published in the June 28, 2010 edition of the EQB Monitor and a public hearing was held on July 22, 2010. Comments on the Draft EIS were accepted through August 5, 2010.

The alternatives evaluated in this Final EIS include the Build (mining and ancillary uses on the UMA) condition and the No-Build condition. The subject areas analyzed include:

- Land Use
- Environmental Hazards
- Fish, Wildlife and Ecologically Sensitive Resources
- Threatened and Endangered Species
- Water Resources/Wetlands
- Surface Water Quality
- Groundwater
- Water Use
- Traffic
- Odors, Noise, and Dust
- Air Quality
- Infrastructure and Utilities
- Farmlands
- Social, Community, and Economic Effects
- Visual Impacts
- Archaeological, Historical, or Architectural Resources
- Cumulative Effects

This Final EIS also includes a summary of mitigation measures for potential impacts that may result from the proposed action (Section 4.0). Many of these measures will be further refined as part of the permitting process that will occur prior to any mining operations. A list of likely permits and approvals is included in Section 6.0 of this Final EIS.

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

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Supplemental Information

This Final EIS for the UMore Park Sand and Gravel Resources 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 Final 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 UMore Park Administration Building located at 1605 160th Street West, Rosemount MN 55068. Electronic copies are available on the project web site located at: www.umorepark.umn.edu/Gravel_Resources_and_Assessment.html. Below is a list of the supplemental technical studies completed for the EIS.

- UMore Park Sand and Gravel Resources Draft EIS
- Groundwater Assessment Report
- Predictive Simulations Report
- Phase II Site of Concern (SOC) Investigation Report; Sites 1-3 and 6-8
- Supplemental Site Inspection (SOC 4) and Remedial Investigation (SOC 5) Report
- Ancillary Use Facility Are Subsurface Investigation, Technical Memorandum
- Wetland Delineation Report
- Traffic Impact Study Report
- Noise Impact Study Report
- Air Quality Impact Study Report
- Air Quality Addendum Technical Memorandum
- 2008 Comparative Appraisal Study for Kelly Aggregate
- Draft UMA Mining Plan

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University of Minnesota - UMore Park

Sand and Gravel Resources Project

Final Environmental Impact Statement

Prepared for the Board of Regents of the University of Minnesota

1.0 Purpose and Need

This Final Environmental Impact Statement (EIS) incorporates by reference the Draft EIS published in June 2010. Furthermore, this document incorporates the comments received during the 30-day Draft EIS public comment period that extended until August 5, 2010. Section 7.0 includes a detailed presentation of the comments received along with the process followed for addressing the substantive issues raised in the comments. In summary, the most frequent comments and subsequently most substantial modifications reflected in this Final EIS pertain to the following topic areas:

- Environmental Hazards
- Groundwater
- Surface Water
- Traffic
- Noise and Dust

1.1 Proposed Action

The University of Minnesota has prepared this Final Environmental Impact Statement (EIS) for the establishment of new mines and ancillary operations on approximately the western third of the UMore Park Property, located in the City of Rosemount and Empire Township, Dakota County, Minnesota (Figure 1). The entire study area consists of approximately 1,722 acres (Figure 2). The project is hereafter referred to as the UMore Park Sand and Gravel Resources Project and the area proposed for such action is hereafter referred to as the UMore Mining Area (UMA). The UMA is part of the University of Minnesota Outreach, Research, and Education Park (UMore Park) that has been owned and operated by the University of Minnesota since the late 1940s. The specific elements of the UMore Sand and Gravel Resources Project are discussed in Section 2.1.7.

The Board of Regents of the University of Minnesota is serving as the Responsible Governmental Unit (RGU) for the Project. This Final EIS meets the requirements of Minnesota Rules 4410.0200 to 4410.6500, which are administered by the Minnesota Environmental Quality Board (MEQB) through the Minnesota Environmental Review Program.

1.2 Purpose of the EIS

As defined by the MEQB, 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.

Prior to preparation of this Final EIS, a Draft EIS, a Scoping Decision Document (SDD) and a companion Scoping Environmental Assessment Worksheet (SEAW) were prepared for the Project. Visit www.umorepark.umn.edu/Gravel_Resources_and_Assessment.html to view these documents and other project related information. The purpose of the SDD is to identify the issues and alternatives that will be examined in depth in the EIS. A draft SDD was published and circulated with the SEAW on January 12, 2009. Comments on both documents were accepted through February 16, 2009. The public comment period also included a public scoping meeting held on February 5, 2009. Comments received during the public comment period were responded to in the final SDD.

A Draft EIS was then prepared that analyzed the potential social, economic, and environmental impacts associated with the build and no-build alternatives and determine how they may be avoided or minimized. The EIS is not a means to approve or disapprove a project, but is simply a source of information to guide approval decisions. The Draft EIS was published in the MEQB Monitor and circulated on June 28, 2010, which also marked the beginning of a mandatory 30-day comment period. A Draft EIS public hearing was held on July 22, 2010 and the official comment period closed on August 5, 2010.

1.3 Need for the Proposed Action

As indicated in previous documents, the primary purpose of the project is to make cost-effective and environmentally-sound use of regionally significant aggregate resources located within the UMA and generate revenues to support the mission of the University of Minnesota. Beneficiaries of the project will include the construction industry and ultimately residents and property owners in the Twin Cities Metropolitan Area and surrounding regions because a local supply of aggregate and other manufactured products will limit the distance these products need to be transported resulting in lower costs.

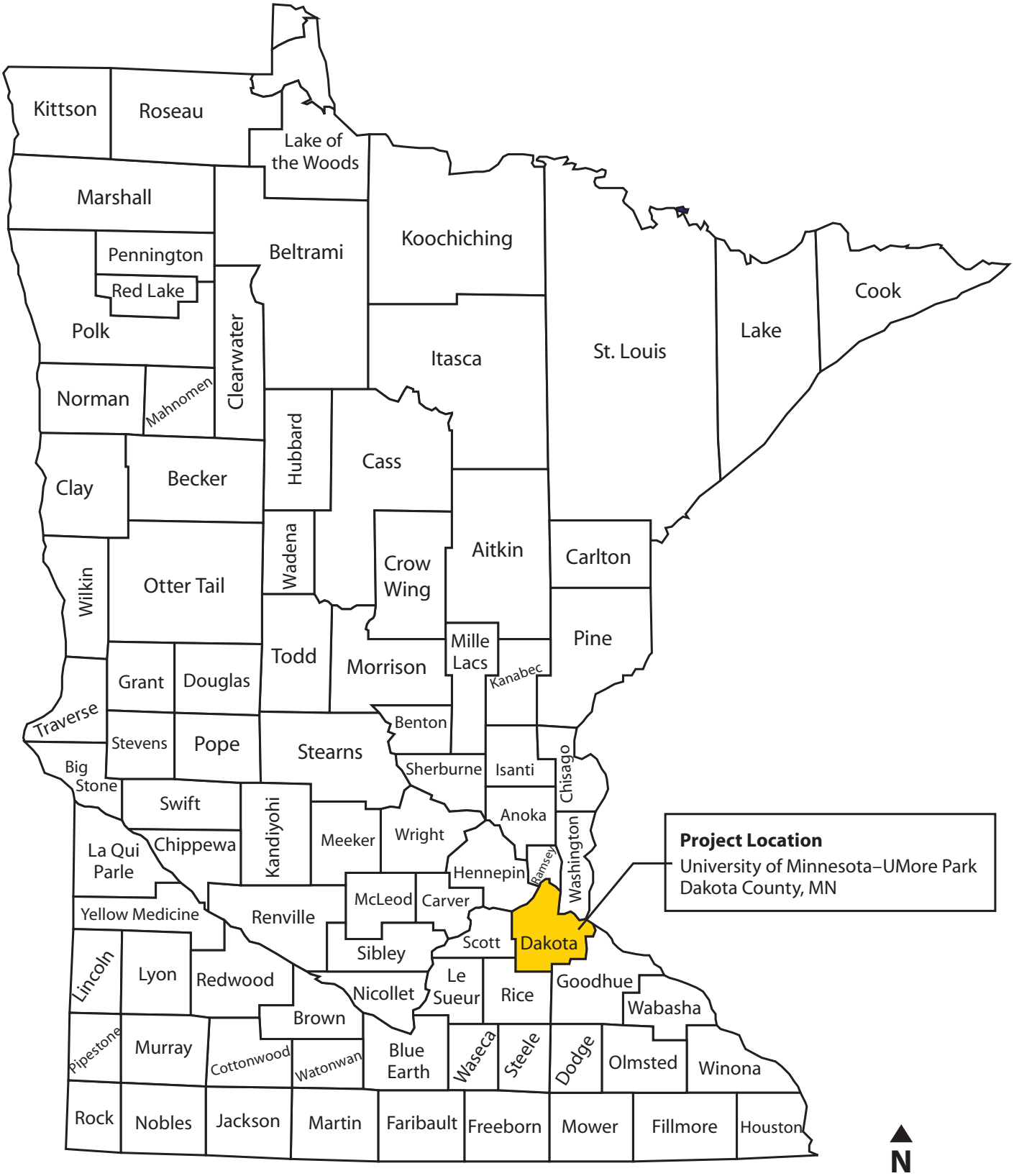

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Figure 1
State/County Location Map

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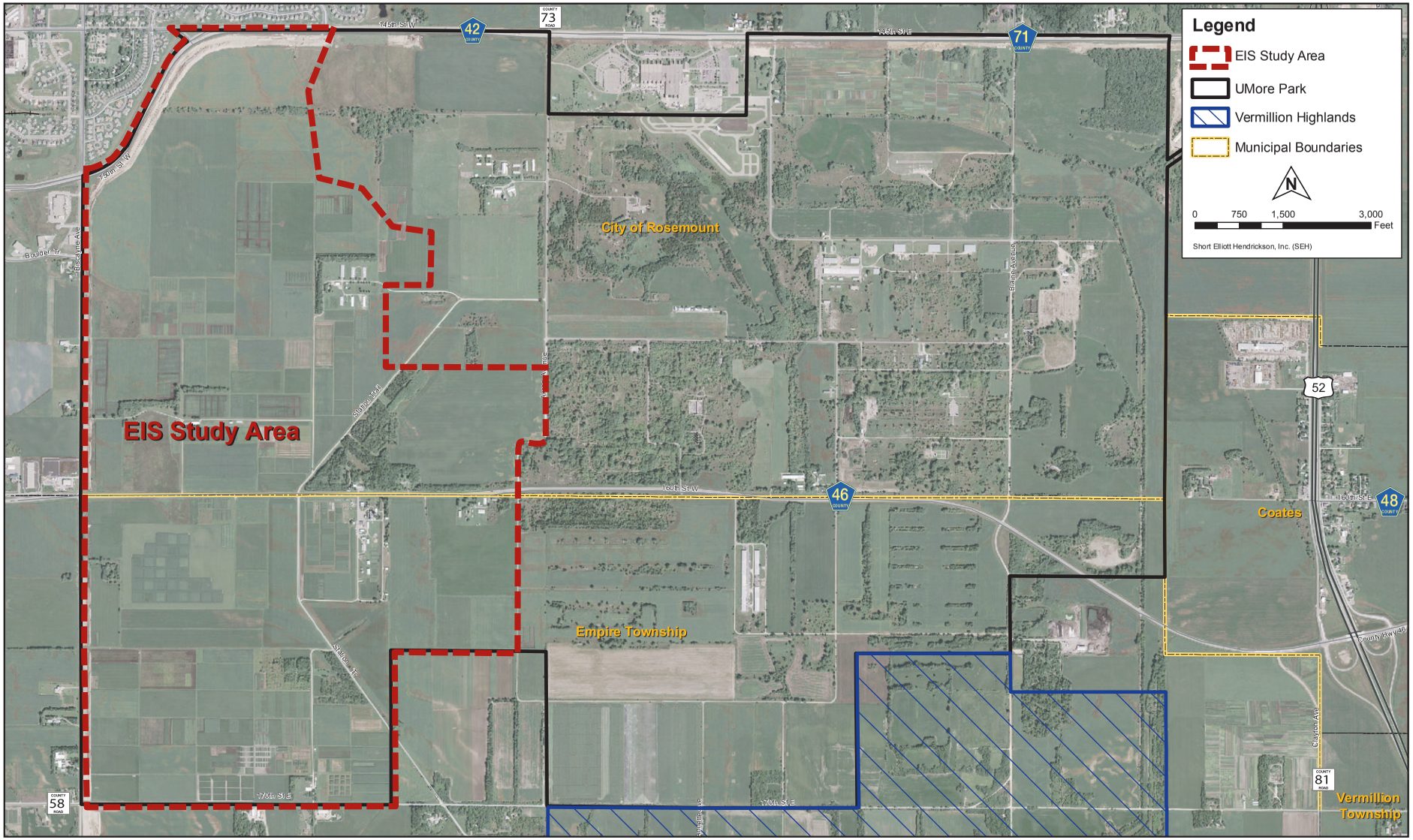

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Figure 2
Proposed UMore Mining Area

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2.0 Project Alternatives

2.1 Scoping Process and Alternatives

The MEQB 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 (MN Rules part 4410.2300, subpart G).

2.1.1 Alternative Sites

The No-Build Alternative (described in Section 2.1.8) is the only site alternative addressed in the EIS. This alternative assumes continued use of the UMA as it is currently being used. Additional off-site alternatives are not being investigated because they do not meet the project purpose and need of making use of regionally significant aggregate resources that are found within the UMA. Site Alternatives are limited to those where there is the presence of the natural resource, as well as University ownership. This regional resource is well located to cost-effectively serve the long-term needs of the region. A regional study by the Metropolitan Council, Department of Natural Resources and the University of Minnesota in 2002, titled Aggregate Resources Inventory of the Seven-County Metropolitan Area identified significant aggregate resources within UMore Park. In addition, the UMore Park Geological Assessment prepared by ProSource Technologies Inc., dated September 2008, identified the location, quality, and quantity of aggregate on the UMore Park property.

2.1.2 Alternative Technologies

Technology alternatives are not within the scope of the UMore Park Sand and Gravel Resources 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 were evaluated during the scoping analysis. For example, the UMore Park Geological Assessment was instrumental in defining the UMA as illustrated in Figure 2. This area represents the Preferred Alternative for the mining and ancillary operations on the site. Additional geologic and hydrologic studies conducted as part of the EIS were used to modify the location of storage and ancillary operations so that they are located in an area that is geologically least vulnerable to the potential for accidental releases or spills to affect groundwater.

As indicated in the Draft EIS, since publication of the SDD in June 2009, the University of Minnesota has modified the UMore Park Sand and Gravel Resources Project Study Boundary to include an additional 120-acres of the UMore Park property. The additional land is located adjacent to the eastern boundary of the original study area and immediately north of Dakota

County Road 46 (160th Street) extending to Akron Avenue. This design modification provides a more efficient layout for the ancillary use facility, provides greater separation from existing residential development, and minimizes potential effects on University research facilities. No changes in the scope and scale of the overall operations are proposed. Based on this change, the preferred alternative (see Section 2.1.7 below) has been revised to include the larger study boundary.

2.1.4 Modified Scale or Magnitude Alternatives

The scale and project magnitude were defined in part through the analysis conducted for the UMore Park Geological Assessment and the selected scale and magnitude parameters in the Preferred Alternative meet the project purpose and need. Therefore, scale and magnitude alternatives will not be addressed in the EIS.

2.1.5 Alternatives That Incorporate Reasonable Mitigation Measures

The Preferred Alternative defined below (Section 2.1.7) incorporates the reasonable mitigation measures identified to date to address the adverse impacts associated with the UMore Park Sand and Gravel Resources Project. This EIS considers all relevant mitigation measures suggested through public and agency comments and recommends incorporation of reasonable mitigation measures into project design and permitting as warranted. For example, reduced pumping rates were evaluated to minimize the potential for impacts to groundwater resources. Routine inspection and engineered containment features are incorporated into the design for fueling and storage areas. Also, greater setbacks from the mining phases to residential developments have been incorporated in response to public and agency comments received on the Draft EIS.

2.1.6 Alternatives Considered

Two alternatives are considered and addressed in the EIS. The first is the Preferred Alternative ("UMore Park Sand and Gravel Resources 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 UMA is not open to new mining and ancillary operations and the land continues to be utilized for agricultural and research purposes (see Section 2.1.8).

2.1.7 Preferred Alternative

The University is proposing to open new aggregate mine(s) and ancillary operations on approximately 1,722 acres of the UMore Park property (see Figure 2). Mining operations and practices are proposed to be similar to current practices at existing aggregate mines adjacent to and near the UMA. The project consists of three primary activities/components: 1) Mining and Aggregate Processing; 2) Ancillary Manufacturing; and 3) General Operations and Administrative.

Mining and Aggregate Processing

The University has entered into an agreement with Dakota Aggregates, LLC for it to operate the sand and gravel mining operations within the UMore Park Property, which is owned by the University of Minnesota. The Preferred Alternative includes mineral extraction and ancillary uses. A draft Mining Operation Plan and accompanying draft narrative describing the preferred alternative (UMA Draft Mining Plan) has been prepared by Dakota Aggregates, LLC, and is available for review at the UMore Park Administrative Offices.

The proposed mining and processing operations will include stripping and stockpiling of topsoil and other overburden material including clay for aggregate products and/or pond/landfill lining, clearing and grubbing, mineral extraction including the use of a floating

dredge, material transporting, material processing including crushing, screening, washing, bagging, asphalt production, concrete production, recycled aggregate production, loading and transporting materials to and from the proposed extraction site, and importing of compactable material for reclamation purposes.

Mining will progress in a series of phases shown on Figure 3. The Dry Mining Phases 1 and 2 will be modified in order to accommodate a greater setback between the mineral extraction activities and residential developments along County Road 42. The activities occurring within each mining phase include the removal of topsoil and overburden that will be used for reclamation activities or stockpiled for future use. Once the overburden is removed, extraction of the mineral deposit will begin. The mining and aggregate processing will be accomplished using several pieces of construction equipment including bulldozers, scrapers, backhoes, excavators, loaders, graders, dredges, conveyor systems, screens, crushers, wash plants, scales, and haul trucks. Topsoil and overburden stripping is the first step in aggregate mining. Initially, each mine site may require the stripping of a few dozen acres that will encompass the actual mining face. As the aggregate is extracted and the mine face advances, additional acreage will be prepared for mining operations. The aggregate reserves will be transported along a conveyor system or through the use of haul trucks to either a dry plant or a wash plant located in the ancillary use facility (AUF) area. At the plant, the material will be fed through a series of crushers, screens, conveyors, wash decks, and classifiers in order to produce the commercial grade construction aggregates. The mined materials will then be stockpiled adjacent to the processing plant and sold to contractors for construction jobs or internally transported and stockpiled for subsequent production of the various ancillary products (asphalt, concrete, etc.).

It is estimated that approximately 105 to 110 million tons of aggregate material (sand and gravel) will be extracted over approximately 40 years. It is estimated that approximately 250,000 tons of material will be removed within the first year of operation. However, the annual rates from the remaining production years are estimated to be between 700,000 to 3,000,000 tons per year depending on the economy and market demand. Extraction activities will reach approximately 80 feet below the natural water table in some areas during the floating dredge phases of the project. The materials extracted will consist of exceptional granular and aggregate material (sand and gravel).

Extraction activities are estimated to be completed by the end of 2051; however, the actual life of the extraction facility will be determined by the demand for the extracted products. Site reclamation will occur within 24 months after completion of mineral extraction in each phase; all reclamation responsibilities will be completed except for interim mine floor areas, which will remain open throughout mining operations for utilization of internal haul roads and processing activities. In general, reclamation will progress in increments/phases. During the first several years of operation as new mining areas are opened and the ancillary uses are developed, relatively little reclamation will occur. Final reclamation efforts will occur once no activities associated with the operations are necessary in a particular phase. The perimeter of the UMA will be reclaimed at a slope of three to one or flatter. Upon completion of reclamation, the property will be suitable for agricultural use.

Ancillary Use Facility Operations and Construction Materials

An approximately 187-acre ancillary use facility (AUF) area will support the mining operations. The AUF is located along the eastern edge of the UMA and north of County Road 46 as shown in Figure 3. This area will serve as the main operations center for the mining activities. A primary business office and scale houses will be located within the AUF along

with fueling and fuel storage areas. It will also be co-located with several plants that will manufacture value-added products from the mined aggregate.

As indicated above, the AUF will also be the location of several construction material plants. The construction material manufacturing activities will include ready mixed concrete production, bagging, asphalt production, and recycled asphalt product production. Each of these construction material plants will be located in close proximity to the aggregate processing to eliminate unnecessary handling and hauling.

Concrete materials of various types will be imported for recycling and integration into the variety of products produced by the project's operations. The AUF area will include the production, stockpiling, warehousing, and transporting items such as concrete block, pavers, cast pipe, and plank products.

Ready-mixed concrete production requires a facility capable of storing and mixing the ingredients for the various mix designs and will have storage silos for the materials, storage tanks for the liquid additives, and will maintain an area for stockpiling return concrete and truck wash out activities. The asphalt facility will require areas for aboveground liquid storage tanks and components which vary depending on the asphalt mix specifications including tanks for asphalt cement, tack oil and heating oil.

As described in Section 3.2, the AUF is located outside of well-head protection areas and in an area where the subsurface geology consists of low permeability glacial till that is naturally protective of groundwater in the event of a potential release. Proven environmental engineering controls will also be in place to prevent and contain potential spills from above ground storage tanks. These tanks will be equipped with secondary containment, will be registered with the state, and will be subject to routine testing and inspection. A spill prevention control and countermeasures (SPCC) plan will be prepared as part of permitting to describe specific measures and procedures for spill response. Recycled asphalt product piles will be underlain with a soil barrier layer and engineered with storm water runoff controls. Studies (e.g. Mn/DOT, 1996[1]; and Townsend et. al 1998[2]) have shown that chemicals leaching from recycled asphalt piles have limited mobility in the subsurface and solubility in water. If constituents do leach from the asphalt pads, they will be attenuated by the soil barrier. In addition, the areas will be developed and managed in accordance with Minnesota Department of Health (MDH) guidelines (MDH, 2006[3]) to minimize the potential releases of hazardous substances or petroleum products to the environment.

General Operations and Administrative

The mining season typically extends from late March through mid-December each year and occasionally starts earlier and runs later. Operations at the material processing site including all of the ancillary facility operations are proposed to be conducted between the hours of 6 AM and 6 PM Monday through Saturday. The proposed hours of operation may need to be altered to comply with local restrictions.

[1] Mn/DOT 1996. "Investigation of Water Quality in Runoff from Stockpiles of Salvaged Concrete and Bituminous Paving," Mn/DOT Report Number 96-31, September 1996.

[2] Townsend, T. and Brantley, 1998. "Leaching Characteristics of Asphalt Road Waste," Report 98-2; University of Florida Center for Solid and Hazardous Waste Management, June 1998.

[3] MDH, 2009. Wellhead Protection Issues Related to Mining Activities , Minnesota Department of Health Source Water Protection Bulletin, August 2009 .

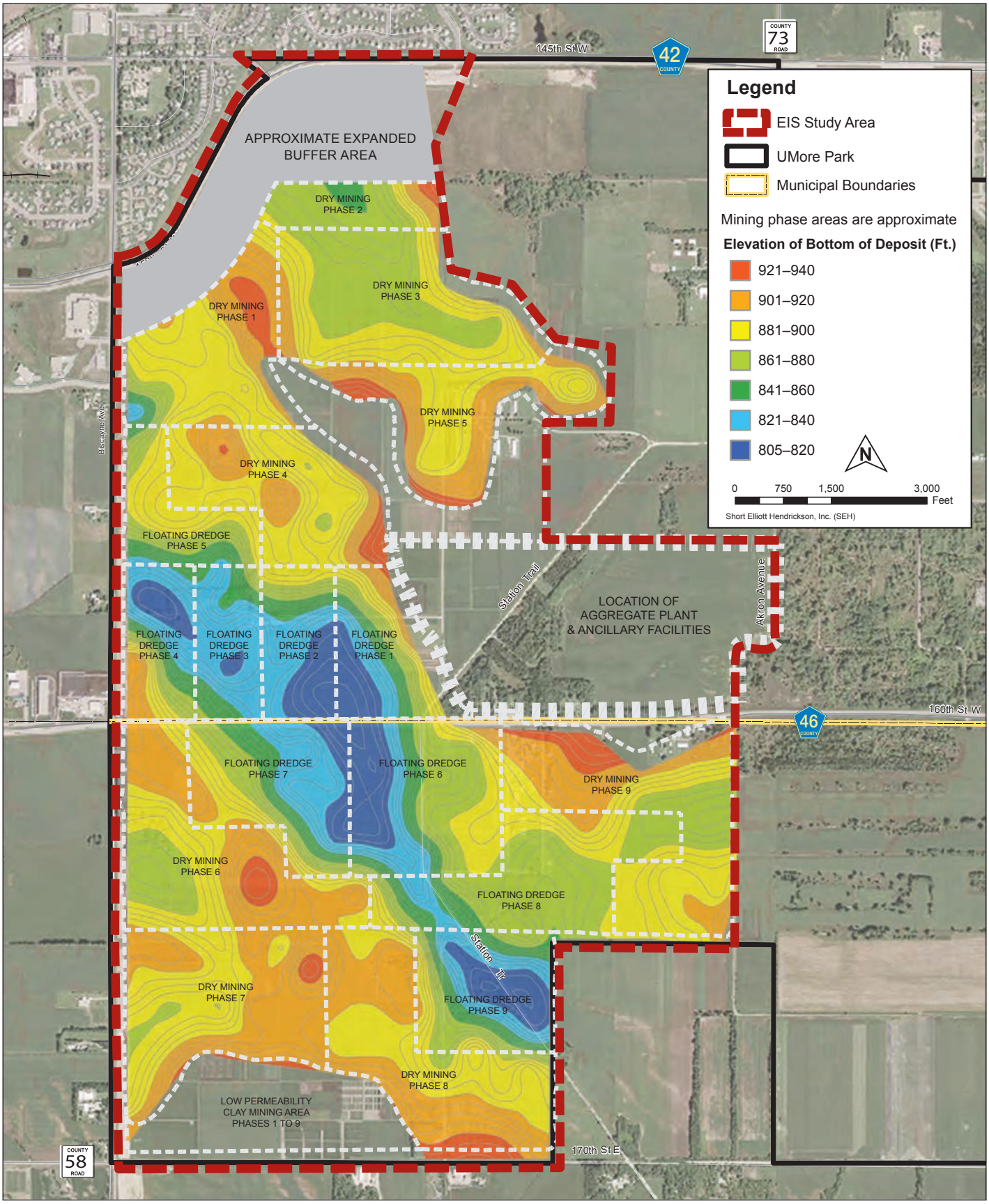

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Figure 3

UMA Phased Mining Plan

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With the short peak construction season in Minnesota, as much processing time as possible is needed to manufacture the quantities of aggregate products needed to meet specifications for public and private projects that will arise over the life of the mining operation. As a result, 24-hour-a-day operations for material hauling and dredging/processing activities are proposed. Both public and private entities commonly require that concrete pours, asphalt paving, and other aggregate material hauling activities occur at non-peak hours during the night and into the early morning hours for safety and efficiency in relation to certain jobs.

Without the ability to haul around the clock, the UMore mining operation will lose the opportunity to supply aggregate products to projects with off-peak needs. Additionally, the actual drive time for a haul truck to/from a mining pit location to the respective project is crucial in terms of efficiency. Daytime traffic congestion can limit delivery opportunities for some projects; however, night and early morning hauling with minimal traffic congestion reduces the overall haul times allowing for a decrease in trucking time.

It is proposed that 24-hour-a-day dredging activities be allowed in order to allow greater quantities of mineral extraction to occur on an annual basis without causing a nuisance to surrounding properties since the dredging operation is relatively quiet and is not anticipated to disturb residential areas. Additionally, the operator proposes a maximum of 15 Sundays a year for operation including hauling between the hours of 6 AM and 6 PM. Due to tight project deadlines, Sunday operations may be required to meet a specific project's completion date. The number of potential Sunday operations and operating hours will be subject to local restrictions.

The primary access to and from the mining operation will occur at an intersection along County Road 46 just east of Station Trail (near the existing UMore Park Administrative Office Building access point to County Road 46). A secondary access point to the AUF and mining operations will occur at the intersection of County Road 46 and Akron Avenue. With the proposed mining operation spanning more than 2.5 miles north to south and approximately 1.5 miles west to east, several other secondary access locations will be required for ingress and egress to various phases of the mining operation. Secondary access locations will be utilized along the existing roads such as Biscayne Avenue, County Road 46, County Road 42, Akron Avenue, and 170th Street. The majority of the truck traffic generated from the operations will utilize the primary access point at County Road 46 and Station Trail. The proposed location and operation of these access points are further discussed in the traffic analysis section of this Final EIS.

2.1.8 No-Build Alternative

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

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3.0 Affected Environment and Environmental Consequences

The subject areas presented and analyzed in Section 3.0 were identified in the SEAW and final SDD for inclusion in the UMore Park Sand and Gravel Resources Project EIS.

3.1 Land Use

3.1.1 Affected Environment

The UMA is part of the UMore Park property that has been owned and operated by the University of Minnesota since the late 1940s. The entire UMore Park encompasses nearly 5,000 acres in the City of Rosemount and Empire Township. Existing land use patterns for UMore Park within the two jurisdictions have been similar or consistent with one another over the years. The University of Minnesota has used the land for educational outreach programs, research, agricultural production, and to a more limited extent, recreational activities. The UMA is within a regionally significant deposit of gravel and sand resources in Dakota County. This was documented in the Aggregate Resources Inventory of the Seven County Metropolitan Area Minnesota (Metropolitan Council and the University of Minnesota, 2002).

Areas of traditional suburban growth have emerged over the last twenty years near the UMA, particularly to the north and west in the City of Rosemount. On a regional scale, this development pattern is consistent with much of central Dakota County. Undeveloped land guided for future urban commercial development is located to the north and east of the UMA site. Existing sand and gravel operations are located to the south and west of the UMA site. All remaining adjacent land uses are of an agricultural, institutional/research facility or farmstead use including the area of UMore Park east of the UMA.

The following land use assessment used a half-mile (2,640 feet) distance from the project boundaries to evaluate existing and planned land use patterns. This distance was determined as a reasonable distance of measurement for the purpose of assessing potential land use impacts in the SEAW. In some cases, this distance may not fully address mining operation impacts associated with items such as traffic, ground water, or surface water. These areas of impact are addressed in further detail in their appropriate sections throughout Section 3.0 of this Final EIS.

City of Rosemount – Existing Land Use

Within the City of Rosemount, adjacent land uses within a half-mile of the UMA include typical suburban residential neighborhoods, a developing business park and some industrial areas (see Figure 4). The residential neighborhoods are located north of the proposed UMA and are comprised of a mix of single-family residential detached dwelling units and attached townhomes. Also located within a half-mile of the UMA are storage facilities, office buildings, service shops, and a convenience store.

A business park and a general industrial land use pattern are located adjacent to the western edge of the site between 145th Street and 160th Street. The business park encompasses approximately 335 acres and currently includes approximately 408,000 finished square feet of manufacturing, office, warehousing, storage, and industrial space. Biscayne Avenue separates these developments from the western limits of the UMA.

Table 1 identifies the existing land uses within a half-mile of the UMA.

Table 1 – City of Rosemount Existing Land Uses

Existing Land Use	Half-Mile Buffer			Directly Adjacent		
	Acres	Existing Housing Units	Finished Commercial /Industrial (Sq. Ft.)	Acres	Existing Housing Units	Finished Commercial /Industrial (Sq. Ft.)
Agricultural	225	-	-	15	-	-
Farmstead	70	1	-	70	1	-
Single Family Residential	199	537	-	23	31	-
Multi-Family Residential	46	352	-	9	83	-
Commercial	3	-	2,096	-	-	-
Office	11	-	35,216	-	-	-
Industrial	135	-	689,213	29	-	106,316
Agricultural Research*	1,864	-	1,880	803	-	1,016
Public/Semi-Public	81	-	-	-	-	-
Open Space	92	-	-	12	-	-
Vacant - Single Family Residential	55	-	-	17	-	-
Vacant - Multi-Family Residential	4	-	-	-	-	-
Vacant - Industrial	6	-	-	0	-	-
Vacant - Commercial	16	-	-	4	-	-
ROW	140	-	-	-	-	-
Total:	2,861	890	728,405	823	115	107,332

* 879 acres of the UMA is located in the City of Rosemount

City of Rosemount – Planned Land Use

The City's 2030 Comprehensive Plan Update guides the entire UMA under the "Agricultural Research" designation (see Figure 5). The compatibility of this designation with the University's initiatives is discussed further in Section 3.17. Table 2 quantifies the planned land uses within a half-mile of the UMA.

Table 2 – City of Rosemount Planned Land Use

Planned Land Use	Half-Mile Buffer (Acres)	Directly Adjacent Parcels (Acres)
Agricultural Research*	1,778	642
Low Density Residential	336	37
Medium Density Residential	61	-
High Density Residential	4	-
Community Commercial	66	15
Business Park	328	129
General Industrial	50	-
Public/Semi-Public	60	-
Open Space	39	-
ROW	140	-
Total:	2,861	823

* 949 acres of the UMA is located in the City of Rosemount

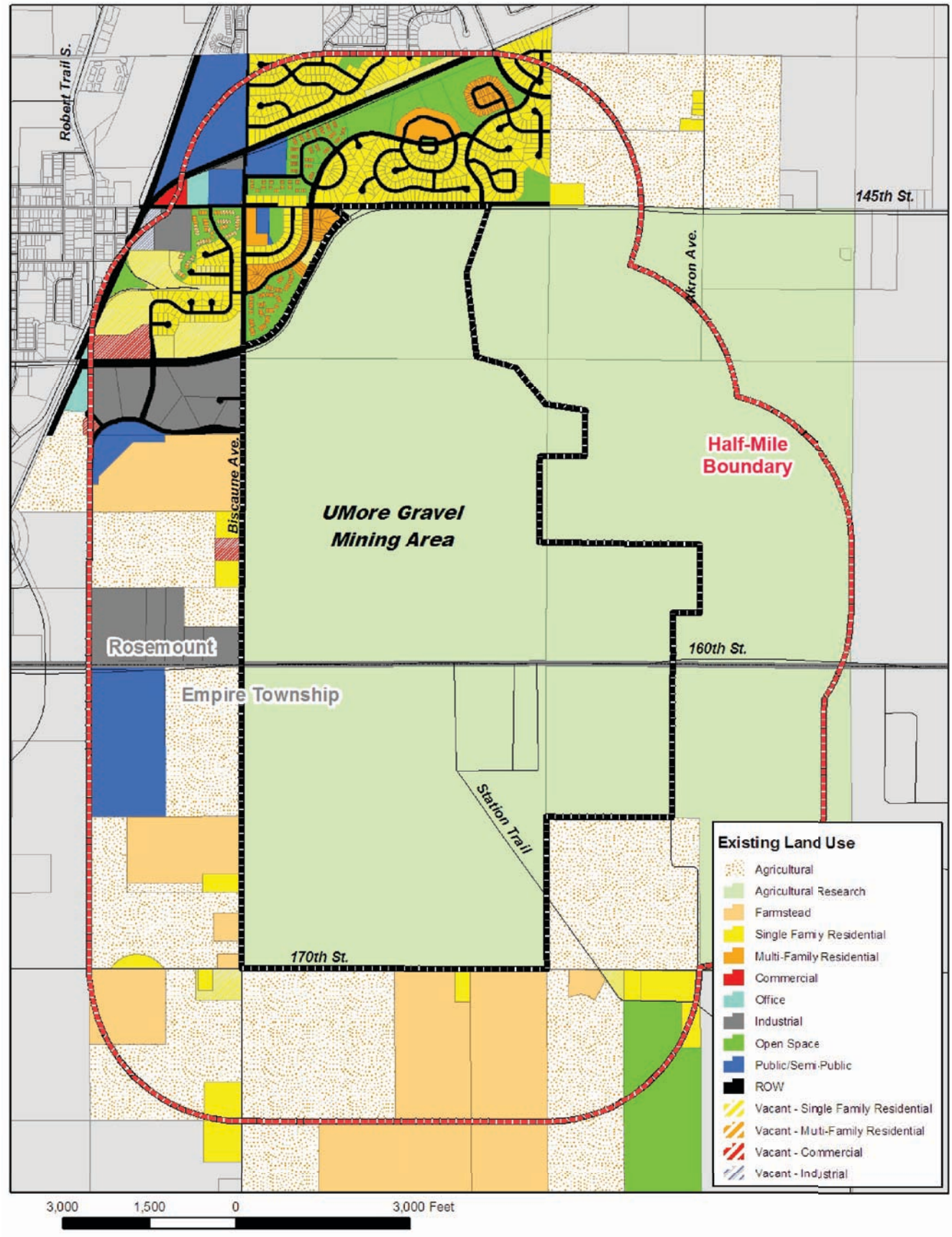

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Figure 4
Existing Land Use

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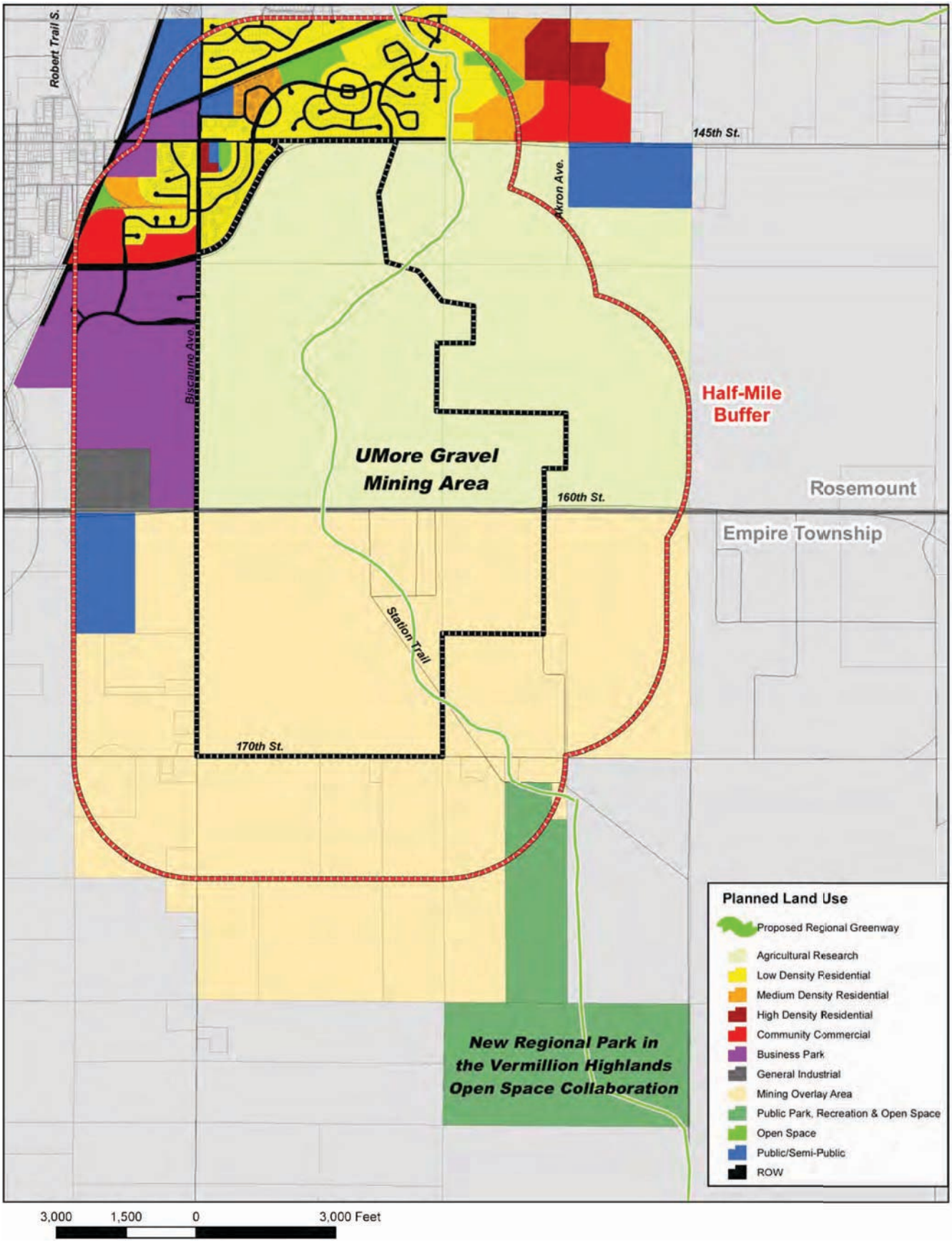

UMore Park Sand and Gravel Resources

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Figure 5
Planned Land Use

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An area of future development planned for higher intensity uses is located northeast of the project area at the intersection of Akron Avenue and Country Road 42 and extending north to the Union Pacific Railroad. This area was the subject of an Alternative Urban Area-Wide Review (AUAR) completed by the City of Rosemount in 2006. The AUAR documents the planning assumptions in greater detail. The land use acreage in Table 2 is consistent with the City's Comprehensive Plan that depicts future land use patterns for this area. Additional detail on the AUAR area is provided in Section 3.20 Cumulative Effects. The City's Land Use Plan anticipates this area of the community to develop between 2011 and 2020. This area would likely absorb the bulk of new residential development that falls within the half-mile boundary of the UMA. Today there is approximately 80 acres of vacant land guided for a mix of commercial and higher density housing within a half-mile of the UMA. Density ranges provided in the City's 2030 Comprehensive Plan were used to assess the number of new residential units that may be absorbed within a half-mile of the UMA over the next twenty years based on vacant land supply (see Table 3).

Table 3 – City of Rosemount Estimated Residential Development

Residential Development	Density Range		Acres	Minimum Units	Maximum Units
	Minimum	Maximum			
Low Density Residential	1	5	51	51	257
Medium Density Residential	5	10	32	158	316
High Density Residential	10	24	0	0	0
Total:	N/A	N/A	83	210	574

Land guided for commercial, industrial and office uses would likely occur along the western edge of the project area, in addition to some commercial development at County Road 42 and Akron Avenue. These areas have experienced some development over the last twenty years; however, there are still large tracts of land available for infill or higher intensity uses. The potential for new commercial and business park uses is estimated in Table 4.

Table 4 – Rosemount Estimated Commercial/Industrial Development

Planned Land Use	FAR *	Acres	Sq. Ft.
Community Commercial	0.2	65	564,799
Business Park/General Industrial **	0.3	142	1,852,128
Total:	N/A	207	2,416,927

* The City's 2030 Comprehensive Plan does not provide assumptions for a floor area ratio (FAR). The FAR provided in this assessment is based on industry standards for related development within the Twin Cities Metropolitan Area.

** Land guided for General Industrial within the half-mile buffer accounts for one acre.

Empire Township – Existing Land Use

Existing land use patterns in the half-mile boundary within Empire Township primarily consist of agricultural uses (including active mining operations), farmsteads and agricultural research facilities owned and operated by the University of Minnesota (see Figure 4 and Table 5). The residential uses within the half-mile distance are comprised of single-family dwelling units and farmsteads, several of which are located directly adjacent to the UMA. Commercial and industrial uses are not present within the half-mile distance, except for the Dakota County Empire Transportation Facility located on the western edge of the UMA near 160th Street. Farming operations are the predominant land use seen throughout the half-mile distance. There are two active mining sites in Empire Township within the half-mile distance to the south of the UMA that consume roughly 30 acres.

Table 5 – Empire Township Existing Land Use

Existing Land Use	Half-Mile Buffer			Directly Adjacent Parcels		
	Acres	Existing Housing Units	Finished Commercial/ Industrial Sq. Ft.	Acres	Existing Housing Units	Finished Commercial/ Industrial Sq. Ft.
Agricultural	825	-	-	641	-	-
Farmstead	502	5	-	456	4	-
Single Family Residential	58	9	-	8	2	-
Multi-Family Residential	-	-	-	-	-	-
Commercial	-	-	-	-	-	-
Office	-	-	-	-	-	-
Industrial	-	-	-	-	-	-
Agricultural Research *	1,127	-	-	485	-	-
Public/Semi-Public	80	-	-	-	-	-
Open Space	138	-	-	-	-	-
Vacant - Single Family Residential	11	-	-	8	-	-
Vacant - Multi-Family Residential	-	-	-	-	-	-
Vacant - Industrial	-	-	-	-	-	-
Vacant - Commercial	-	-	-	-	-	-
ROW	-	-	-	-	-	-
Total:	2,740	14	-	1,598	6	-

** 776 acres of the UMA is located in Empire Township*

Empire Township – Planned Land Use

Most of the land located within a half-mile of the proposed UMA is guided under the "Mineral Extraction Overlay Area" (see Figure 5 and Table 6). At the edge of the half-mile buffer to the east is an area guided for "Public Park, Recreation and Open Space." This area has been preserved for the future Empire Wetlands Regional Park. The Mineral Extraction Overlay Area is defined as follows by the Township's Land Use Plan:

"The purpose of the Mineral Extraction Overlay area is to identify concentrated locations of high quality aggregate and where mineral extraction may occur. Over 6,000 acres of land are included in the overlay area, including portions of UMore Park. Environmental reviews for mineral extraction have been completed on nearly 4,000 acres of land. Over 1,000 acres of land are currently permitted for mining in the Mineral Extraction Overlay area. The mining operations will include aggregate processing, ready mix concrete plants, asphalt plants, and other aggregate accessory uses, including roadway construction businesses and related uses."

This portion of Empire Township is not anticipated to urbanize within the life expectancy of the comprehensive plan, but will serve as a resource for aggregate materials.

Table 6 – Empire Township Planned Land Use

Planned Land Use	Half-Mile Buffer (Acres)	Directly Adjacent Parcels (Acres)
Mining Overlay Area*	2,522	1,598
Public/Semi-Public	80	0
Public Park Recreation & Open Space	138	0
Total:	2,740	1,598

** 776 acres of the UMA is located in Empire Township*

Dakota County 2030 Comprehensive Plan Update – Greenways

Dakota County's 2030 Comprehensive Plan provides a framework for preserving and protecting a network of green infrastructure. This system includes a series of greenways that would enhance open spaces and provide community benefits in the area of water quality, habitat, recreation and non-motorized transportation. The greenway system plays a significant building block to the County's green infrastructure plans.

A greenway corridor is proposed to pass through the UMA site connecting Vermilion Highlands and the new Dakota County Regional Park to Lebanon Hills Regional Park and other destinations north of the UMA (see corridor in Figure 5, Planned Land Use). The comprehensive plan recognizes that preserving this corridor from a land use planning perspective is a complex matter. The University recognizes the need to work collaboratively with Dakota County and other stakeholders to incorporate the greenway corridor in the end use plan.

3.1.2 Environmental Consequences

Mining operations will be phased throughout the UMA (see Figure 3) and extraction activities are expected to be completed by the end of 2051. In the first several years of operation as new mining areas are opened and the ancillary uses are developed, relatively little reclamation will occur. It is anticipated the first and second phases of extraction would occur in the northern portion of the UMA between the years 2011 and 2024. These areas of extraction are closest to existing residential land use patterns. Land guided for additional residential and commercial uses is also located within some proximity of the first two phases of extraction. The City of Rosemount's Land Use Plan anticipates these areas along Akron Avenue and north of County Road 42 will develop between the year 2011 and 2020.

In respect to the adjacent land uses, minimal adverse environmental consequences directly related to land use patterns are anticipated. Existing and planned land uses in Rosemount and Empire Township are compatible with the UMA, as proposed.

3.1.3 Mitigation

Mining operations will be setback a minimum of 350 feet from residential properties. In addition, along County Road 42 where there is the greatest concentration of residences the mining operations setback will range from 1,000 to 1,600 feet. This expanded setback encompasses the majority of the residential land use adjacent to the UMA. In addition, berming will be constructed 10 feet high with a 5-foot top and 3:1 side slopes as indicated on the Mining Plan, which is available for review at the UMore Park Administrative Office. The berm will be seeded and maintained as needed by the operator. As mineral extraction transitions to lower elevations of depth, the equipment and the extraction area will not be visible to the adjacent residential properties on the north side of County Road 42.

Other activities that will ensure the operation complies with local planning initiatives include:

- The University will file a zoning amendment with Empire Township, and
- The University will file a zoning amendment with the City of Rosemount.

3.1.4 No-Build Alternative

Under the No-Build Alternative, existing and planned land uses would not be impacted by mining activities, and the existing land use for the UMA would continue as an agricultural and institutional/research facility use.

3.2 Environmental Hazards

3.2.1 Affected Environment

The unconsolidated soils, bedrock geologic units, and groundwater are the media most susceptible to potential past releases of hazardous substances or petroleum products to soil or subsurface within the UMA. The relatively high permeability of the near surface soils and the possible hydraulic connection between the outwash (water table aquifer) and the underlying bedrock aquifers have been cited as a potential concern in the context of mine development. The concern is that mine operations, material storage, and or alteration of the landscape from mining may affect the direction of groundwater flow and/or groundwater quality.

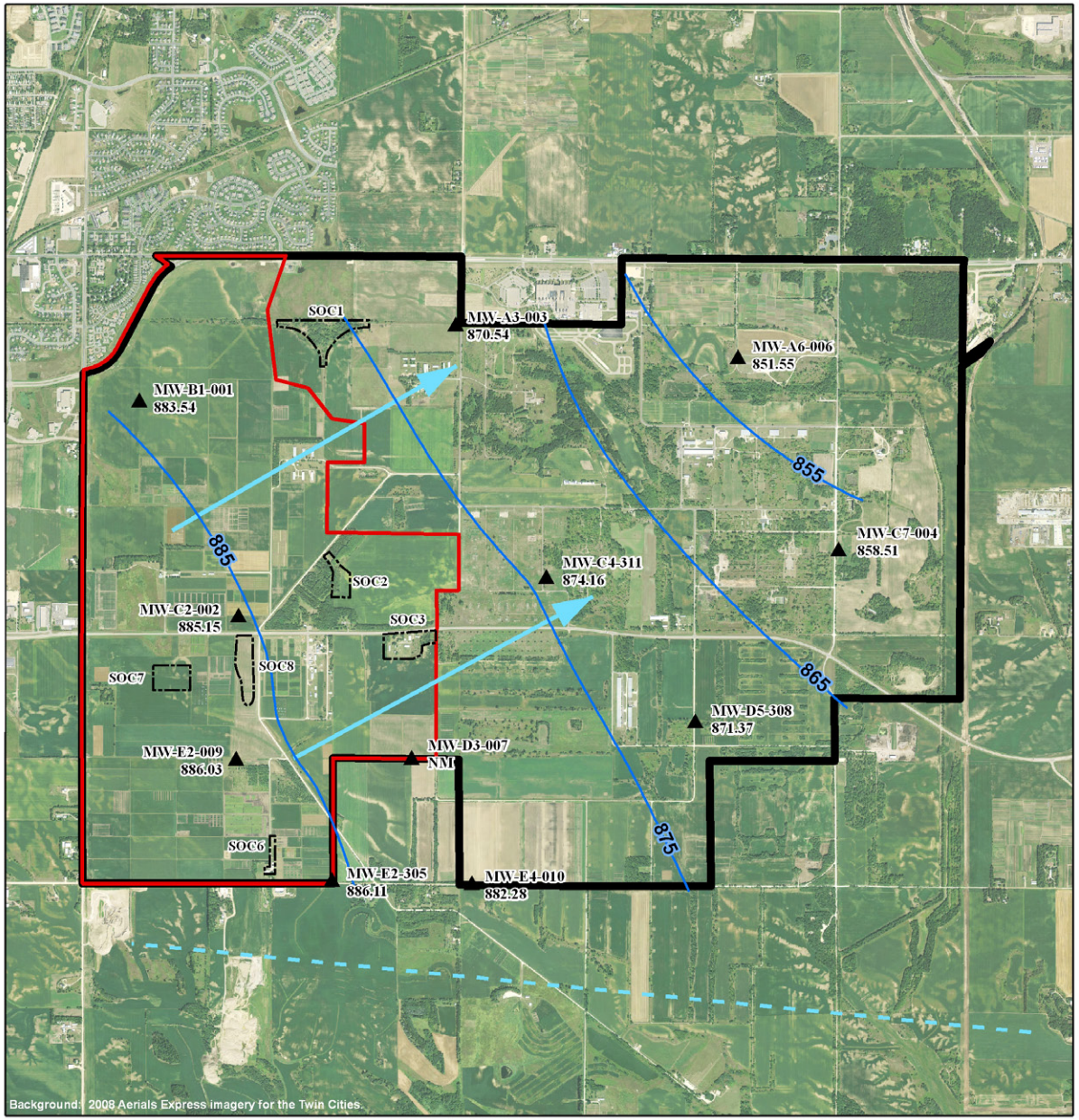
In order to address these concerns, several field investigations, extensive monitoring, and numerous computer groundwater model simulations have been completed to better understand the groundwater flow system and assess potential historical environmental releases within the UMA. A summary of information gathered from these investigations is described below. A complete listing of these investigations along with relevant reports and work plans can be found at: www.umorepark.umn.edu/Gravel_Resources_and_Assessment.html.

The unconsolidated soils at the UMA consist of thin veneer of windblown silt underlain by sandy to gravelly glacial outwash which was deposited over, and laterally equivalent to areas of thick glacial till (clay) deposits. The uppermost bedrock units in the area consist of erosional remnants of the St. Peter Formation sandstone and the underlying Prairie Du Chien Group (PDC) dolostone. The PDC is the uppermost laterally continuous bedrock unit in the mining area and provides a separation between the outwash and the underlying Jordan Formation sandstone.

Like most portions of northern Dakota County including the UMA the PDC is potentially susceptible to dissolution of the carbonate rock resulting in development of karst features. These processes typically occur when the rock is exposed at the surface and subject to infiltration under unsaturated conditions. However, the water table under the UMA occurs within the outwash or other glacial deposits throughout most of the UMA. The dolostone under the UMA is therefore covered with glacial deposits and will continue to exist under saturated conditions during and after mining activities. There are no known features at or near the site listed in the Minnesota karst features database[4] (There are also no unusual groundwater flow patterns in the dolostone below the outwash that would indicate potential karst solution features are likely to influence future mine operations. Therefore, available information suggests that karst is not likely a potential or likely hazard at the UMA).

Groundwater within the UMA flows to the northeast and ultimately discharges to the Mississippi River. Although the UMA is located within the Vermillion River surface watershed, there is a groundwater (no-flow) divide located along the southern edge of UMore Park. This divide separates the groundwater flow system at the UMA from the surface flow system that discharges groundwater to the Vermillion River. Groundwater contours and flow directions at UMore Park are shown on Figure 6.

[4] Yongli Gao, E. Calvin Alexander, Jr., and Robert G. Tipping - The development of a karst feature database for southeastern Minnesota. *Journal of Cave and Karst Studies 64*(1): 51-57.)..



874.67 Groundwater Elevation ft, msl July 1, 2009

Monitoring Wells

Groundwater Elevation Contour

Approximate Groundwater Flow Divide

Groundwater Flow Direction

Site of Concern (SOC) Boundary

UMore Mining Area (UMA)

UMore Park Boundary

Source: Metropolitan Council, MnDOT, Dakota County, Barr, ProSource, James R. Hill, HKGi.

Water levels used for this map are from wells completed in the uppermost saturated unit and within 25 feet of the water table. Well MW-C4-311 completed in St. Peter Sandstone confined by diamicton.

N

Feet

3,000 0 3,000

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Figure 6

Groundwater Flow Map—
Uppermost Saturated Unit

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It is not unusual for differences to exist between surface watersheds and groundwater flow boundaries. These differences occur because surface water runoff is controlled by surface topography whereas groundwater flow direction is controlled by regional hydraulic (pressure) gradients. In this case of the UMA, the regional hydraulic gradient is toward the Mississippi River and not toward the Vermillion River. A detailed description of the site geology and groundwater flow within the UMA and surrounding area is provided in the SEAW, Section 3.8 of this Final EIS, and the Groundwater Assessment Report (Barr, 2009a[5]).

The majority of residential water supply wells near the UMA are completed in the PDC. The Jordan Formation sandstone is utilized as a source aquifer for high capacity wells, including the City of Rosemount's water supply well. Strategies to protect groundwater supplies and modeling of potential effects of mining are described in Section 3.8.

3.2.2 Environmental Consequences

There are two primary concerns relative to potential environmental releases for this project. The first concern is that groundwater below the UMA might become impacted due to a release of chemicals or materials that are stored or used during mining operations (e.g. from above ground storage tanks). The second concern is the possibility that environmental releases from past land use may become disturbed or mobilized as a result of mining operations. A unique feature of UMore Park is the presence of the former buildings and storage areas for the World War II-era Gopher Ordnance Works (GOW). Additionally, historical agricultural operations have been located within the UMA. Some previous soil impacts are associated with these past land use activities.

The following sections address the potential concerns for releases of hazardous substances or petroleum products from the planned mining operations as well as the results of investigations conducted within the UMA to address known and suspected areas of environmental impact based on past land use.

Environmental Hazards Associated with Mine Operations

Potential sources of environmental impacts within the UMA would be related to the storage of petroleum used for fueling equipment, storage of asphalt cement, storage of lubricants and chemicals associated with equipment maintenance, the storage of recycled asphalt product piles and miscellaneous additives or other materials used in concrete and asphalt production.

The protection of groundwater resources is a high priority in planning for the future of the UMA and has been incorporated into the UMA Draft Mining Plan. The following measures were incorporated into the UMA Draft Mining Plan that will help to avoid or mitigate the potential for future impacts to groundwater. These include:

- Siting of the AUF – The operations with more potential to result in impact to groundwater will occur in the AUF, which will be located along the eastern edge of the UMA (Figure 3). This area is underlain by dense glacial till which provides a natural protective barrier to limit the migration of a potential release to groundwater. As described in Section 3.8, the proposed AUF will be located in an area of low groundwater vulnerability and outside the City of Rosemount's future conceptual Drinking Water Supply Management Area (DWSMA). The area proposed for the AUF is considered an area of low environmental risk to groundwater because

[5] Barr Engineering Co., 2009a. *Groundwater Assessment Report, Resource Document for Environmental Impact Statement, UMore Mining Area, Dakota County, Minnesota.* Prepared for University of Minnesota. June 30, 2009.

groundwater movement within the underlying glacial till is extremely slow. If an environmental release occurs in this area, it can be mitigated long before groundwater resources are impacted.

- Clay Liners and Containment – The petroleum fuel storage, asphalt cement and binder material storage, and equipment fueling operations will take place within secondary containment to prevent a release from migrating laterally and vertically into the subsurface. The recycled aggregate piles will be lined with a soil barrier to minimize leaching to groundwater. Although not likely to be a source of release, the wash water recirculation ponds will also be lined to limit infiltration.
- Facility Response, Operations, and Training – The UMA Mining Plan includes provisions for implementing best management practices (BMPs) to manage run off from stock piles and other storage areas. A site-specific Spill Prevention, Control, and Countermeasures (SPCC) plan will be prepared to identify the location and volumes of petroleum and hazardous materials at the UMA and will include redundant measures for containment, routine inspections, training, and equipment that will be used to prevent and rapidly respond to a release at the facility.
- Implementation of Minnesota Department of Health (MDH) Guidance and City of Rosemount Wellhead Protection Plan – The operations at the AUF, including equipment fueling and asphalt and concrete production, will be conducted in areas outside the conceptual DWSMA. Operations within both the active mining area and the AUF will be consistent with guidance documents prepared by the MDH for protection of groundwater at aggregate mining sites (MDH, 2009) and the City's current and future Wellhead Protection Plan requirements.

The environmental pathway to groundwater receptors would be direct infiltration of a release into the subsurface or surface water runoff into the mine and subsequent infiltration into soils. If a sufficient mass of hazardous substances or petroleum products infiltrates and migrates vertically through the subsurface, it would eventually reach the water table. Subsequent migration of these substances in groundwater could then result in impact to potential human and/or ecological receptors. It should be noted that migration of a potential release directly into the mine lake is unlikely due to mitigative features described above. Storm water runoff controls and storm water pretreatment measures that will be incorporated into the project as part of the permitting process. Spill response and control measures would be implemented to contain and rapidly remove a potential future release.

If a direct release of a hazardous substance or petroleum product into the lake did occur (without first infiltrating into the subsurface soil), it would be similar to a release directly to the water table, except that the mass of the release would be diluted by mixing with the water in the lake before it would be able to migrate in groundwater. A computer simulation of a release to the water table is described in Section 3.8 and demonstrates that the potential for impact to human or ecological receptors from the UMA is very low. Additionally, the diluted substances introduced in the lake would enter a broad cross-section of the aquifer as it exited the lake into the aquifer, thereby further decreasing the concentrations entering the groundwater flow system and mitigating impact to potential human and/or ecological receptors.

Environmental Hazards Associated with Past Land Use

The second way the project could result in a release to the environment is if past release of petroleum products or hazardous substances were to be disturbed or mobilized as part of mining operations. There are several potential release scenarios that could be involved with specific mine operations. One is that soils affected by past spills or releases to surface soil would be stripped as part of topsoil removal during pre-mining site preparation. This soil

would most likely be stockpiled within the UMA, but moved away from the hypothetical source area so that the release might then be present in both the original source area as well as the stockpile area. In later years, the stockpiled soil could be used for reclamation, so the impacted soil could potentially be moved to other portions of the UMA. Therefore, identification of potential past release areas and careful management of affected surface soil is an important goal in the implementation of the proposed mining operations.

Similarly, buried wastes (e.g. concrete rubble, demolition debris and/or other materials) could conceivably be encountered during the stripping and subsequent excavation of soil. Although it is unlikely that these wastes would be stockpiled since they would be readily visible during stripping, they would present on-site management challenges if encountered unexpectedly. In each of the above cases, the most likely populations that would be exposed to the affected soils or debris would be on-site workers.

Several investigations have been conducted within the UMA to identify source areas of a potential release and to evaluate potential exposure pathways. This information is needed to develop Response Action Plans (RAPs) to remove or manage those affected areas prior to, or in conjunction with mine-site preparation or mining operations.

Work within areas that are not the subject of a RAP will be conducted under a site-specific Environmental Contingency Plan (ECP) that will anticipate how to identify, investigate, and manage different types of unforeseen environmental hazards if they are discovered during the course of mining. Both the RAPs and the ECP will be submitted to the Minnesota Pollution Control Agency (MPCA) for review and approval prior to commencement of mining

Background Information on Past Land Use

The majority of the UMA has been used as farmland, therefore the potential for substantial environmental impact from past land use is very low. However, a portion of the land within the UMA was used to support the former Gopher Ordnance Works (GOW) and/or for other uses that had the potential for the releases of hazardous substances or petroleum products to the environment.

It is important to note that the GOW production and maintenance facilities for which construction was completed and which were placed in service were concentrated on the eastern third of UMore Park, well east of the UMA. The GOW operations were focused mainly on the production of smokeless gunpowder for cannon and rifle shells. No munitions assembly or high explosives (e.g. TNT, RDX, nitroglycerin, etc.) production was associated with the GOW. The plant also was used for manufacture of several intermediary products for powder production such as a concentrated form of sulfuric acid known as oleum that was also exported to other ordnance plants.

The history of the GOW construction was relatively short and involved intense construction activity during 1942 to 1943 (see http://www.umorepark.umn.edu/sites/c9e0e563-70e4-43e4-8a5e-b620e3ae848e/uploads/Appendix_A_Background_Information.pdf). Construction of the facility was halted in 1943 then restarted in late 1944 so that limited gunpowder production occurred only during the period from January to August 1945. With the surrender of Japan in 1945, powder production ended, although the plant was in kept in use for the purpose of reworking salvaged powder through the middle of 1946.

Eventually, the GOW was declared war surplus. Demolition activities were initiated and included burning off excess powder and powder-coated materials, knocking down buildings, stripping and shipping unused production materials. At least some of the demolition debris was buried in low areas near the production lines. The property on which the UMA is located

was transferred to the University by the Federal Farm Mortgage Corporation in 1947. The former GOW storage and support areas within the UMA soon became part of agricultural fields or were used to support research activities.

Past land use in portions of the UMA may have resulted in spills, leaks or spreading of the petroleum products and hazardous substances on the ground surface. Therefore, if a release occurred within these areas it would most likely have affected topsoil and shallow soils.

In areas where building debris might have been buried, deeper subsurface soil impact is possible due to leaching of chemicals from within the debris into underlying soil. To date, sampling and analysis of groundwater monitoring wells placed around the UMA have not confirmed that an impact to groundwater is present within proposed extraction areas or downgradient from the UMore Mining Area. The following sections describe the investigations that have been conducted, potential release source areas, and planned response actions.

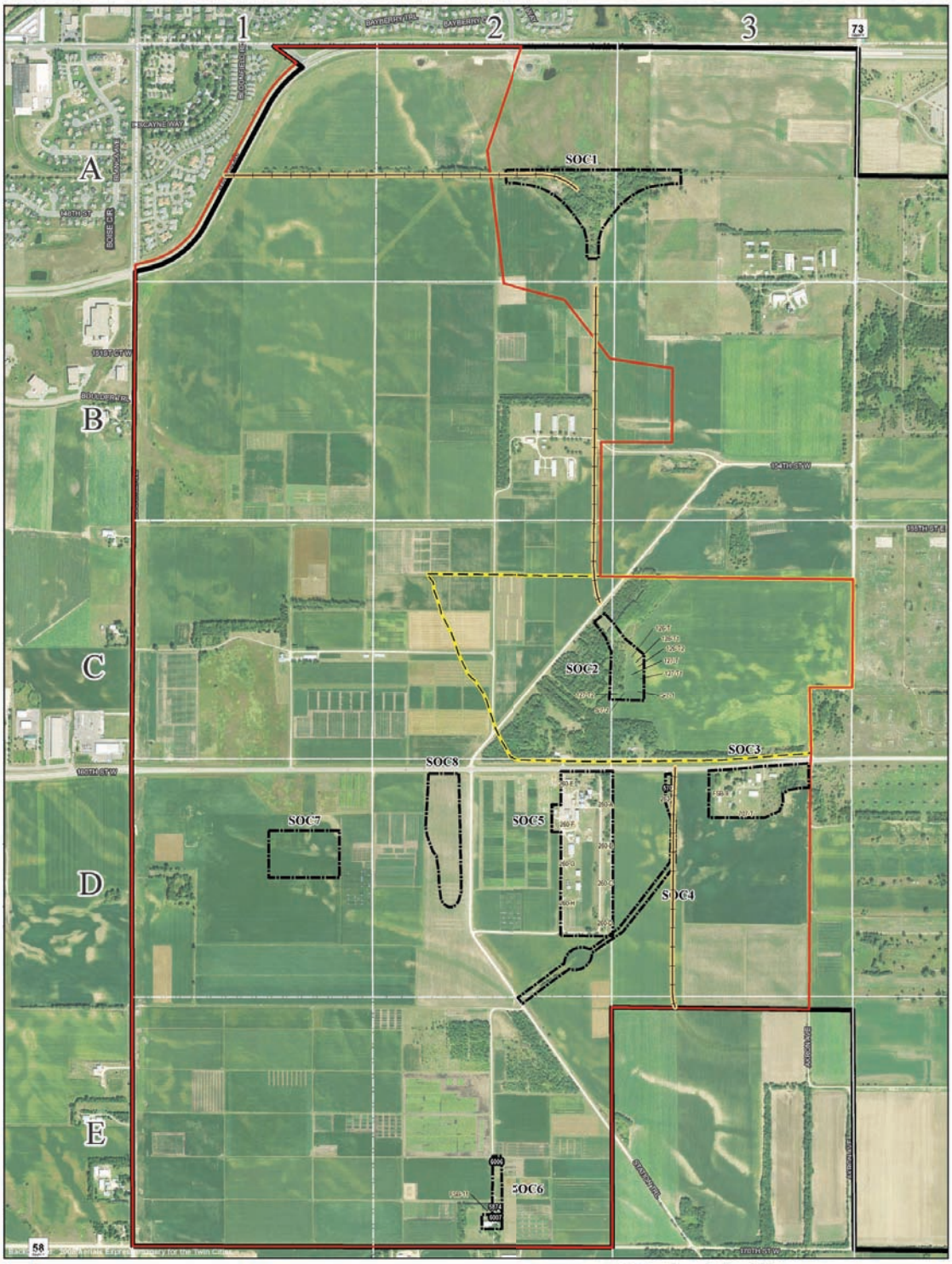
Previous Studies and Preliminary Investigations

On behalf of the University, Barr reviewed standard environmental databases, Dakota County reports, historical information, a previous Phase I Environmental Site Assessment of UMore Park completed by Peer (2006[6]) for the University and the United States Army Corps of Engineers (USACE) investigation (USACE 2009[7]). This information, along with a series of site reconnaissance visits, interviews with UMore staff, and an extensive review of historical aerial photographs, was used to identify potential locations for further investigation.

Based on these reviews, there was no evidence of the release of hazardous substances or petroleum products over the vast majority of the UMA. However, there were several locations for which there was some evidence of past use that was potentially associated with releases of hazardous substances or petroleum products. There were also several past GOW support areas that had not been previously investigated by USACE. Table 7 provides a summary of these potential Sites of Concern (SOCs) within the UMA that were identified for further investigation. In addition, the proposed location for the ancillary use facility (AUF) was investigated to assess the potential for past releases. The location of the SOCs and AUF within the UMA are shown on Figure 7. The potential constituents of concern at these SOCs include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), asbestos containing materials (ACM), pesticides, herbicides, metals, and explosive constituents.

[6] Peer Engineering, 2006. *Phase I Environmental Site Assessment, UMore Park, Rosemount, Minnesota.*

[7] USACE 2009. *Final Focused Site Inspection Report,* Former Gopher Ordnance Works, Rosemount, Minnesota, prepared by BayWest, March 2009.



UMore Mining Area (UMA)
UMore Park Boundary
Site of Concern (SOC) Boundary
Extent of Former GOW Railgrade in UMA
Ancillary Use Facility Boundary
260-H GOW-Era Building Name
8152 Previously Mapped and Evaluated Site Number

Feet
1,000 0 1,000

SOC1 Former Railroad "Y"
SOC2 Forestry Research/Former GOW Storage
SOC3 Ag. Engineering/K Street Dump
SOC4 Former DNT Platform and AOC 3-DA1
SOC5 Central Services/Former DNT Bunkers (AOC 5)
SOC6 Southern Complex Storage Buildings and Wash Pads
SOC7 Susp. Disposal Area
SOC8 Undet. Use Area

Source: Dakota County, Barr, James R. Hill, HKGi.

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Figure 7

UMA Sites of Concern (SOCs)

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Table 7– Summary of Investigated Sites of Concern (Barr 2009b)

SOC	Name	Description	Previously Identified Site	Potentially Affected Media	Constituents of Concern
SOC 1	Former Railroad "Y"	Heavy gauge railroad junction was a gateway for delivery of construction and raw material supplies for manufacture of smokeless gunpowder and outbound shipments of manufactured gunpowder, oleum, and nitric acid. During GOW decommission, salvaged materials would have been shipped out along the railroad.	Barr Site ID# 6001 was visited by USACE but not included in scope of Focused Site Investigation. No previous investigations.	Soil & Groundwater	SVOC/PAH from railroad. Possible spills from railcars including SVOCs (DNT, DBP, and DPA). Possible use of arsenic-herbicides along tracks.
SOC 2	Forestry Research/Former GOW Construction Materials Shipping and Storage	Wooded area transected by the railroad south of SOC 1. GOW era loading platform/storehouses located south of the GOW lumber yard. The area appears to have disturbed ground on the 1945 air photo and scattered concrete/brick fragments were observed at the surface during 2008 field visit. Railroad ties in woods.	Barr Site ID# 6004 and ID# 6005, Dakota County Site ID# 5262 and ID# 5263. Storage buildings 126-T, 127-T1, T2, and S-7-1. No other investigations.	Soil	ACM, SVOCs, metals
SOC 3	Ag Engineering/ GOW-Era Suspected "K" Street Dump	Former Kane farmstead. West and central side of site is the Ag Engineering Complex. University staff indicated the well in building 1010 is non-potable. East central portion includes a former animal waste lagoon and associated outlet structures and east side is suspected former dump. Dump area is currently wooded with irregular surface. Was borrow area for GOW and site of proposed DNT Screening House (never built); Debris encountered during construction of CR 46.	Barr Site ID# 6014, Dakota County Site ID# 5225. Possibly associated with LEAK 7504, no known previous investigations.	Soil & Groundwater	ACM, pesticides, herbicides, metals, SVOCs (including DNT, DBP, DPA)
SOC 4	Former DNT Loading Platform and Drainage Ditch	Loading platform received barrels of DNT by rail, transferred to trucks, then hauled to storage bunkers. Drainage to south flows to large ditch, which traverses field to southwest and meets with drainage from SOC 5.	GOW Bldg 260, drainage south (AOC 3DA-1) was sampled in 2008 by USACE and was non-detect for explosives. No other parameters analyzed.	Soil & Groundwater	NC, metals, SVOCs (including DNT, DBP, DPA)
SOC 5	Central Services/Former DNT Storage Bunkers and Dry Wells	Release of DNT noted by USACE in drains that lead to dry wells inside Buildings 263-A, E, and F. Previous investigation in 2008 detected DNT, PAHs, dieldrin, metals, and petroleum in soils. Petroleum and low level PAHs detected in groundwater. Previous pesticide and petroleum releases cleaned up and closed, but residual soil or groundwater impacts may be present.	Dakota Co. Site ID# 5705, ID# 5012, DNT storage bunkers are Bldgs 263 A-H; PAH concentrations appear limited to surface soil (<6").	Soil & Groundwater	Nitrocellulose, herbicides, pesticides, metals, SVOCs (including DNT, DBP, DPA), VOCs
SOC 6	Southern Complex Storage Buildings and Wash Pads	Pesticide release sites closed (2002).	Barr Site ID# 6006, Dakota County Site ID# 5874	Soil & Groundwater	Pesticides, herbicides
SOC 7	Former Dairy Complex Suspected Dump Area	Suspected dump area. Some evidence of concrete and plastic in surface soils.	Dakota County Site ID# 5152 (in 2006 Peer Phase I)	Soil	ACM, metals, SVOCs
SOC 8	Unknown Use Area Near SOC 5	An agricultural field with evidence of numerous semi-circular piles noted in 1945 air photos.	None	Soil	Surficial debris to be characterized by visual examination
AUF	Proposed Ancillary Use Facility (AUF)	An agricultural field. Historical air photos do not indicate any sites of concern, but additional investigation was conducted to assess areas of past land use and evaluate potential for past release	5009 Former borrow area Railroad grade, Construction laydown area	Soil	PAHs, metals (arsenic lead, and mercury)

Explosive constituents consist of the components of smokeless gunpowder manufactured at the GOW and include nitrocellulose (NC), dinitrotoluene (DNT), di-butylpthalate (DBP), and diphenylanaline (DPA). None of these constituents are considered high explosives. NC is a

rapid burning propellant with low to no toxicity, DNT is a plasticizer used to control burn rate of the gunpowder, and DBP and DPA are SVOCs used as stabilizers and to extend the stability and shelf life of the gunpowder mixture. The SVOC constituents are associated with health-based risk values that describe concentrations associated with exposure scenarios.

Because SOCs 4 and 5 are included in the USACE's Formerly Used Defense Sites (FUDS) program, these two SOCs were addressed in a separate work plan. The Phase II Site Investigation of SOCs 1-3 and 6-8 Work Plan (Barr 2009c) was approved by the MPCA in May 2009. The Supplemental Site Inspection/Remedial Investigation Work Plan for SOCs 4 and 5 (Barr 2009d[8]) was approved by the MPCA in August 2009.

As discussed in the work plans, several sites were identified as having a low potential for past release of petroleum products and/or hazardous substances and were deemed not to warrant further investigation. These included former pre-GOW farmsteads and several past petroleum or pesticide release sites that had been previously remediated and administratively closed. Although residual effects from a past release are possible at these locations, the concentrations are likely to be below levels of regulatory concern. These sites will be stripped of soils prior to mining under University supervision and within the context of an MPCA-approved ECP. Areas where building debris is encountered will be addressed under the University's Asbestos Emissions Control Plan (AECP).

SOCs 1-3, and 6-8 (SOC) Investigation

The purpose of the SOC investigation was to look for evidence of historical releases of hazardous substance, subsurface disturbance debris disposal or past petroleum and/or pesticide releases. None of these sites were the subject of previous field investigation by the USACE under the FUDS program.

As shown on Table 7, SOCs 1, 2, 3 and 8 were associated with the former GOW. SOCs 6 and 7 were associated with post-GOW agricultural activities by the University including pesticide storage or possible suspect filling of low areas. Investigation sampling locations were selected based on historical information (e.g. GOW-era records and aerial photographs), evidence of surface debris, and/or in areas that would have been most likely to have been impacted a release had occurred. These areas included topographically low areas, and areas where materials would likely have been transported, stored, or disposed.

The SOC investigation was conducted during the summer of 2009 and consisted of surface sampling, test trenching, soil borings, and groundwater sampling. Samples were screened in the field for evidence of past release and samples were submitted for laboratory analysis of asbestos, VOCs, SVOCs including PAHs, metals, pesticides, and explosive constituents depending on the history of the SOCs. Results of the investigation are included in the Phase II Investigation Report for SOCs 1-3 and 6-8 (Barr 2009e[9]) and summarized in Table 8.

The investigation results indicated that there was no evidence of impacts to soil detected in the majority of locations sampled. Most of the sample results indicated low or no chemical concentrations and visual observations indicated intact natural soil horizons and undisturbed cross-bedded sands below the topsoil. There was no evidence of releases of hazardous

[8] Barr Engineering Co., 2009d. *Work Plan for Supplemental Site Inspection (SOC 4) and Remedial Investigation (SOC 5), UMore Mining Area, Dakota County, Minnesota.* Prepared for University of Minnesota. August 20, 2009.

[9] Barr Engineering Co., 2009e. *Phase II Investigation Report, Sites of Concern 1-3 and 6-8, UMore Mining Area, Dakota County, Minnesota.* Prepared for University of Minnesota. November 12, 2009.

substances or petroleum products in the groundwater samples. Table 8 includes a summary of compounds detected above regulatory health-based residential risk screening criteria, associated observations and recommended further actions.

Table 8 – Sites of Concern (SOCs) 1 – 3 and 6 – 8 Investigation Results

Site of Concern	Affected Media			Description of Investigation Results	Proposed Future Response Action
	Soil	Debris	None		
SOC 1	X			One of nine surface soil samples collected on the former railroad grade outside the UMA slightly exceeded residential health-based risk screening criteria for carcinogenic PAHs.	None in SOC 1 as it is no longer in the UMA. Additional sampling will be conducted on the former railroad grade within the UMA as part of MPCA-approved Response Action Plan (RAP) implementation. Soil will be managed in accordance with an approved Environmental Contingency Plan (ECP).
SOC 2			X	NA-No Affected Media	No action required. Impacted soil or debris encountered during mining operations will be managed in accordance with the approved ECP.
SOC 3		X		Minor amount of buried concrete observed in shallow subsurface soils. Arsenic detected slightly above residential risk health-based screening criteria in two of fifteen soil samples. Results likely reflect natural variation within soil material.	Debris will be excavated and disposed of as necessary during mining operations. The average concentration of arsenic in the samples is well below risk-based threshold, therefore no action is required. Debris and soil will be managed in accordance with ECP.
SOC 6			X	NA-No Affected Media	No action required. Impacted soil or debris encountered during mining operations will be managed in accordance with the approved ECP.
SOC 7			X	NA-No Affected Media	No action required. Impacted soil or debris encountered during mining operations will be managed in accordance with the approved ECP.
SOC 8		X		Asbestos-containing material (building debris) encountered in surface soil and abated by University.	No action required. Impacted soil or debris will be managed in accordance with the approved ECP as part of mining operations. If additional asbestos is encountered, materials will be abated by the University.
Background	X			One pesticide was detected above the residential health-based risk screening criteria in one of five surface soil samples.	No action required. Pesticide detection is consistent with agricultural land use. Soils will be managed in accordance with the approved ECP as part of mining operations.

Barr, 2009. Phase II Environmental Investigation for SOCs 1-3 and 6-8, UMore Mining Area prepared for University of Minnesota, November 2009

Supplemental Site Inspection/Remedial Investigation (SSIRI) for SOCs 4 and 5

The investigation of SOCs 4 and 5 was conducted to develop additional information on whether a release had occurred in SOC 4 and to determine the extent and magnitude of release in SOC 5 that was previously documented by the USACE (USACE 2009). The USACE's investigation of SOC 4 included several borings and a groundwater sample in the drainageway south of SOC 5. The sample constituents evaluated by the USACE were limited to DNT, NC, and other explosives constituents.

Investigation by the USACE at SOC 5 indicated that several constituents were present in shallow soil (less than 4 feet deep). Concentrations of PAHs were measured above the risk-based screening thresholds used in the USACE investigation. The insecticide dieldrin was also found in shallow soils in the northwestern portion of SOC 5. Previous petroleum and pesticide releases were investigated and closed by the MPCA and the Minnesota Department of Agriculture (MDA) within the northwestern portion of SOC 5.

Based on the background information collected (Barr 2009b), three operable units (OUs) were identified in SOC 4 and three OUs were identified in SOC 5 as described in the work plan for the investigation (Barr 2009d). Each OU represents a unique source area and potential release model with corresponding chemical constituents of concern.

The three OUs associated with SOC 4 consisted of the following:

- SOC 4-OU1- Former GOW DNT loading platform and drainageway east of SOC 5
- SOC 4-OU2 - Settling basin and drainage way south of SOC 5
- SOC 4-OU3 - Area of visible debris in portion of drainage ditch southwest of SOC 5

The OUs associated with SOC 5 consisted of the following:

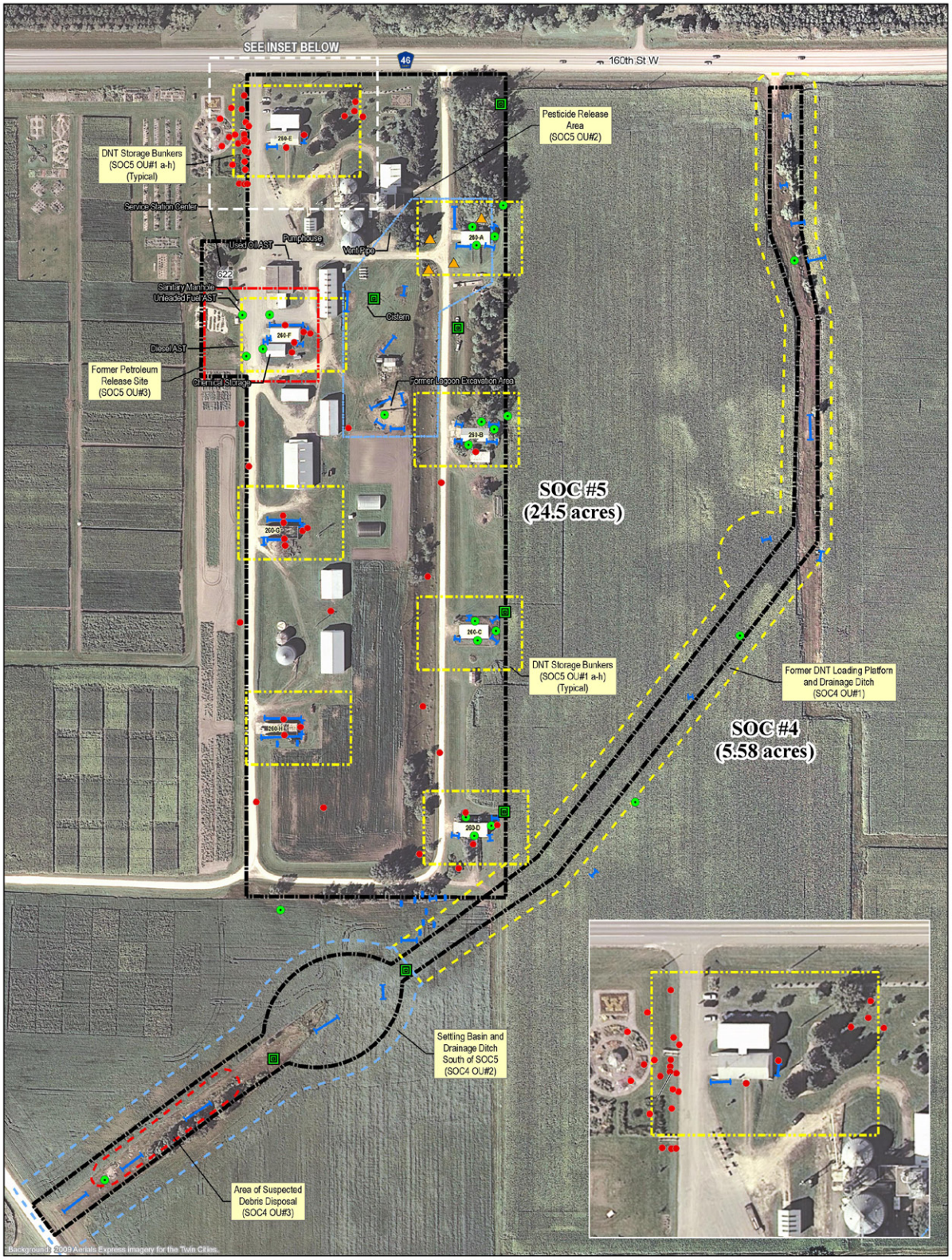
- SOC 5-OU1 – Former GOW DNT storage bunkers including:
  - OU1a. - Possible soil impacts related to past spills of DNT powder and/or other hazardous substances to the floor drains in the bunkers.
  - OU1b. - PAH soil impacts from past release around the exterior of the storage bunkers possibly related to “flashing” of the bunkers by the Army and/or weathering of the tar waterproofing on the exterior walls of the bunkers.
- SOC 5-OU2 - Previously investigated and remediated pesticide releases as well as the pesticide dieldrin in soil identified by the USACE (USACE 2009).
- SOC 5-OU3 - Potential past petroleum release in soil near fuel storage and loading areas related to current or past petroleum releases remediated and closed by MPCA.

Results of SSIRI Investigation

Details of the SSIRI investigation are described in the SSIRI Investigation Report (Barr 2010a[10]) and are summarized below and in Table 9. Sample locations are shown on Figure 8.

Within SOC 4, a previously unknown area of buried debris including metal, wood, plastic, glass, ash, shingles, and wallboard was encountered adjacent to the southern portion of the drainageway located south of SOC 5 and north of SOC 4 (SOC 4-OU2 as shown on Figure 8).

[10] Barr Engineering Co., 2010a. *Supplemental Site Inspection (SOC4)/Remedial Investigation (SOC 5) Report, UMore Mining Area, Dakota County, Minnesota (SSIRI Report).* Prepared for University of Minnesota. January 12, 2010.



Direct Push Boring for Ag. Chem. Soil Sampling
Direct Push Boring for Soil Sampling
Direct Push Boring for Soil and/or Groundwater Sampling
Surface Soil Sample
Test Trench

Site of Concern (SOC) Boundary
OU1 Operable Unit Boundary
OU2 Operable Unit Boundary
OU3 Operable Unit Boundary

N

Feet
100 0 100 200 300 400

Source: Dakota County, Barr, SEH, HKGi, Bay West (2008).

UMore Park Sand and Gravel Resources

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Figure 8
Central Services Station—Former DNT Bunkers Sampling Locations

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Table 9– SOC 4 and 5 Investigation Results

Site of Concern	Affected Media			Description of Investigation Results	Proposed Future Response Action
	Soil	Groundwater	Debris		
SOC 4			X	Buried demolition debris was encountered in shallow sub-surface soils.	The buried debris will be excavated and managed in accordance with an MPCA-approved Environmental Contingency Plan (ECP) prior to mining operations.
SOC 5	X			PAHs and two additional SVOCs were detected above residential health based risk-screening criteria in surface soils around five DNT bunkers. Field observation and analytical data indicate that the impacts are limited to near surface soils containing fragments of water-proofing materials that have weathered and fallen from the exterior bunker walls.	The extent of affected soils has been defined. Soil will be excavated and managed in accordance with a Response Action Plan (RAP) prior to mining activities and ECP during mining operations.
	X			Arsenic and lead and were detected above Tier I soil reference values (SRV) in surface soils near the vicinity of the machine shop. Pentachlorophenol was detected above Tier I soil leaching values but was not detected in groundwater samples collected downgradient of the machine shop. The results suggest impacts are limited to shallow sub-surface soils.	Additional investigation will be conducted to refine the extent of the affected soil in the vicinity of the machine shop. Resulting data will be used to develop an RAP prior to sand and gravel mining operations.
	X			Mercury was detected in surface and near surface soils at concentrations above the Tier I soil reference values in a ditch along the northeastern portion of SOC 5.	An Interim Corrective Action was conducted in this area to remove approximately 47 cy of soil in the vicinity of the detected mercury concentrations that were elevated above Tier 1 Residential SRV of 0.5 mg/Kg. Additional investigation of mercury in SOC 5 will be used to develop an RAP prior to mining operations.
		X		Beryllium and thallium were detected in groundwater at concentrations above Minnesota Department of Health Risk Limits but below US Environmental Protection Agency (USEPA) Maximum Contaminant Limits.	The results will be verified by re-sampling. Beryllium and thallium are naturally occurring trace elements. No source of beryllium or thallium is known to exist in the UMA.

No asbestos-containing material was observed within the debris. The extent of the debris area was approximately 70 feet by 120 feet and from about 1 to 10 feet deep. It is estimated that approximately 1,500 to 2,500 cubic yards of rubble and debris is present within this area. Soil samples collected below the debris materials did not indicate that the debris has impacted underlying soil.

Also in SOC 4, visual observations of soil conditions and the results of the analysis of samples collected near the DNT loading platform and the northern portion of the drainageway

(SOC 4 OU1) did not exhibit evidence of soil impacts. Likewise, the samples collected near the previously documented area of visible debris (Barr 2009b) in the southern portion of the drainageway (SOC 4 OU3) did not exhibit evidence of past releases to the environment.

Results of groundwater sampling from temporary wells placed within SOC 4 indicated that none of the sampled parameters were above regulatory thresholds, with the exception of elevated nitrate which is commonly encountered in shallow groundwater in agricultural areas.

Within SOC 5, the extent and magnitude of releases within OU1, OU2, and OU3 are described below:

- The floor drains in the DNT bunkers (SOC 5-OU1a) were found to terminate under the concrete apron located at the entrance of the storage bunkers. There was no evidence of a vertical dry well that would serve as a pathway for a release of materials stored within the bunker to migrate into soil below the bunker slab. A vitrified clay drain tile was discovered around each bunker, but was not found to be connected to the bunker building or the underlying foundation. The drain tile is believed to have been a standard Army munitions bunker design intended to ensure that the bunkers would stay dry if heavy rains or high water table conditions threatened to flood the bunkers.
- The PAH concentrations in soil along the base of the exterior walls of the DNT bunkers (SOC 5-OU1b) were associated with visible chips of tar coating that have apparently fallen off of the exterior walls of the bunkers during or after decommissioning of the GOW in the mid-1940s. Sample results indicate that the surface soil within approximately 15 to 20 feet of the exterior wall of the bunkers have elevated PAH concentrations. Several of the DNT bunkers do not have exposed exterior walls because the walls are covered by approximately 6 foot high soil berms. None of the soil samples collected within the bermed soil exhibited elevated PAHs.
- No additional areas of past pesticide releases were encountered in the past pesticide clean up areas (SOC 5 OU2). The detection of dieldrin reported in a previous investigation appears to be an isolated detection that was not reproduced with subsequent sampling.
- In the previously closed petroleum release area (SOC 5-OU3), one sample in the upper 5 feet of the soil profile exhibited petroleum odors and an elevated field headspace readings indicative of gasoline or diesel fuel. Soil sample results indicated that concentrations of VOCs or SVOCs were not present above risk-based screening levels. Two samples contained elevated lead near the former location of a fuel tank that contained leaded fuel and are believed to be associated with the closed petroleum release area.
- Mercury was detected in near surface soils at several locations in the northwest portion of SOC 5. Concentrations above health-based risk screening levels were found within a north-south trending drainage ditch that is located on the northwestern edge of SOC 5. The total affected soil was estimated to be 40 to 60 cubic yards. Groundwater samples collected from temporary wells indicated no mercury or other significant impacts to groundwater. A sample from temporary well GP4 indicated concentrations of beryllium and thallium that were above MDH Health Risk Limits. However, these constituents are naturally-occurring earth elements and may be related to background (ambient) groundwater conditions. Neither beryllium nor thallium are associated with any known historical process at UMore Park or the former GOW.

A well search was conducted as part of the SSIRI to document the presence of potential receptors of groundwater within the area. Four water supply wells were sampled to evaluate groundwater quality near SOC 5. Each of the water supply wells were sampled for nitrate plus nitrite (as N), NC, perchlorate, metals (unfiltered samples), SVOCs, VOCs, and pesticides. All of the wells are completed in the PDC below the glacial outwash aquifer. The results of the well sampling are described below:

- Lead was detected at a concentration of 18 micrograms per liter (ug/L) in the groundwater sample collected from the UMore Administration Building (WSW-208402). The action limit for lead is 15 ug/L. This well will be resampled to determine if additional actions are necessary.
- Beryllium and thallium were detected above their respective health risk limits but below the EPA Maximum Contaminant Levels in the sample from the Central Services well (WSW-207607). This well will be resampled to determine if additional actions are necessary. As noted above, there is no known source of these metals used at UMore or at the former GOW.
- Nitrate plus nitrite (as N) was below the maximum contaminate limit of 10 mg/L in each of the groundwater samples collected from the water supply wells.

AUF Subsurface Investigation

The location of the AUF was modified during the preparation of the Draft EIS so that operations and storage areas will be located outside of the DWSMA and offer a more protective geologic setting compared to the initial concept of the mining plan. Because the soil and groundwater investigation plans were developed based on the earlier AUF location, some of the area within the currently proposed AUF was not previously investigated. The purpose of the AUF subsurface investigation was to collect information within the new AUF area and assess the potential for past impacts in GOW and University operational areas prior to mining in order to avoid or manage potential environmental issues within the AUF.

The western portion of the AUF had been previously investigated during the investigation of SOC 2. The AUF area east of SOC 2 consists primarily of a large open agricultural field. A review of historical information including air photographs, interviews and field reconnaissance were conducted to identify areas that may have been associated with past releases. None of the areas appeared to be associated with past releases, but past activities included a filled depression (identified previously as a potential dump site by Dakota County), and included -GOW-era features such as a railroad grade, a construction laydown area, an incomplete GOW alcohol tank, and several unknown features.

The field work included soil sampling, visual observation, and field headspace screening. Sixteen test trenches were excavated in six areas of interest including GOW era storage areas, former above ground storage tanks, former railroad track and lay down area, and areas of suspected filling identified by Dakota County. Subsurface soil was screened for environmental impacts and ten soil samples were collected and analyzed for SVOCs, arsenic, lead, and mercury.

The investigation results did not indicate the presence of hazardous substances or petroleum products, or buried demolition debris or other materials. Minor amounts of buried concrete were encountered in near surface soils in the central and eastern portions of the AUF. No VOCs were indicated by field screening, and no SVOCs or mercury were detected. Arsenic and lead concentrations in soil were found at concentrations below their respective Tier 1 SRVs. Results of the AUF Investigation are summarized in the Technical Memorandum,

Preliminary Subsurface Investigation Results, AUF, UMore Mining Area, Dakota County, Minnesota dated April 26, 2010 (Barr 2010b[11]).

3.2.3 Mitigation

Mercury Soil Interim Corrective Action

During the SSIRI, mercury was detected at concentrations above health risk-based standards for industrial settings in soils at the base of the drainage ditch located in the northwestern corner of the Central Services Station (SOC 5; Figure 8). The magnitude and extent of the mercury impacted soils was determined by additional soil sampling analysis as documented in the SSIRI Report (Barr, 2010a) and shown on Figure 8. The MPCA was provided with notice of the identified mercury release and the work plan for the interim corrective action.

Interim Corrective Action was conducted to remove the affected soils as described in the Interim Corrective Action Technical Memorandum Barr (2010c[12]). Approximately 47 CY of mercury impacted soils were removed and disposed at a permitted solid waste disposal facility. Confirmation soil samples were collected from the excavation base and sidewalls prior to backfilling of the excavation. The samples were analyzed to verify that the remaining soils (adjacent to the excavation) did not contain concentrations of mercury above health risk-based standards for residential/unrestricted use. The results of the confirmation sampling indicated that mercury concentrations were below Tier 1 SRVs at the base and sides of the excavation except for the northern sidewall samples located slightly under the walking bridge (Figure 8). This sample was above the Tier 1 SRV for residential land use, but below the Tier II SRV for recreational land use. The bridge itself limits access to the underlying soils; therefore the risk for exposure to soil under the bridge is very low. The area north of the walking bridge will be further investigated and additional excavation will be conducted depending on the investigation results.

Clean up Criteria and Environmental Contingency Plan Contents

In order to be protective of human health and the environment, the University has assumed that the MPCA's most restrictive health risk-based soil screening criteria referred to as Tier 1 Soil Reference Values (SRVs) will apply to soils excavated in the UMA. This assumption is also intended to provide maximum operational flexibility so that once mining extraction begins; the soil and gravel derived from the UMA can be managed without restrictions, consistent with typical mining operations.

The investigation results do not indicate any areas of wide-spread impacts from hazardous substances or petroleum constituents above the Tier 1 SRVs within the UMA. Based on the results of the investigations, the majority of the soil within the UMA is below the Tier 1 SRVs and is free of soil impacts that might interfere with mining operations.

Soil stripping and gravel excavation in these areas will be guided by an MPCA-approved ECP that will be used throughout mining operations. The ECP will address unforeseen circumstances, or releases of petroleum products and hazardous substances that will be addressed prior to, or during mining.

Circumstances addressed in the ECP include buried debris, underground storage tanks, old wells, and previously unknown release areas. Where evidence of a release is discovered

[11] Barr Engineering Company 2010b. Technical Memorandum, Preliminary Subsurface Investigation Results, AUF, UMore Mining Area, Dakota County, Minnesota. Prepared for the University of Minnesota by Barr Engineering Company, dated April 26, 2010.

[12] Barr Engineering Co. 2010c. Technical Memorandum Interim Corrective Action Implementation Report for SOC 5 Mercury-Affected Soils, UMA Mining Area, (in preparation); May 2010.

during mining operations, appropriate actions will be taken to control the extent of the potential release and to remove or remediate the impacted media in ways that protect human health and the environment. The ECP will also include operator awareness training, routine inspection of stripped areas and active mine face areas, and University oversight of specific areas such as the SOCs, abandoned farmsteads, and previously closed petroleum and pesticide release areas.

Summary of Presumed Response Actions

The investigation results indicated that a few isolated areas of the UMA exhibit evidence of a release of petroleum products or hazardous substances. These areas may require additional investigation and specific MPCA-approved RAPs where targeted soil clean up is needed. The actions are described below.

SOCs 1-3 and 6-8

No additional investigation or remediation is required in these areas. Future mining operations in these areas will be performed in accordance with an ECP. The slightly elevated PAH concentrations found in the former rail bed portion of SOC 1 suggest that management of soil during mining operations that intersect the former rail bed may be necessary. The northwestern arm of the rail line transects Phases 2 and 3 of the mining operation. This area will likely require a RAP to ensure the proper management of overburden soils.

The portion of the former rail bed that extends toward along the eastern edge of the UMA is located within tilled areas where the soil has been well mixed with topsoil over the years and therefore is not likely to be impacted or pose an exposure risk. These areas will likely not require additional Response Action Plans.

SOC 4

Additional investigation will be needed to document the extent of the debris and characterize the debris material for off-site disposal at a permitted solid waste disposal facility prior to the start of mining operations. The debris is not considered a significant threat to groundwater.

SOC 5

Additional soil and groundwater sampling within SOC 5 will be conducted prior to mining. Each of the areas within SOC 5 where soil sample results were above a Tier 1 SRV will be subjected to additional soil sampling so that appropriate response actions can be planned. The response actions in these areas will be addressed in a specific RAP for each area and approved by the MPCA. Mercury soils above Tier I SRVs that remain in soil after the Interim Corrective Action will be further investigated and removed as appropriate, prior to initiation of mining activities in this area.

3.2.4 No-Build Alternative

Because future investigation and response action is driven by the proposed mining operations, the No-Build Alternative would likely result in no further investigation and little remediation of the affected areas. With the exception of a small area of SOC 5, the conditions would not likely warrant additional investigation or response action under current land use.

3.3 Cover Types

3.3.1 Affected Environment

The UMA was entirely prairie in the mid-1800s[13]. By the late 1800s it had been converted to cropland. After World War II (WWII) agriculture continued but because of land use changes associated with the GOW, some locations were not cropped, resulting in the current cover types. The cover types presented here are based on the Minnesota Land Cover Classification System (MLCCS). The MLCCS data for Dakota County (developed by others circa 2002) was downloaded from the Minnesota Department of Natural Resources (MNDNR) geographic information system (GIS) website, checked in the field by AES on September 19, 2008 and April 13, 2010, and refined as necessary. Existing acreages of land cover types at the UMA are provided in Table 10.

Table 10– Existing Land Cover, End Use Land Cover and Change in Land Cover Type

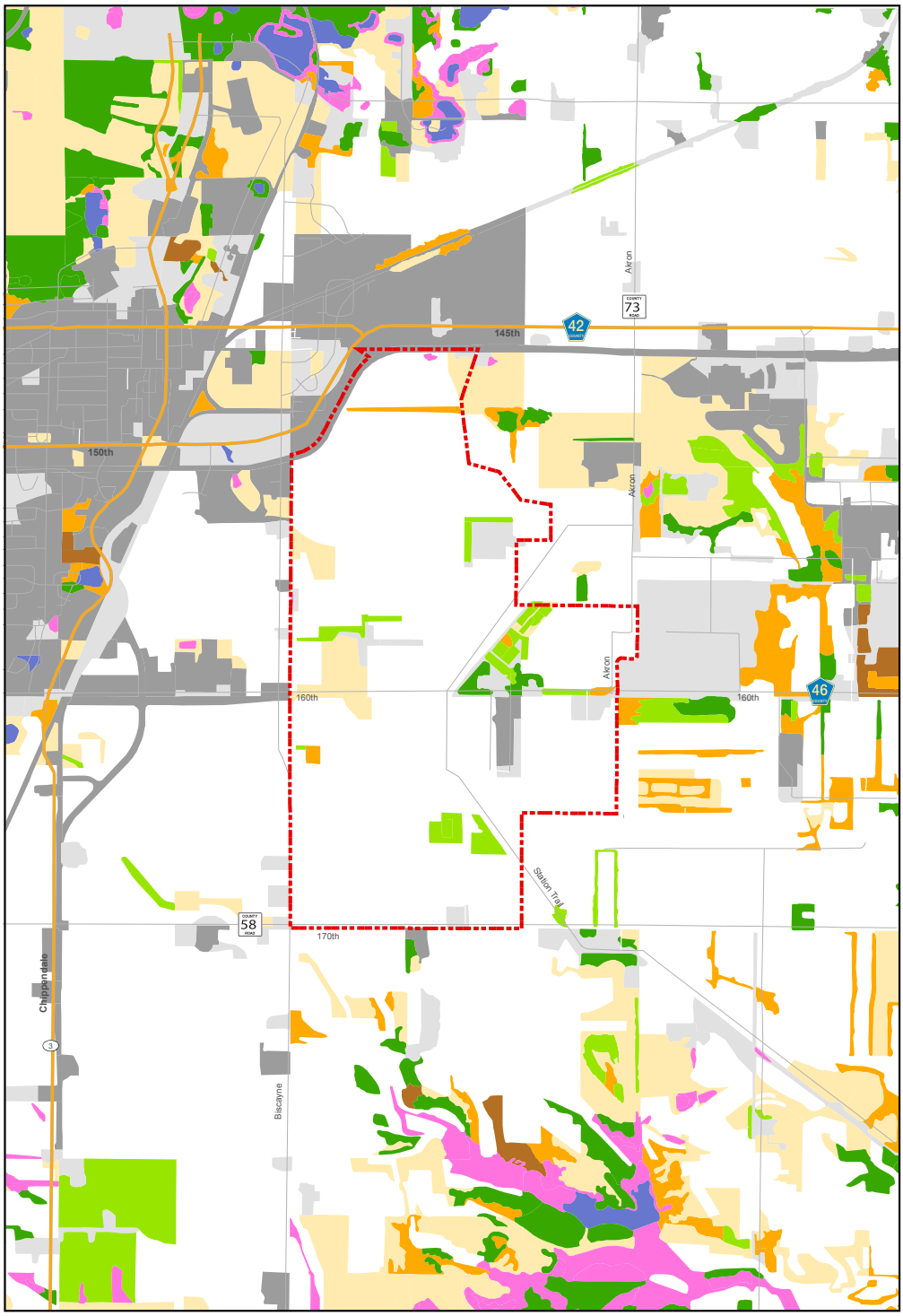
Land Cover Type	Existing (acres)	End Use (acres)	Change (acres)	Percent Change
Impervious Cover >25%	33.3	17.94	-15.36	-46.1
Impervious Cover <25% with Vegetation	77.5	17.1	-60.4	-77.9
Cropland	1457.9	1011.9	-466.0	-30.6
Forest Plantation	58.9	10.0	-48.9	-83.0
Forest/Woodland	12.8	4.9	-7.9	-61.7
Brushland/Grassland with Sparse Trees	12.9	2.1	-10.8	-83.7
Non-native Grassland	67.6	270.8	203.2	401
Native Grassland	0.0	9.8	66.7	NA
Herbaceous/Shrub Wetland	1.04	0.66	-0.37	-35.9
Open Water	0.0	376.7	376.7	NA
Totals	1721.9*	1721.9*	NA	NA

* The total site area, including public rights-of-way, is approximately 1,722 acres, whereas the net acreage of the proposed mining operations is approximately 1,656 acres.

The UMA is currently 84.5 percent cropland (see Figure 9). The cropland consists of corn, soybeans, and other crops. Approximately 153 acres of permanent vegetation are present on the site (about 9 percent of site), consisting of plantation forest, forest/woodland, non-native grassland (with/without trees), and several small herbaceous wetlands. No areas were found of an ecological condition that would qualify as a native plant community.

Historical aerial photos indicate that the plantation forests and forest/woodland were cropland in 1951. Consequently, these forests have a poorly developed understory dominated by non-native species. Plantation forests were planted in single-species blocks with trees in rows. The forest/woodland are dominated by early-successional tree species (e.g., cottonwood, green ash, box elder). The UMA's 1.04 acres of wetlands are distributed in several small patches of land dominated by non-native/weedy species and within or in close proximity to developed land and cropland. Wetlands are discussed in detail in Section 3.6.

[13] Marshner, F. J. 1974. The original vegetation of Minnesota. United States Forest Service, North Central Forest Experiment Station, St. Paul, MN.



Legend

EIS Study Area

Existing Use Land Cover:

- Impervious Cover > 25%
- Impervious Cover < 25% with Vegetation
- Cropland
- Forest Plantation
- Forest/Woodland
- Non-native Grassland
- Brushland/Grassland with Sparse Trees
- Native Grassland
- Herbaceous/Shrub Wetland
- Open Water

0 0.25 0.5 1
Miles

N

AES
September 2010

UMore Park Sand and Gravel Resources

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Figure 9
Existing Land Cover

University of Minnesota
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Forest Genetics Plantings at UMore Park[14,15,16]

The University of Minnesota has historically led research in forest genetics of tree species that are native to, or commonly planted in, the northeastern United States. Dr Carl Mohn, Professor Emeritus in the Department of Forest Resources, established many of the trials located in UMore Park and forwarded records and recommendations from his files to his successor, Dr. Andy David, Associate Professor in Forest Resources based in the North Central Research and Outreach Center in Grand Rapids and Carrie Pike, Research Fellow & Tree Improvement Specialist at the Cloquet Forestry Center.

The trials at UMore Park include progeny tests, provenance trials and general seed source comparisons that are used to evaluate the performance of different families or seed sources. Several of the plantings at UMore Park are replicated at other locations including the U of M's North Central Research and Outreach Center in Grand Rapids and the Cloquet Forestry Center. In addition to these three properties, select trials are replicated on sites owned by members of the Minnesota Tree Improvement Cooperative (MTIC) which is administered through the Department of Forest Resources on the St Paul campus of the U of M. Members of the MTIC include state and county land agencies along with industry landholders from multi-national corporations. The studies at UMore Park are, in many cases, replications of a larger study.

UMore Park's southerly location possesses unique value to the genetics program because this site is located just south of the natural geographic range for boreal tree species such as black spruce. This location also represents a northerly aspect for hardwood species and lends itself well to the study of Populus and other species used in agroforestry. Figure 10 depicts where the tree studies are located (abbreviated with the letters A-L that match summary in Table 11). Progeny tests at UMore Park were established for Scots pine (J), birch (E), silver maple (C) and cottonwood (D). Range-wide provenance trials are in place for black spruce (A) and cottonwood (G). Seed source trials for blue spruce (K), birch (F), Japanese larch (H), cottonwood (B & I), were established.

The black spruce provenance test (A) currently posts the highest value with silver maple (C) in 2nd place. According to Dr Mohn's notes and recommendations shown on Table 11, the black spruce is the only trial left with high research value. All others can, and in some cases should, be removed at UMore Park's discretion.

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[14] Pike, Carolyn. C., J. Warren, and A. David. 2004. Annual report of the Minnesota Tree Improvement Cooperative. Department of Forest Resources, University of Minnesota. 46 pp.

[15] Parker, William H., Riddell, Claire L., and Lesser, Mark R. 2004. Identification of black spruce seed sources to compensate for loss of growth resulting from climate change. Lakehead University, Thunder Bay, Ontario. 105 pp.

[16] Merrill, R. E.; Mohn, Carl A., and Cromell, William H. 1983. Survival and height growth of a range-wide black spruce provenance test on two sites in Minnesota. IN. Proceedings of the third North Central Tree Improvement Conference. Aug 17-1983. pp 34-38.

Table 11– UMore Park Tree Research Summary

Label	Planting	Year	Material	Comments	Suggested Action
K	Blue Spruce	1958	Seed Sources of blue spruce	I have no records or map for this planting. It was put in by Don Duncan.	To best of my knowledge this is an orphan study. Declare inactive and remove if possible
J	Scots Pine 1-tree progeny	1961	OP families from J. Wright	Planting failed--insects and drought. No Information available	Declare inactive and remove if possible
E	Birch	1961	OP Progenies of paper x Sandbergii and bog birch	K. Clausen's interest. 1964 ht. Data collected. Plantation probably gone	Declare inactive and remove if possible
F	Birch	1961	6 sources: 2 Alaska, 3 Itasca Co. and 1 North Carolina	Only measurement 1964. Planting probably gone	Declare inactive and remove if possible
H	Japanese Larch	1964	13 sources (odd # per source) from J. Wright.	Materials saved from planting with high mortality and wind damage established in 1961	Declare inactive and remove if possible
G	Cottonwood	1965	108 OP Families range wide collection from Jokala at Illinois	No value	Declare inactive and remove if possible
L	Poplar Storage Test	1972	Misc. Poplars and Aspens	No value	Declare inactive and remove if possible
A	Black spruce provenance test	1974	110 sources from Petawawa	Ht. Data 76, 79, 83 and 85. Published by Canadians in a summary of the same materials in several plantings. Still has potential value. Last time on site hardwood invasion was becoming a problem.	Good study, hope it was measured and results given to Canada. Probably need clean up. Retain if possible.
B	Inter-provenance Cottonwood hybrids	1974 & 1975	Dhir's thesis material. Seedlings in '74, rooted cuttings in '75	Measured 76, 77, 79, 82, 85. Couple of pubs from Dhir's thesis and a note by Dana Nelson. Pretty beat up and long of tooth	Declare inactive and remove if possible
I	Competition test	1975	Chuck Tauer's design. Black cottonwood	Interesting design. Problem is survival and clones tested (they are all related). No clear effects of competition which only shows that experiment is not big enough. Data from 76, 77, & 79 in file. Plantation was subject to great insults (cutting were collected etc) after '79. Information on competition studies in Chuck T. MS thesis. Replicate study at Audetter Farm was a bust.	No value. Declare inactive and remove if possible
C	Silver maple	1980	90 open-pollinated families of silver maple. Regional test initiated by U of Nebraska	Ht. measured 82, 86, and 97. Dbh and Nr. Stems in 97. Nebraska never called for data. Sent data to MSU (Miller in 97(as they were going to publish--no action. Looking at data--large geographic differences. Plantation was very tight last time I was there. Survival good may be worth looking at.	Possible value. Unless gone completely to pot, then declare inactive and remove if possible
D	Cottonwood progeny test	1985	99 OP families from 13 locations is SE MN, WI and Iowa. In a RB design (sort of) with shortage of stock causing lots of holes	Poor survival because of drought and quality of stock. Replacements in 1986. Hts measured in 86, 87 and 92. Family and area differences are strong but mortality prohibited any consideration of publication. Selected individuals being tested in Crookston.	Declare inactive and remove if possible

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Figure 10
Tree Research Study Locations

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3.3.2 Environmental Consequences

When gravel mining is completed and the UMA is reclaimed (estimated to be 40 years after project initiation) approximately 59 percent of the site will be cropland (Table 10 and Figure 11). Some 377 acres of the site will be open water resulting from gravel extraction below the water table.

About 67.6 acres of forest plantation, forest/woodland, and brushland/grassland with sparse trees will be eliminated by the completion of the mining process. As part of the reclamation, approximately 270.8 acres of grassland will be planted, 9.8 acres of which is native grassland (Mn/DOT 340 seed mix),, resulting in an overall gain of about 214 acres of grassland. Mining will directly eliminate 0.37 acres of the 1.04 wetland acres delineated in the UMA (see Section 3.6).

In general, at the completion of mining the UMA will have more grassland and fewer trees, and substantially more open water, but less cropland. The area of cropland will decrease by approximately 30.6 percent and a large area of open water will be created in its place. The amount of plantation forests, forest/woodland, and brushland/grassland with sparse trees will be reduced. Reclamation will increase the acreage of both non-native grassland and native grassland over the acreages that were present before mining.

3.3.3 Mitigation

Mitigation for changes in cover types will be addressed in greater detail as part of the reclamation plan. In refining the reclamation plan, the University will work with the City of Rosemount including their tree preservation ordinance. Based on the Draft Mining Plan, non-native grassland eliminated by mining will be replaced at twice the original acreage. Furthermore, approximately 66.7 acres of native grassland will also be planted; no native grassland currently exists on the site. Mitigation will be completed to replace the lost wetland acres, as described in Section 3.6.

3.3.4 No-Build Alternative

Under the No-Build Alternative, the amount of cropland would remain the same over the next 40 years. The amount of non-native grassland would probably decrease due to forest succession, assuming that the current practice of no grassland management continues. No wetlands would be impacted under the No-Build Alternative. In summary, tree cover would likely increase, grassland cover decrease, and cropland remain the same.

3.4 Fish, Wildlife, and Ecologically Sensitive Resources

Prior wildlife studies in the UMA and on adjacent lands were reviewed and site visits were completed by AES on September 19, 2008 and April 13, 2010 to investigate general wildlife use.

3.4.1 Affected Environment

Wildlife of the UMA in the mid-1800s likely included many prairie species that no longer regularly occur in the region, such as sharp-tailed grouse, western hognose snake, and elk. By the late 1800s the site's wildlife consisted of species able to utilize cropland and farmsteads, including red-winged blackbird, American robin, house sparrow, and meadow vole. After WWII some cropland and pasture was abandoned and planted with trees and shrubs or left alone to become non-native grassland. This increased the variety of wildlife using the UMA.

The site remains predominantly cropland, which has limited wildlife and rare species habitat value. It provides reproductive and foraging habitat for common species such as white-tailed

deer, raccoon, blue jay, horned lark, savannah sparrow, red-winged blackbird, and common grackle. Of the permanent vegetation, the plantation forests and forest/woodland areas provide habitat for common mammals and birds such as white-tailed deer, eastern mole, raccoon, fox, skunk, gray squirrel, blue jay, American crow, black-capped chickadee, downy woodpecker, hairy woodpecker, and white-breasted nuthatch. The plantation forests and forest/woodland also provide stopping points for migrating passerine birds, such as wood warblers and vireos. The non-native grasslands provide habitat for pocket gopher, meadow vole, and upland grassland birds (e.g., savannah sparrow) and foraging habitat for red-tailed hawk and bald eagle. In edge habitat between cropland/grassland and wooded areas, or in grassland with sparse trees, eastern phoebe, northern cardinal, goldfinch, and chipping sparrow may be found. Wetlands on the UMA are primarily too small to support a distinct wildlife population. The wetlands are dominated by non-native/weedy species and have low plant diversity, limiting their habitat value (see Section 3.6).

In general, during the breeding season the UMA does not support wildlife species that require large blocks of permanent and natural habitat or that primarily use native habitat in fair to good condition. Such area-sensitive and specialist species may temporarily be found on-site during migration in spring and fall.

Wildlife habitat within 0.5 mile of the UMA is similar to that inside the mining area but differs in context. North and west of the UMA, wildlife habitat is embedded in predominantly suburban, commercial, and rural residential areas rather than cropland. East and south of the UMA, there are more trees and grassland patches.

Two large areas of wildlife habitat are found within 1-mile of the UMA. These areas are primarily non-native grassland. Due to their large size, these habitat areas may support Species of Greatest Conservation Need (SGCN). The first area is southeast of the UMA on public open space at Dakota County Regional Park and the Vermillion Highlands Research, Recreation, and Wildlife Management Area (RR&WMA). See Figures 9 and 12. A proposed interpretive center is planned on the RR&WMA and would be within approximately 4,300 feet of the UMA. The second large habitat area is east of the UMA and south of County Road 42 and the Dakota County Technical College. This area is within the UMore Park property.

3.4.2 Environmental Consequences

Direct Effects

At its completion the project is expected to directly affect the majority of wildlife habitat on the site. Mine reclamation would increase the amount of non-native and native grassland from what is currently present at the UMA.

The impact of habitat change was evaluated using SGCN species as defined by the MNDNR[17]. SGCN species are uncommon to rare species that indicate the condition of wildlife habitat in an area. The presence of SGCN species in a habitat generally indicates that its condition is better than average for an ecoregion. Better wildlife habitat conditions are due to larger habitat patches, appropriate vegetation structure, a diversity of plant species, and features necessary to complete a species life cycle, such as nesting sites.

[17] Minnesota Department of Natural Resources. 2006. Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife, Comprehensive Wildlife Conservation Strategy. Division of Ecological Services, Minnesota Department of Natural Resources.

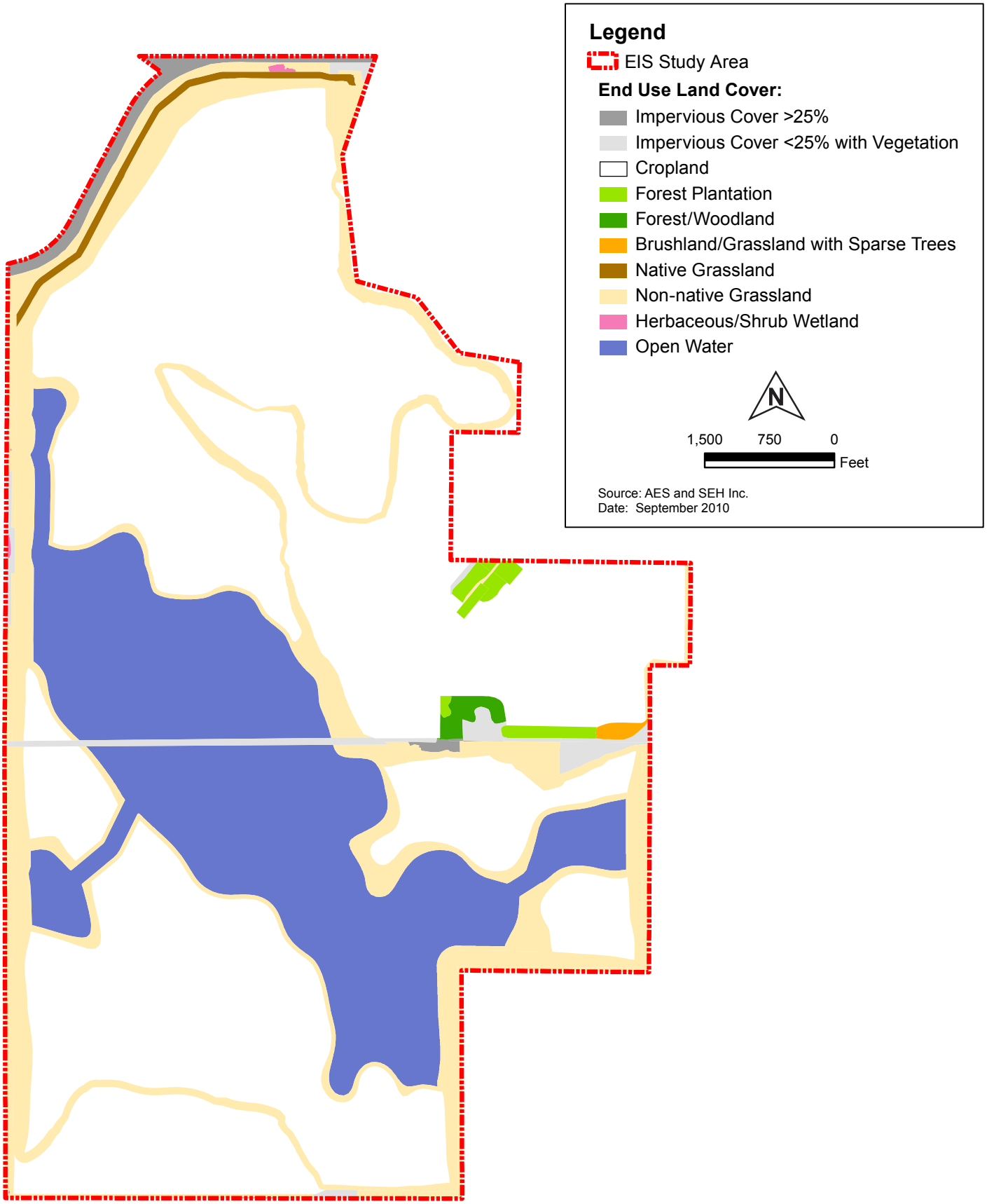

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Figure 11

End Use
Land Cover

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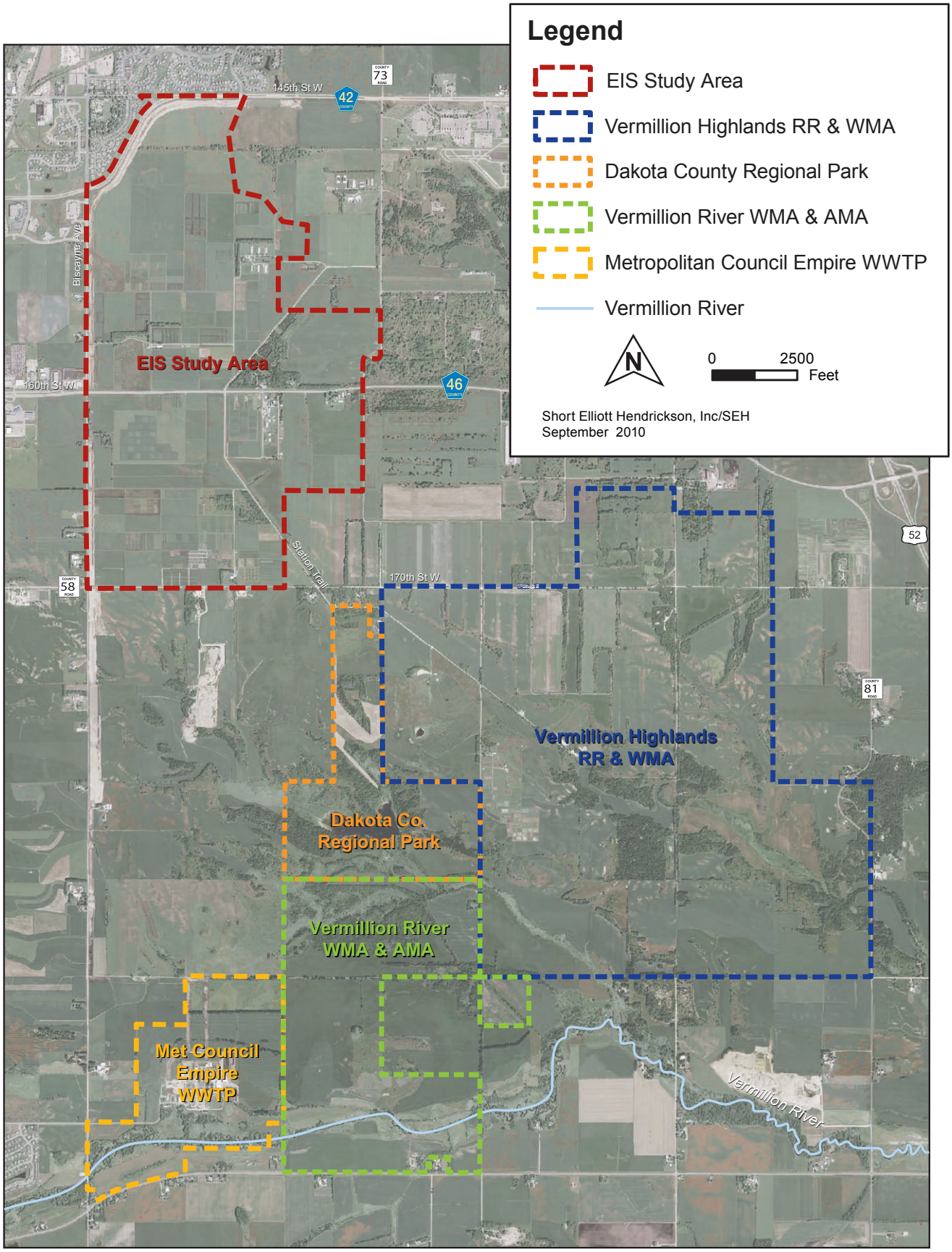

UMore Park Sand and Gravel Resources

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Figure 12
Major Public Lands

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A list of SGCN species was developed by the MNDNR for each ecoregion subsection in Minnesota. The UMA is contained in the Oak Savanna subsection[18] which has experienced a 99 percent loss of upland prairie, wet prairie, and savanna, as well as degradation of remnant habitats. Non-native grassland (9.9 percent of the subsection) is now important for wildlife because once-abundant native grassland has been eliminated from this ecoregion subsection.

The analysis was completed by compiling the list of SGCN species for the Oak Savanna subsection and assigning species to habitats consistent with the existing cover types (Section 3.3.1). The MNDNR considers the breeding season the critical period for most SGCN species. The migration period is most important for shorebirds. Each species was evaluated as to its likelihood of occurring in the breeding season (or during migration for shorebirds) on or within 1-mile of the UMA. Likelihood of occurrence was assigned in five categories (confirmed, likely, possible, unlikely, not possible) based on field observations of habitat and wildlife, records obtained from the Minnesota Natural Heritage Information System (NHIS), range maps, field guides, and the observers' knowledge of the species.

The project's impact on wildlife is discussed in terms of impacts on SGCN species given their likelihood of occurrence in the UMA at the appropriate time. Threatened and endangered species are discussed separately in Section 3.5.

According to the MNDNR data, there are 93 SGCN species in the Oak Savanna subsection. There are no areas of open water on the site or within 1-mile that are suitable for the SGCN species using rivers, streams, lakes and ponds. Wetland, brushland/savanna and forest/woodland habitats on and within 1-mile of the site are generally small, in poor ecological condition, and next to land uses that do not favor the presence of SGCN species (e.g., roadways, cropland, building sites). It is unlikely or not possible that SGCN species would use these habitats.

Non-native grassland represents the best breeding opportunity for SGCN species on the site, and cropland the best stopover habitat for SGCN shorebirds. There is one 30- to 35-acre patch of non-native grassland on the UMA located west of the UMore Administration Building. At this patch, a savannah sparrow and a red-tailed hawk were observed (both grassland but not SGCN species). A similar sized grassland patch is located primarily outside the northeast corner of the UMA site south of County Road 42 and near a lift station. The portion located in the UMA boundary is part of an expanded buffer area between the proposed mining activities and developments located to the north. At this patch, but outside the UMA, an eastern meadowlark and possibly a Henslow's sparrow (both SGCN species) were observed in the fall migration period. In addition, a bald eagle was observed perching in a row of planted pines north of County Road 46 in the east-central portion of the site and was subsequently observed soaring over cropland south of the same road. With the addition of a greater buffer along the northern edge of the UMA, the northeast grassland patch is not anticipated to affected by the project, and the row of planted pines along County Road 46 will not be affected. While SGCN species may temporarily and periodically visit the site's grassland patches and other habitats, breeding cannot be inferred from the presence of SGCN species observed during the two field visits. In addition, the grassland patches in the UMA are at or below a minimum size that might be used by SGCN species which are sensitive to the size of a habitat patch[19]. Among other SGCN species inhabiting grasslands, it is unlikely

[18] Minnesota Department of Natural Resources. 2006. Tomorrow's Habitat for the Wild and Rare: Oak Savanna Subsection Profile. Division of Ecological Services, MN Department of Natural Resources. At: http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/oak_savanna.pdf. (Accessed October 13, 2008).

[19] Johnson, D.H. and L.D. Igl. 2001. Area requirements of grassland birds: a regional perspective. Auk 118:24-34. At: http://www.npwrc.usgs.gov/resource/birds/gbarea/index.htm. (Accessed October 13, 2008).

that prairie mammals (e.g., western harvest mouse, prairie vole) or the gopher snake occur on the site given habitat conditions.

During the migratory period, SGCN species may temporarily use the habitat within the UMA. Individual wildlife, especially birds, often use a broader range of habitats in migration than in the breeding season. The two grassland patches, the forest/woodland patch near the UMore Park Administration Building, and cropland have the greatest potential to attract SGCN species in migration. However, the amount of grassland and forest stopover habitat at the UMA is small compared to similar habitats beyond a mile from the site.

In summary, mining at the UMA would have a direct effect by eliminating a patch of non-native grassland and the forest/woodland patch near the UMore Park Administration Building. These areas have low value for SGCN species. Other habitats at the site are less likely to support SGCN species, except cropland which may be visited by shorebirds in migration. After mining is completed, 59 percent of the UMA will remain in cropland and cropland will be available in the vicinity of the UMA. The elimination of a patch of non-native grassland, other habitats, and some migratory stopover habitat on the UMA would not substantially affect SGCN species.

The mining operation will create a lake containing approximately 370acres of open water and associated shoreline and littoral wetlands. This will have a direct beneficial effect on wildlife. Several SGCN species that pass through the area in migration may use the open water and shoreline of the lake (e.g., greater yellowlegs, ruddy turnstone, eared grebe), and some may breed and become permanent residents in this large aquatic habitat (e.g., marsh wren, Virginia rail). This open water habitat may also be used by eagles for foraging.

Indirect Effects

The mining operation will generate noise and dust. Noise is known to affect wildlife populations by reducing breeding density or reproductive output at varying distances from the noise source, especially in territorial birds[20]. The level of noise during mining operations will have an effect on these species in the UMA (e.g., savannah sparrow, not SGCN species). Noise may affect the northeast grassland patch (located mostly off site with remaining areas within the expanded buffer area along the northern edge of the UMA). Traffic noise from County Road 42 already affects this wildlife area. The ecological effect of the mining operation on SGCN species using the large habitat patches within 1-mile of the UMA would primarily be due to noise. It is expected that noise levels from construction equipment at the AUF area will be at a level that does not affect wildlife in the Dakota County RR&WMA (see Section 3.11 Noise).

Dust that covers vegetation can reduce plant photosynthesis and rate of growth. The majority of the dust produced by the mining process is not expected to travel beyond the UMA boundary. Section 3.12 – Air Quality/Dust provides further detail on this issue.

3.4.3 Mitigation

The mine reclamation plan will create 9.8 acres of long, narrow grasslands within agricultural lands will be seeded with a mixture of dominant native species and an additional 270.8 acres will be seeded with non-native species. After mining there will be approximately 203.2 acres of additional grassland compared to pre-mining grassland, but the configuration of the habitat will change. Rather than two 30- to 35-acre blocks (one primarily off site) in an agricultural matrix, the expanded buffer will ensure the preservation of the northeastern most block, the

[20] Forman, R.T., D. Sperling, J.A. Bissonette, A. P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C.R. Goldman, K. Heanue, J.A. Jones, F.J. Swanson, T. Turrentine and T.C. Winter. 2003. Road ecology: science and solutions. Island Press, Washington, DC.

reclamation of the site will create extensive linear grasslands in an agricultural matrix, and create approximately 57 acres of grassland around the lake. It is expected that wetland vegetation (e.g. cattails) will develop in the lake's shallow littoral zone. The lake perimeter native seeding and emergent vegetation will create stopover habitat for some SGCN species during migration and possibly in the breeding season.

Lands with slopes less than 3:1 (horizontal:vertical) or outside the lake perimeter strip will continue to be farmed after mining. Farming is a 150-year old land use on the UMA. Aerial photographs indicate that habitat in the project area was poor for SGCN species in the 20th century. The reclamation plan has the potential to improve conditions for SGCN species by creating open water habitat, littoral wetlands, and upland grassland. Even though agriculture will continue on the majority of the site, the new post-mining natural features will create conditions more favorable to some SGCN species than before mining.

3.4.4 No-Build Alternative

The No-Build Alternative results in the preservation of a block of grassland and the wooded area along County Road 46. It does not result in the creation of open water, shoreline and littoral wetlands, or the planting of non-native and native grasslands in addition to what currently exists. The effect on SGCN species of preserving the one 30- to 35-acre grassland patch and forest/woodland patch will be minimal. The No-Build Alternative will remove the potential benefits to migratory SGCN waterfowl, waterbirds and shorebirds by not creating the lake, shoreline, native plantings, and littoral wetlands.

3.5 Threatened and Endangered Species

3.5.1 Affected Environment

Prior studies of threatened and endangered species and sensitive habitats at the UMA and on adjacent lands were reviewed. The MNDNR Natural Heritage Information System (NHIS) Rare Features Database was queried for any occurrences of rare plants, animals and natural communities on or within one mile of the UMA (correspondence # ERDB 20090153). No rare features were reported to occur on the UMA. Within 1-mile of the UMA two occurrences of loggerhead shrike and one occurrence of a mesic prairie were identified. Additionally, a Blanding's turtle record was reported just over 1-mile from the site. In addition, a portion of the project area is in the Vermillion River watershed. Lastly, a possible sighting of Henslow's sparrow was made off site during fall migration, but within 1 mile of the UMA boundary. Because it was observed off site and an insufficient amount of suitable breeding habitat exists for Henslow's sparrow on the site, this species was not considered separately but rather treated as one of the SGCN species above. Henslow's sparrow generally requires large blocks of contiguous grassland (e.g. at least 100 acres) of suitable nesting habitat to colonize an area for breeding purposes. Several smaller blocks (<40 acres) of suitable grassland habitat exist within and around the site, but these grassland areas are fragmented and thus not considered suitable for this species.

The analysis completed for this EIS examined the loggerhead shrike and Blanding's turtle distribution in Minnesota, the scientific literature, and site survey information to determine whether these resources are present in the UMA, and if present, the extent of and potential impact to the species. Information regarding surface water (see Section 3.7) in the UMA was reviewed to determine the interaction of the UMA with the Vermillion River.

Loggerhead Shrike (Lanius ludovicianus)

Prior to 2002 loggerhead shrike were observed along the western boundary of the UMA, and utilized nearby habitat within the UMA boundaries. However, since that time the habitat at this location was modified and the current status of the shrike at this location is not known.

Loggerhead shrike is a state threatened species, although globally it is considered apparently secure. Loggerhead shrike is a territorial bird that utilizes cropland, hedgerows, old-fields, grasslands and savannas. Loggerhead shrike nest in isolated trees, hedgerows, or open woodlands, and requires suitable hunting perches (e.g., solitary trees, wires, fence posts) in its territory. It feeds primarily on large insects, but its diet includes other invertebrates, small birds, lizards, frogs and rodents, and it has been known to scavenge. It stores its food on the barbs of thorn bushes and barbed wire fences.

Loggerhead shrike populations have been declining in North America since the 1960s, particularly in its north-central and northeastern range, including Minnesota. While part of its decline is due to habitat loss from development and reforestation, in Minnesota breeding habitat does not appear to be limiting for this species. Some studies have also suggested that loggerhead shrike are reproducing at near-optimal levels for an open-nesting passerine species. Therefore, the extent of the shrike's decline cannot fully be explained. Other possible factors include increased pesticide use; road kills; changes in farming practices that result in fewer isolated trees, shrubs and fences; and a reduction in the quality of wintering habitat.

A review of nearby habitat and aerial photographs indicates that the amount of grassland and potential nest trees is greater west of the UMA at locations where shrikes have been observed than it is within the UMA boundaries. The eastern half of the UMA site especially lacks suitable perch sites utilized by shrikes while foraging, and it also lacks open grassland habitat which this species requires. The end use of the UMA site will retain a strip of open grassland and crop fields along the western edge of the site that could be used by shrikes in the future.

As of October 2008, the NHIS database reported 108 records of loggerhead shrike statewide, with 82 sightings since 1990. In Dakota County there were 20 sightings, with 11 since 1990. Dakota County and southwestern Minnesota have the highest densities of loggerhead shrike records in the state. This National distribution map also shows a concentration of shrike records from Dakota County southward and near southwestern Minnesota.

On August 12, 2010, an updated request was made to the MNDNR's Natural Heritage Information System (NHIS) regarding rare natural features on and in the vicinity of the site. These data will be reviewed and assessed upon receipt of the MNDNR's response letter. Any substantial changes will be accounted for in the final record. However, review of March 2010 NHIS data did not suggest any increased risk or impact associated with loggerhead shrike or any other rare natural feature.

Based on reviewed NHIS data, loggerhead shrike was within one-mile of the UMA. In the 1990s and early 2000s, shrikes were observed along Biscayne Avenue (the western boundary of the UMA) in lightly grazed pastures, residential yards, and cropland with scattered shrubs and shelter belts, but have not been observed since. These shrikes were also observed utilizing nearby cropland in the UMA for foraging. Several occurrences of adult shrikes with young were also reported to the east and southeast of the UMA in the 1960s, 1980s, 1990s and as recently as 2008 and 2009. Locations of these shrike sightings change from year to year. Several of the late 2000 sightings were of shrikes in short-stature cropland interspersed with scattered grasslands or pastures with cedar trees and fencerows east of US Highway 52. While loggerhead shrike may nest at the same site in successive years, return rates are typically low. Males are more likely to return to their territory than females.

Blanding's Turtle (Emydoidea blandingii)

Blanding's turtles were not reported inside the UMA. Blanding's turtle is a state threatened species in decline over most of its range. As of October 2008, there were 1,034 reported occurrences statewide, with 628 since 1990. In Dakota County, 24 records are reported, with 12 since 1990. Blanding's turtle inhabits freshwater ponds and marshes for most of the year. Typically in June the females travel to nearby grasslands and open areas with sandy soil and lay eggs. Females usually travel 200 to 400 m to lay eggs, but some have been observed traveling over 1,600 m to nest. Both sexes have been reported to make up to 10 km journeys outside the nesting season. In 1992, a Blanding's turtle was found just over one mile southeast of the UMA near Butler Pond in Dakota County Regional Park.

Blanding's turtles could potentially use the UMA for nesting because Butler Pond is within a distance that a female might travel to nest. However, the Blanding's turtle record is old and Blanding's turtles have been observed to limit their travel distance in areas dominated by human activity, such as cropland.

Mesic Prairie

Mesic prairie is a native grassland type with moderate soil moisture levels. It is dominated by tall grasses such as big bluestem and Indian grass, and contains a high diversity of wildflower species. No intact prairie remnant exists in the UMA. Mesic prairie remnants occur to the south and southeast on Dakota County Regional Park and Vermillion Highlands RR&WMA.

Vermillion River

The Vermillion River is located approximately 2.8 miles south of the UMA. Approximately 43 percent of the UMA surface water drains toward the Vermillion River, a MNDNR-designated trout stream with naturally reproducing brown trout.

The Vermillion River Watershed Joint Powers Organization (VRWJPO) identified "tributary connectors" of the Vermillion River in the project area. +A tributary connector is defined as an "aquatic corridor" and "perennial or intermittent streams with designated floodplain." VRWJPO maps of the Vermillion River and its tributaries depict two potential tributary connectors in the southern portion of the UMA. Both tributaries were investigated in the field and reviewed using LIDAR contour maps and high resolution aerial photography. Both potential tributary connectors lacked a defined channel, and the USACE concurred that the mapped tributary connectors do not constitute Waters of the U.S. leading to the Vermillion River. The anticipated impact of surface water is anticipated to be very low. Section 3.7 provides a detailed analysis of the UMA surface water drainage.

3.5.2 Environmental Consequences

Loggerhead shrike have recently been reported along the western boundary of the. The lands west of the UMA boundary contain suitable loggerhead shrike nest sites, foraging habitat, and hunting perches, and nearby cropland within the UMA site has been utilized for foraging. However, given the lack of open grassland, hunting perches and limited suitable nest tree distribution on the site, the UMA is not preferred habitat for this species. Open grassland will be maintained along the western edge of the site during mining operations, and both grassland and cropland will be major components of the end use at the UMA. Noise, traffic, and dust from the mining operations and ancillary facilities may affect some historic shrike habitat to the west and east of the UMA; however, there are substantial areas of suitable but unoccupied breeding habitat nearby.

The proposed action is not likely to affect Blanding's turtles using Butler Pond, if they are still present.

No adverse consequences are expected to mesic prairie or the Vermillion River.

3.5.3 Mitigation

No mitigation is required for Blanding's turtle, mesic prairie, or the Vermillion River trout stream. No mitigation is necessary to offset direct impacts to loggerhead shrike on the UMA, however, implementation of the site reclamation plan (i.e. planting grasslands on 1:3 slopes, along some of the site's perimeter, and around the lake) could benefit loggerhead shrike. If the project requires tree replacement, appropriate trees will be selected and sited properly in order to benefit loggerhead shrike habitat.

3.5.4 No-Build Alternative

Under the No-Build Alternative, one existing grassland area would be preserved, but given its relatively small size, the surrounding agricultural matrix, and limited tree distribution at the UMA, it is expected to remain unused by loggerhead shrike. The No-Build Alternative is not expected to affect Blanding's turtles, mesic prairie, or the Vermillion River.

3.6 Wetlands

3.6.1 Affected Environment

Surface waters on the UMA consist solely of small, isolated wetland basins. There are no MNDNR Public Waters Inventory (PWI) basins (lakes or wetlands), no MPCA impaired waters, and no streams located on the UMA. In addition, based on correspondence with the USACE, there are no Waters of the U.S. on the site (copies of the USACE approved jurisdictional determinations are available for review at the UMore Park Administrative Office and online at www.umorepark.umn.edu/Gravel_Resources_and_Assessment.html.

Wetland delineation activities were conducted on the UMA during the growing seasons of 2008, 2009, and 2010. Six isolated wetland basins were delineated with one wetland (Wetland R8) located off site (see Figure 13 and Table 12). Wetland delineation reports were prepared and approved by the Local Governmental Units (LGUs), which are the City of Rosemount and Empire Township.

Table 12 – UMA Wetland Summary

Wetland ID	Circular 39 Wetland Type	Cowardin Wetland Classification	Size (acres)
Wetland R1	1	PEMA	0.002
Wetland R4	1	PEMA	0.202
Wetland R5	1	PEMA	0.005
Wetland R8 (off site)	3	PEMC	0.691
Wetland R19	1	PEMA	0.816
Wetland E5	1	PEMA	0.012
		Total Acreage	**1.728**

The following data were consulted as part of the wetland delineation process:

- U.S. Fish & Wildlife Service National Wetlands Inventory (NWI);
- MNDNR Public Waters Inventory (PWI);
- City of Rosemount Wetland Inventory;
- Empire Township Wetland Inventory (completed by Dakota SWCD);
- USDA Soil Survey of Dakota County;

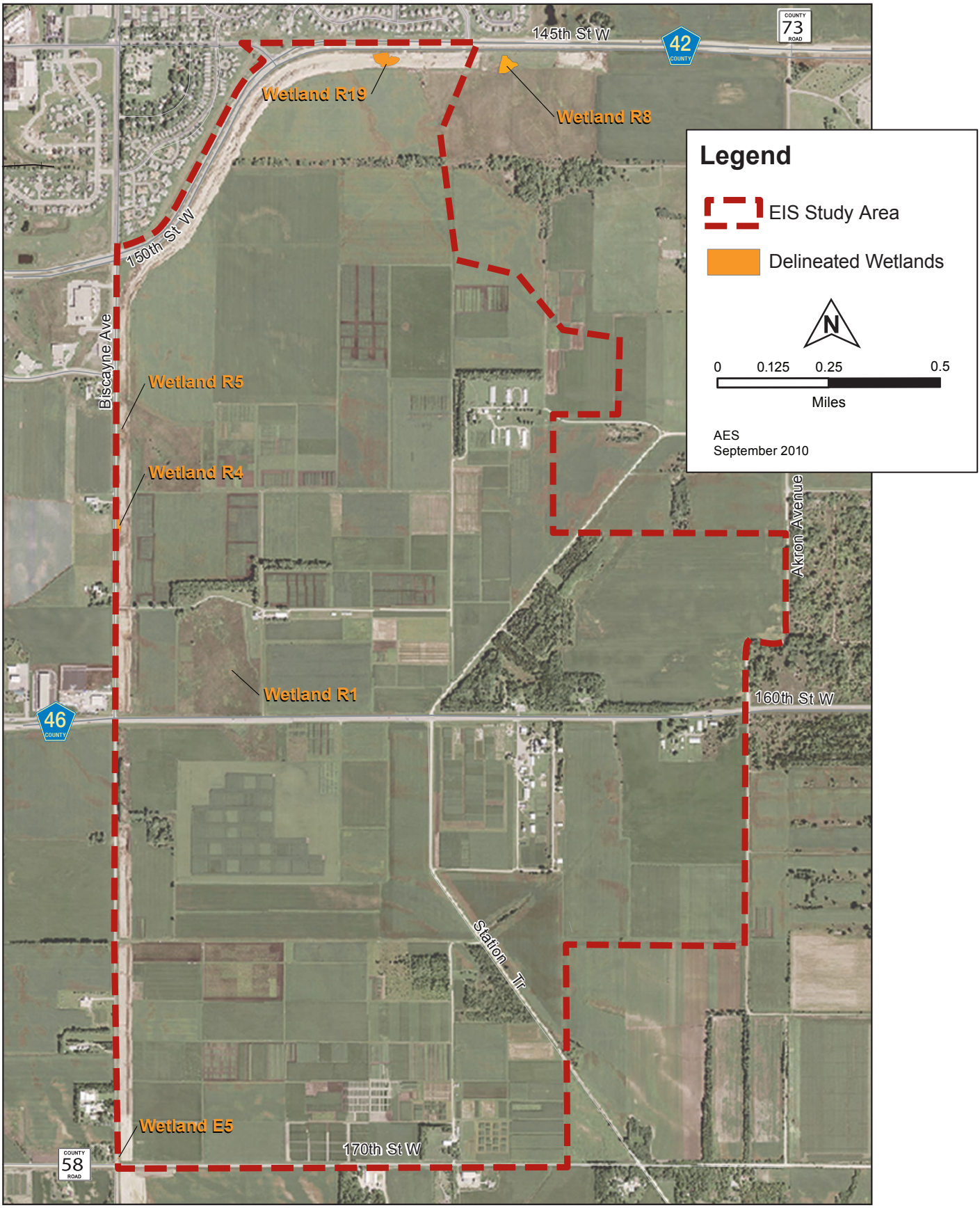

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Figure 13
Delineated Wetlands

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- USDA Farm Services Agency (FSA) and Dakota County historical aerial photographs (1938 to present); and
- Wetland field assessment of the entire UMore Park property (completed by Bonestroo, 2007).

The delineated wetland basins are small, shallow, primarily seasonal, and isolated depressions. Wetland R1 is a small, seasonally flooded depression located in an old field grassland. Wetland R8 (located off site, approximately 300 feet east of the UMA boundary) is a shallow marsh that receives storm water runoff from County Road 42 and a residential development to the north.

Wetlands R4, R5, R19 and E5 are located along the west and north edge of the UMA in an area of disturbance caused by a Metropolitan Council sewer interceptor installation in 2006. Wetland R19 is located in a subtle depression in a soybean field, and Wetland R4, R5, and E5 consist of small, shallow, clay hardpan basins. A wetland delineation conducted in 2002 identified no wetlands along this corridor, making it likely these four wetlands were created incidentally by the sewer installation project.

3.6.2 Environmental Consequences

Direct Effects

Sequencing was followed to first avoid, then minimize, and then mitigate wetland impacts during development of the UMA Draft Mining Plan. Wetlands R4, R5, R8, and E5 will not be directly impacted by the mining operation. Wetland R1 (0.002 acre) and approximately half of Wetland R19 (~0.37 acre) are expected to be impacted by the proposed project. This results in a total wetland impact of approximately 0.39 acre. The mining process will involve excavation and dredging below the water table resulting in a new lake (approximately 377 acres) with a littoral wetland fringe.

Indirect Effects

Because mining below the water table will be accomplished using a floating dredge, dewatering will not occur at the site. Drainage flowing to the remaining site wetlands will not be altered substantially by the proposed project. Therefore, hydrologic impacts to remaining site wetlands and nearby wetlands are not expected and monitoring of wetlands is not necessary.

3.6.3 Mitigation

All wetland impacts will be mitigated following Minnesota Wetland Conservation Act (WCA) and MPCA replacement requirements. Note that MPCA rules require compensatory mitigation for unavoidable impacts to all wetlands, regardless of their jurisdictional status. Wetland mitigation will consist of on-site replacement, off-site replacement, or purchase of wetland bank credits.

3.6.4 No-Build Alternative

Under the No-Build Alternative, there would be no impacts to site wetlands and no creation of the proposed 377-acre lake, shoreline, and littoral wetlands.

3.7 Surface Water Drainage

This surface water analysis investigates the potential for surface water impacts related to the proposed UMore Park Sand and Gravel Resources Project. As indicated in Section 3.2, the surface watershed and groundwatershed are hydraulically separate flow regimes. Surface flow and drainage within the UMA occurs primarily when surface soils become saturated and

the rate of rainfall exceeds the infiltration capacity of the soil. Otherwise, infiltration results in the vertical movement of moisture to the groundwater flow system where flow under the entire UMA is toward the Mississippi River. This section analyzes surface water flow assuming that conditions are conducive for runoff to occur.

This analysis evaluates the existing and proposed land use, drainage facilities including the proposed lake located within the UMA boundary, and impacts on the Vermillion River. As proposed in the Mining Plan, the UMA will manage mine area runoff internally through infiltration and will not allow surface water runoff to leave the pit boundary. Only relatively small portions of the UMA will discharge surface water offsite. Overall, surface water runoff during and after mining activities will generally have the same water quality and reduced quantity compared to runoff from the existing area.

The analysis provided below defines the project's effects on the volume, rate and quality of the surface water runoff leaving the UMA as well as the impacts of runoff on downstream tributaries to the Vermillion River.

3.7.1 Affected Environment

Existing Condition

Approximately 43 percent of the UMA surface watershed drains toward the Vermillion River approximately 2.8 miles south of the UMA. This reach of the Vermillion River is a MNDNR designated trout stream. The remaining portion of the UMA drains toward the Mississippi River. The primary land use of the study area is agricultural and open space. The impervious portions of the study area are comprised of a few roads, mostly gravel, and a few buildings on the east, center and south sides of the property. There are some sparse wooded areas which cover less than 3-percent of the UMA.

Figure 14 illustrates watershed divides and the UMA boundary under existing conditions. To evaluate both pre- and post-project drainage, the drainage divides were delineated to cover the extent of the tributary area. In general, runoff from areas south of 160th Street flow toward the south and southeast and indirectly contributes to the North Branch of the Vermillion River, Tributary No. 5 to the Vermillion River, and Tributary C to the Vermillion River (the name assigned for that branch in hydrologic model studies of the Vermillion River) and eventually the Vermillion River.

The central and northwestern parts of the UMA are landlocked (i.e. watershed areas tributary to depressions that will not overflow during the 100-year frequency, 24-hour duration rainfall event; 6.0 inches of rainfall in 24-hour period) with two small areas draining to the west. The north and northeast portions of the UMA drain to the east and do not contribute to the Vermillion River. Surface water runoff from areas north of 160th Street drains north and east toward the Mississippi River, which is located approximately 4.5 miles northeast of the UMA. During rain events, watersheds ExtN-4, ExtN-29, ExtN-46, ExtN-52, and ExtN-67 discharge storm water offsite through culverts while runoff from the remaining watersheds is conveyed offsite in surface swales. The flow arrows shown in Figues 14 and 15 are intended to illustrate general flow direction for non-landlocked areas either through culverts or over roadways when culverts are not present.

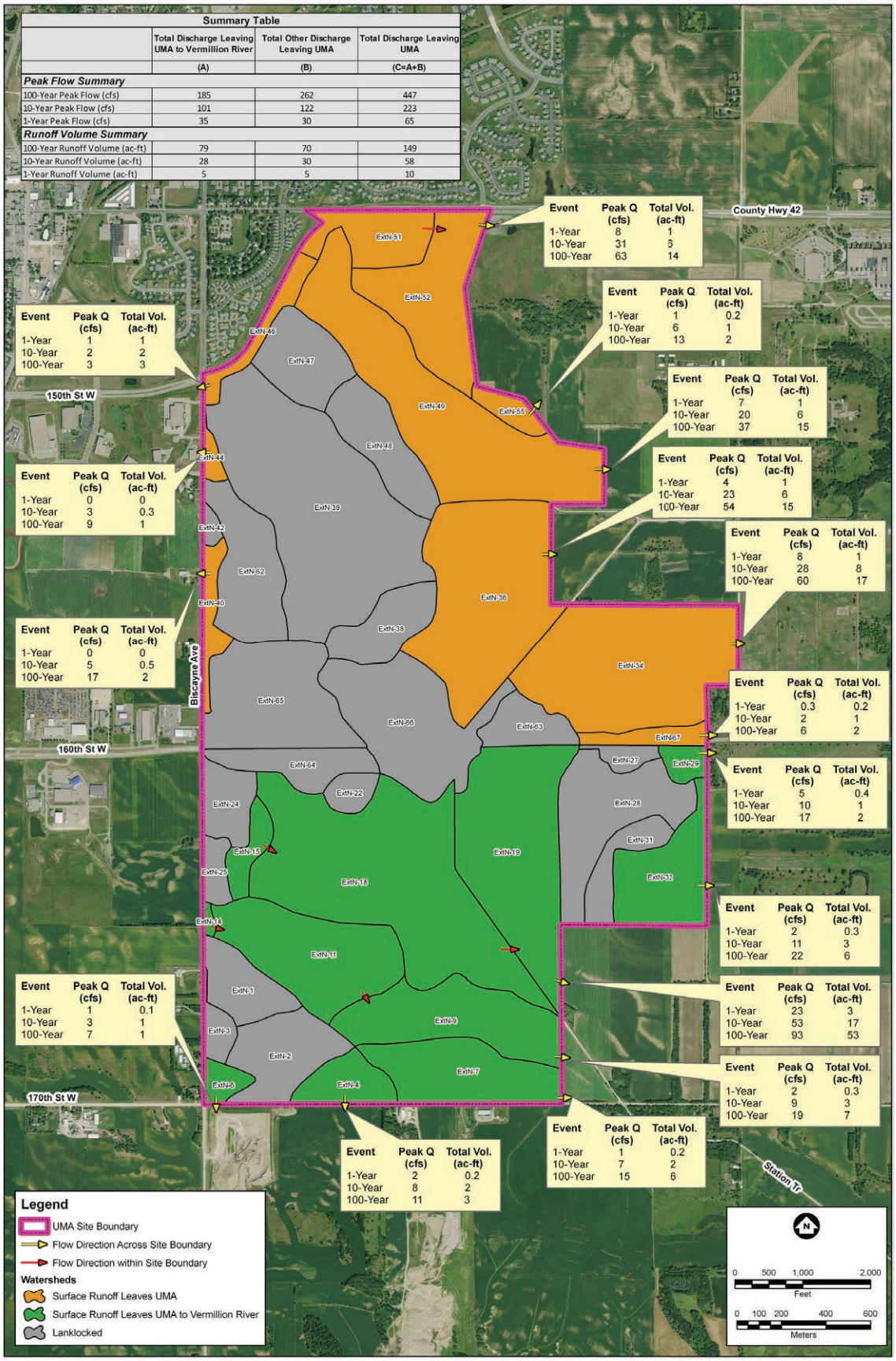

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Figure 14
Existing Conditions
Design Event
Offsite Peak Flow &
Runoff Volume

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Approximately 1,046 acres within the UMA are not land locked and contribute to surface water runoff leaving the site. There are 504 acres that contribute flow toward the Mississippi River, and 542 acres that contribute flow toward the Vermillion River. The existing offsite surface water discharges were calculated and used for comparison with the offsite discharges under proposed conditions. The annual sediment and nutrient loads under existing conditions were also calculated for comparison with these loads under proposed project conditions.

Existing Condition: Data and Design Assumptions

The existing watershed divides in the UMA Mining Plan were delineated to encompass all of the tributary area to the UMA. The divides were verified with available topography data, aerial photos, and a field reconnaissance of the site.

Land uses on the UMA were identified based on the 2005 Metropolitan Council Land Use Classifications[21]. The 2005 Metropolitan Council Land Use Classifications were used because the VRWJPO has a calibrated existing conditions XP-SWMM model that assumes 2005 land use classifications. A visual comparison of 2008 aerial photos and the Metropolitan Council 2005 Land Use Classifications was completed to verify that the 2005 classifications reasonably reflect the current conditions in the UMA.

Current land uses on the UMA include agricultural, farmstead, highway, mixed use industrial, single family residential and undeveloped areas. Watershed areas and land use information were used to calculate or estimate hydrologic parameters including impervious area, depression storage, and roughness for each area.

Where possible, culvert information for existing conditions was obtained from the Mining Plan. This included pipe diameter, shape, material, and invert elevations. Information for the culvert crossing at Biscayne Ave south of 150th Street was not in the Mining Plan. Information for this crossing was obtained during site reconnaissance. It is assumed that existing culverts leaving the site will not be disturbed as part of the proposed UMore Sand and Gravel Resources Project.

Post-Mining Condition

After mining and reclamation are complete, there will be approximately 295 acres that are not landlocked and will contribute to surface water runoff leaving the UMA. Similar to existing conditions, storm water from areas that are not landlocked south of 160th Street will flow toward the Vermillion River, and areas that are not landlocked to the north of 160th Street will flow toward the Mississippi River. There will be 242 acres that contribute flow toward the Mississippi River and 53 acres that contribute flow toward the Vermillion River under the post-project condition.

The proposed watershed divides as well as the limits of the mine lake at the expected normal water level (NWL) are shown in Figure 15. The NWL in the mine lake is assumed to be elevation 885 feet mean sea level (MSL), which is the existing groundwater table elevation in the area.

During mining operations as well as the post-mining period, the area surrounding the mining operation will remain in agricultural production or vegetated green space and its runoff will be managed outside of the mining operation, not allowing the runoff to drain into the operational area or the mine pit. The mining area itself will manage its runoff internally through infiltration, allowing no storm water runoff to leave the mine area boundary.

[21] Metropolitan Council 2005. *Generalized Land Use 2005 for the Twin Cities Metropolitan Area;* Metropolitan Council June 2005.

Based on the City of Rosemount 2007 Surface Water Management Plans (SWMP), the city plans to convey stormwater onto the UMA when the areas west of Biscayne Avenue are fully developed (WSB, 2007[22]). Rosemount's 2007 SWMP includes development standards that require developing areas to store all the runoff from the 100-year, 24-hour storm event. The University acknowledges that according to the 2007 SWMP the city is planning on directing stormwater runoff to the UMA and the site will accommodate those planned offsite flow directed to the UMA.

Rosemount's 2007 SWMP indicates an additional 3,625 acres west of Biscayne (see Figure 18) could potentially contribute runoff to the proposed UMA at some time in the future . Approximately 2,115 acre-feet of runoff volume from the 100-year 10-day runoff event (7.0-inches according to Technical Release 60, 2005) could potentially be conveyed to the UMA assuming the entire 3,625 acre area is developed without complying with the City's 2007 SWMP of retaining and infiltrating the 100-year 24-hour storm (6-inches) onsite, and there is no other stormwater storage volume in the watershed. This could certainly be classified as an extreme or worst case scenario. By comparison the mine-pit lake will have an available storage capacity of approximately 30,930 ac-ft between the anticipated normal water level of 885 and the proposed natural overflow of 934. If the entire 3,625 acres west of Biscayne drained to the UMA the lake levels in the mine pit lake would only increase to approximately Elevation 891 which is still 43 feet below the natural overflow of the lake. Since the areas west of Biscayne Avenue yet to be developed will be required to comply with the City's SWMP additional stormwater storage volume will be required as development occurred, thus further reducing the anticipated volume of runoff directed to the UMA. Therefore it is anticipated that the proposed mine pit lake will provide adequate stormwater runoff storage to meet the City's desire to utilize portions of the UMA for future regional ponding.

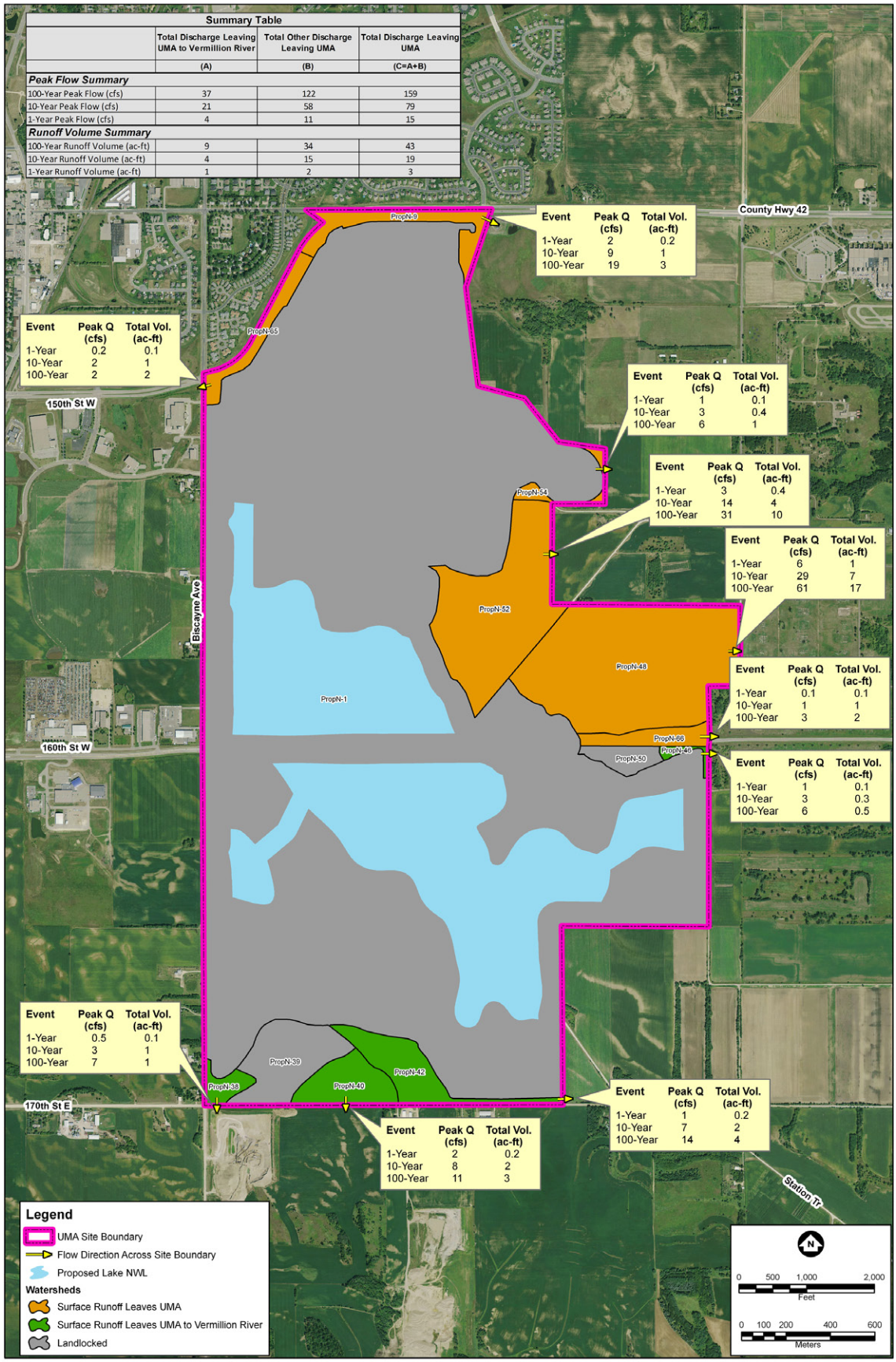
When the City of Rosemount determines a need to direct stormwater into the mine-pit lake, the University will discuss both jurisdictions' needs and concerns to ensure that the water quality in the lake or current use of the UMA is not negatively impacted by the stormwater redirected onto the UMA. However, to assess the impacts of the UMA alone this analysis is based on the existing off-site topography and drainage patterns, and it is assumed that following the proposed mining project, no additional off-site surface water runoff will enter the UMA. For this analysis, the mining area and surrounding agricultural area is assumed to have no directly connected impervious surface.

Proposed Action: Data and Design Assumptions

The proposed action is defined by information included in the UMA Draft Mining Plan completed in August, 2009 and the current UMA boundary. The watershed divides, culverts, and surface water modeling are also based on data presented in the Mining Plan and the UMA boundary. In locations along the perimeter of the mining area where information was not included it was assumed that existing topography and culverts would not change. Consequently the outer boundary of the proposed action drainage area shown in Figure 15 does not change from the existing conditions.

Due to the mining operation, it is anticipated that there will be 751 additional acres of landlocked area during and following the proposed action. The increase in landlocked area reduces the total drainage area producing offsite runoff. The area contributing runoff that drains to the Mississippi River is reduced from 504 acres to 242 acres and the area supplying runoff that flows toward the Vermillion River is reduced from 542 acres to 53 acres.

[22] WSB& Associates Inc., 2007.*Comprehensive Surface Water Management Plan*. Prepared for the City of Rosemount.



Summary Table

	Total Discharge Leaving UMA to Vermillion River	Total Other Discharge Leaving UMA	Total Discharge Leaving UMA
	(A)	(B)	(C=A+B)
Peak Flow Summary			
100-Year Peak Flow (cfs)	37	122	159
10-Year Peak Flow (cfs)	21	58	79
1-Year Peak Flow (cfs)	4	11	15
Runoff Volume Summary			
100-Year Runoff Volume (ac-ft)	9	34	43
10-Year Runoff Volume (ac-ft)	4	15	19
1-Year Runoff Volume (ac-ft)	1	2	3

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	2	0.2
10-Year	9	1
100-Year	19	3

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	0.2	0.1
10-Year	2	1
100-Year	2	2

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	1	0.1
10-Year	3	0.4
100-Year	6	1

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	3	0.4
10-Year	14	4
100-Year	31	10

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	6	1
10-Year	29	7
100-Year	61	17

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	0.1	0.1
10-Year	1	1
100-Year	3	2

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	1	0.1
10-Year	3	0.3
100-Year	6	0.5

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	0.5	0.1
10-Year	3	1
100-Year	7	1

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	2	0.2
10-Year	8	2
100-Year	11	3

Event	Peak Q (cfs)	Total Vol. (ac-ft)
1-Year	1	0.2
10-Year	7	2
100-Year	14	4

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Figure 15
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Future land use in each proposed action UMA watershed was assumed to be either agricultural or water (mine lake), and hydrologic parameters (i.e., impervious area, depression storage, and roughness) were estimated based on this assumption.
Lake areas at different elevations (the mine lake's stage-area relationship) were measured from topographical maps for the grading plan. The mine lake will not have a piped outlet so that water only leaves the lake through infiltration or evaporation. The natural overflow level is at elevation 934 feet MSL or 49 feet higher than the NWL. Water level elevations at this level are not anticipated but the overflow direction would be to the southeast.

The existing culverts around the perimeter of the UMA were assumed to remain in place and not be altered during or following mining operations.

Impacted Areas

Most of the north portion of the UMA is landlocked. Surface water runoff from the east portion of the UMA is conveyed off site by overland flow following the natural drainage patterns toward the Mississippi River. Most of the south portion of the UMA discharges surface water runoff toward various drainage ways that are tributary to the Vermillion River.

Sections of the Vermillion River upstream of the Hastings Dam are listed in the 2008 and draft 2010 MPCA List of Impaired Waters under Section 303(d) of the Clean Water Act (MPCA 2008[23], 2010[24]) as being impaired for fecal coliform bacteria. The Mississippi River is listed as an impaired water on Minnesota's 303(d) list due to mercury, PCBs (polychlorinated biphenyls), PFOS (Perfluorooctane Sulfonate), and turbidity between the Rock Island RR bridge and Lake Pepin, while Lake Pepin is listed as impaired for excess nutrients (MPCA, 2010).

3.7.2 Environmental Consequences

Analysis Methodology

The following models and simulations were created to evaluate the proposed action's impact on surface water runoff volumes, rates and quality:

- A hydrologic/hydraulic model (XPSWMM2009, Version 11.0) was constructed to predict the existing and future runoff from the UMA during the following three design storm events: the 1-year frequency (2.2 inches of rainfall), 10-year frequency (4.2 inches of rainfall) and 100-year frequency (6.0 inches of rainfall) SCS Type II storms.

  The model was used to generate existing conditions and proposed action runoff hydrographs for each watershed and route the hydrographs through the network of storage areas and culverts on the UMA so that the flows leaving the UMA under proposed action conditions could be compared to the flows leaving the site under existing conditions.

  To thoroughly assess the long-term impacts of the UMore Park Sand and Gravel Resources Project, a 58-year (1950-2007) continuous simulation was completed using hourly precipitation and daily temperature data recorded at the Minneapolis-St. Paul Airport (NWS, 1961[25]). Results from the continuous simulations were used to

[23] Minnesota Pollution Control Agency, 2008. *MPCA 2008 303(d) List*.

[24] And Minnesota Pollution Control Agency. 2010. *Draft MPCA 2010 303(d) List*.

[25] National Weather Service. 1961. Technical Paper 40: Rainfall Frequency Atlas for the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years. U.S. Department of Commerce, Washington DC.

compare the annual average runoff volumes under existing and proposed action conditions.

- Annual average nutrient and sediment loads leaving the UMA were estimated using aerial export coefficients published by the Metropolitan Council (Mulcahy, 1991[26]). The export coefficient was determined for each land use and multiplied by the area for that land use classification to determine the loading for each land use. Runoff to landlocked areas (e.g. depression areas that did not overflow for the 100-year frequency SCS Type II design storm) does not leave the site; therefore, the loading leaving the UMA from these areas is zero. The remaining areas flow either north toward the Mississippi River or south toward the Vermillion River with little or no treatment; therefore, the entire load is assumed to leave the UMA.

- For future conditions, receiving water impacts in the mine lake were estimated using the Wisconsin Lake Modeling Suite (WiLMS, Version 3.3[27]) and checked using the Minnesota Lake Eutrophication Analysis Procedure (MnLEAP[28]). The WiLMS model was created to reflect the performance of the mine lake during an average year of precipitation. Results from the mine lake impact model were compared to the MPCA standards for deep water lakes.

Significant Impact Criteria

Following mining, runoff from the UMA will need to meet runoff quantity and quality standards required by the VRWJPO, City of Rosemount, and Empire Township for land disturbing activities.

- The Vermillion River Watershed Plan (Amended February, 2008) includes the current requirements by the VRWJPO.

  a) Under this plan, surface water discharge rates from developing sites must not exceed existing rates for the critical 1-year, 10-year, and 100-year frequency rainfall events.

  b) For storm water quality, runoff from the UMA must not adversely impact the water quality of the Vermillion River or other major tributaries.

  c) Land disturbances shall be governed by the following minimum runoff volume control standards:

     1. Development that creates one acre or more of new impervious surface must incorporate volume control practices into the design sufficient to prevent an increase in the runoff volume for the 2-year 24-hour storm above pre-development conditions, unless soil conditions limit infiltration.

     2. Empire Township Water Resources Management Ordinance Number 350 (March, 2009) includes the current requirements by Empire Township.

[26] Mulcahy J.P., 1991. *Phosphorus Export in the Twin Cities Metropolitan Area*. Prepared for the Minnesota Pollution Control Agency. 1991.

[27] WDNR, 2001. Wisconsin Department of Natural Resources. *Wisconsin Lake Modeling Suite* (WiLMS). 2001

[28] Wilson, C.B. and W.W. Walker. *The Minnesota Lake Eutrophication Analysis Procedure* (MnLEAP). Minnesota Pollution Control Agency. 1988.

- For land disturbances of 40 acres or more Empire Township refers to the VRWJPO for review and comment prior to review or approval. Consequently the Empire Water Resources Management Ordinance includes similar surface water rate and volume requirements to what is included in the Vermillion River Watershed Plan(VRWJPO, 2005[29]).

  a) Runoff rates for proposed activities, and development shall:

     1. Not exceed existing runoff rates for the 1-year, and 10-year critical duration storm events.

     2. Be implemented such that peak runoff rate controls keep future peak flood flows for the Vermillion River 100-year, 4-day event from increasing above existing conditions peak flows.

  b) Land disturbances shall be governed by the following minimum runoff volume control standards:

     1. Development that creates one acre or more of new impervious surface must incorporate volume control practices into the design sufficient to prevent an increase in the runoff volume for the 2-year 24-hour storm above pre-development conditions, unless soil conditions limit infiltration.

- The Rosemount 2007 SWMP includes design policies for required storage and infiltration of runoff volume for development as summarized below.

  a) For newly developing areas, no discharge or infiltration can be assumed for purposes of establishing the 100-year, 24-hour storm event high water elevation. For events with longer duration, a maximum peak stormwater discharge rate will be limited to 0.05 cfs/acre.

  b) Landlocked depressions that presently do not have a defined outlet and do not typically overflow may be allowed a positive overflow to prevent damage to adjacent properties. Any overflows from landlocked depressions will comply with the City's rate control, runoff volume control and low floor requirements including storing runoff from the 100-year, 24-hour storm event for new development and restricting discharge to 0.05 cfs per acre for longer duration storm events.

Future development that could occur following the proposed action and site reclamation to agricultural use would be required to demonstrate that future development complies with the City of Rosemount design policies. However, given the amount of grading that will occur the UMA will make every effort to restore the agricultural area so that the land disturbed by the grading will comply with the City of Rosemount 2007 SWMP Section V policies.

Following a review of the VRWJPO, Empire Township (Empire Township, 2009[30]), and City of Rosemount applicable policies and ordinances, a significant surface water impact from the proposed action was defined as:

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[29] VRWJPO, 2005. Vermillion River Watershed Joint Powers Organization. 2005.*VRWJPO Watershed Plan (Amended 2008).*Apple Valley, MN.

[30] Empire Township. 2009. Ordinance 350 - *Water Resource Management*. Empire Township, MN.

1. A flow rate leaving the UMA that exceeded an existing peak flow rate, during the 1-, 10- or 100-year frequency SCS Type II storm event.
2. An increase in total runoff volume leaving the UMA that exceeds the existing runoff volume during the 1-, 10-, or 100-year frequency SCS Type II storm event, or an increase in runoff volume that would be sufficient in magnitude to increase downstream erosion rates or harm downstream wetlands.
3. An annual sediment or nutrient load leaving the UMA that exceeds the existing load or would be likely to cause substantial degradation of the downstream wetlands, the Vermillion River, or other receiving waters. A substantial degradation was defined as causing a violation of MPCA water quality standards, a change in functions or values of a wetland complex, or substantially impairing a desired use.

Impacts on Storm Water Runoff Rates & Volume

A XP-SWMM model was constructed to predict existing and proposed action runoff rates and volumes from the UMA during the 1-, 10-, and 100-year frequency SCS Type II storms. The model was used to generate existing and proposed runoff hydrographs for each watershed and route the hydrographs through the network of storage areas and culverts on the UMA so that the flows leaving the site under proposed conditions could be compared to the flows under existing conditions. Table 13 provides a summary of existing storm water runoff rates and volumes leaving the UMA. Based on the 100-year frequency model and existing conditions, the total peak storm water runoff rate leaving the UMA boundary is 447 cubic feet per second (cfs) and the total volume is 149 ac-ft. Figure 14 shows the storm water runoff rate and volume at each location where storm water leaves the UMA under existing conditions.

Table 13 – Existing Conditions Storm Water Peak Runoff Rates & Volumes

Storm Event	Total Discharge Leaving UMA to Vermillion River	Total Other Discharge Leaving UMA	Total Discharge Leaving UMA
	(A)	(B)	(C=A+B)
	Peak Flow Summary		
100-Year Peak Flow (cfs)	185	262	447
10-Year Peak Flow (cfs)	101	122	223
1-Year Peak Flow (cfs)	35	30	65
	Runoff Volume Summary		
100-Year Runoff Volume (ac-ft)	79	70	149
10-Year Runoff Volume (ac-ft)	28	30	58
1-Year Runoff Volume (ac-ft)	5	5	10

The existing conditions XP-SWMM model was then modified to predict the runoff rates and volumes from the UMA following the proposed UMore Park Sand and Gravel Resources Project. Based on model results for the proposed action, the 100-year total peak storm water runoff rate is reduced to 159 cfs and the total volume is reduced to 43 ac-ft. Table 14 includes a summary of proposed action storm water runoff rates and volumes leaving the UMA. Figure 15 shows the storm water runoff rate and volume at each location where storm water is conveyed offsite after the proposed action.

Table 14 – Proposed Conditions Storm Water Peak Runoff Rates & Volumes

Storm Event	Total Discharge Leaving UMA to Vermillion River (A)	Total Other Discharge Leaving UMA (B)	Total Discharge Leaving UMA (C=A+B)
Peak Flow Summary			
100-Year Peak Flow (cfs)	37	122	159
10-Year Peak Flow (cfs)	21	58	79
1-Year Peak Flow (cfs)	4	11	15
Runoff Volume Summary			
100-Year Runoff Volume (ac-ft)	9	34	43
10-Year Runoff Volume (ac-ft)	4	15	19
1-Year Runoff Volume (ac-ft)	1	2	3

In general, the peak storm water runoff rates and total volumes following a single design event are substantially reduced following the proposed UMore Park Sand and Gravel Resources Project. In each location where storm water is discharged offsite, the peak rate and runoff volume are either equal to or less than the corresponding existing conditions peak rate and runoff volume. Therefore, no significant impacts are predicted with regard to storm water discharge rates and volumes. The proposed action meets Section 7.3 of the VRWJPO Standards Adopted January 8, 2008 and amended February 2008, Section 5.06 and 5.07 of the Empire Township Standards.

Section 5.C of the City of Rosemount Standards states that following land development activities the runoff from the 100-year 24-hour event must be infiltrated on site. Following the mining operation the runoff volume from the agricultural area will be reduced from 70 ac-ft to 34 ac-ft, the majority of which will be directed to adjoining University property. The remaining 2 ac-ft of runoff volume is generated from the 150th Street right-of-way/buffer area and is discharged to the west along 150th Street. This area will likely remain undisturbed during the UMA operations. The remaining net discharge from areas graded during UMA operations will be managed following the City of Rosemount policies as outlined in Section V of the current SWMP and other applicable permit requirements.

Impacts on Annual Average Storm Water Runoff Volume

A 58 year (1950-2007) continuous simulation was completed to assess the long-term impacts of the proposed UMore Park Sand and Gravel Resources Project on storm water runoff volumes. Results from the continuous simulation were used to compare the annual average offsite runoff volumes under existing and proposed action conditions. XP-SWMM model results indicate that over the length of the simulation the existing conditions annual average runoff is 1.1 inches over areas contributing to offsite runoff (i.e. areas that were not identified as landlocked for the 100-year frequency SCS Type II design event). The average annual runoff for the proposed action conditions over the same period is 0.6 inches over areas contributing to offsite runoff. Because the proposed action annual average runoff is less than the existing conditions annual average runoff, no substantial storm water impact is predicted with regard to annual average runoff volume. This is consistent with Section 7.3 of the VRWJPO Standards Adopted January 8, 2008 and amended February 2008, and Section 5.06 and 5.07 of Empire Township Standards. As previously discussed the existing runoff leaving the UMA within Rosemount is either directed towards other University property or is generated within the 150th Street right-of-way/buffer areas.

Impacts on Water Quality

Annual average nutrient and sediment loads leaving the UMA were estimated using aerial export coefficients published by the Met Council (Mulcahy, 1991). Landlocked watersheds during the 100-Year frequency SCS Type II rainfall event were assumed to have an export rate of 0 lb/yr regardless of the land use (i.e. landlocked areas do not contribute to offsite loading). As shown in Table 15 and Figure 16, the total offsite loading for existing conditions is 474 lbs/yr and 82,523 lbs/year for total phosphorus (TP) and total suspended solids (TSS), respectively. Based on the future topography there are an additional 751 acres that will be landlocked due to proposed mining and will not contribute to offsite loading. Consequently the annual nutrient and sediment loads following the proposed action are reduced as shown in Table 15 and Figure 17. Overall, the TP load is reduced 75 percent and the net TSS load is reduced 90 percent with the proposed action. The only locations where the nutrient and sediment loads increase with the proposed action are watersheds PropN-48 and PropN-66.. In this case, the existing land use is undeveloped, and based on 2008 aerial photographs, this area can be classified as forest. As stated in the Mining Plan, it is assumed this area will be classified as agricultural which is assigned larger TP and TSS export coefficients.

Table 15– Offsite Nutrient & Sediment Loading

Substance	Total Load Leaving UMA to Vermillion River (A)	Total Other Load Leaving UMA (B)	Total Load Leaving UMA (C=A+B)
Existing Conditions			
TP Load (lbs/yr)	259	215	474
TSS Load (lbs/yr)	41,461	41,062	82,523
Proposed Conditions			
TP Load (lbs/yr)	21	98	119
TSS Load (lbs/yr)	2,139	9,772	11,911

Onsite receiving water impacts were calculated with the WiLMS model and verified with the MnLEAP model to assess the expected water quality in the mine lake (Table 16). Based on the long term XP-SWMM simulation results, the annual average runoff from contributing watersheds to the landlocked pit is estimated to be 6.4 inches after mining and reclamation is complete. The WiLMS model results were compared to the MPCA's deep lake criteria to assess expected lake water quality relative to the State's water quality standards. The WiLMS model predicted a TP concentration in the mine lake of 37 µg/L and the MnLEAP model predicted a TP concentration in the mine lake of 20 µg/L (± 8 µg/L) both of which are lower than the MPCA standard for deep lakes (40 µg/L). Table 16 summarizes water quality model results for onsite receiving water impacts.

Table 16– Expected Nutrient Concentration in the Landlocked Mine Lake following the Proposed Action Site Reclamation

Nutrient	Proposed Action In-Lake Concentration (WiLMS)[31]	Proposed Action In-Lake Concentration (MnLEAP)	MPCA Deep Lake Criteria
Total Phosphorus (TP) (µg/L)	37	20 ± 8	40

[31] Canfield-Bachmann, 1981. Canfield, D.D., Jr. and R.W. Bachmann. 1981. Prediction of total phosphorus concentrations, chlorophyll a and Secchi depths in natural and artificial lakes. Canadian Journal of Fisheries and Aquatic Sciences 38(4):414-423.

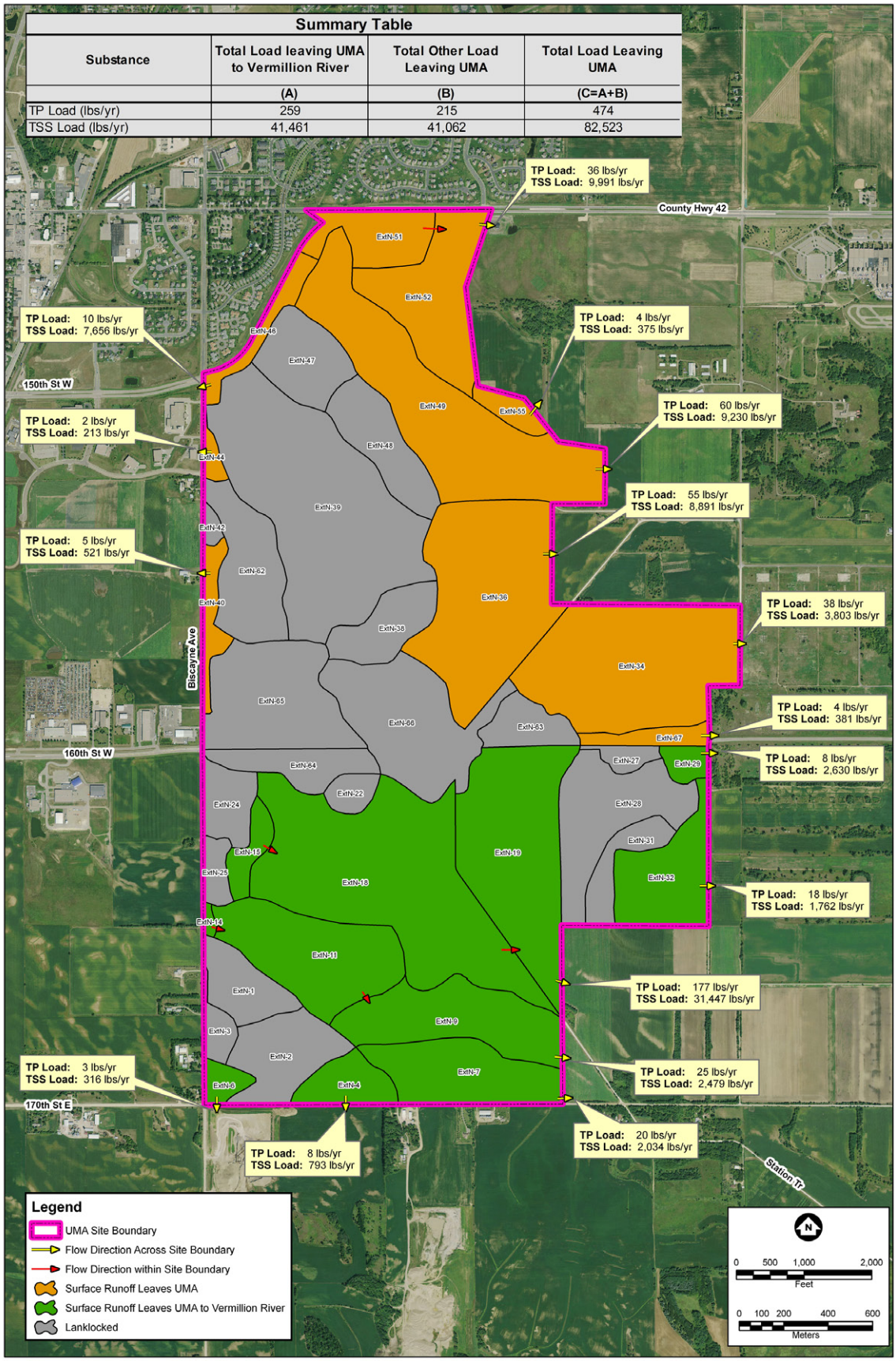

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Figure 16

Existing Conditions
Water Quality Offsite
TP and TSS Loading

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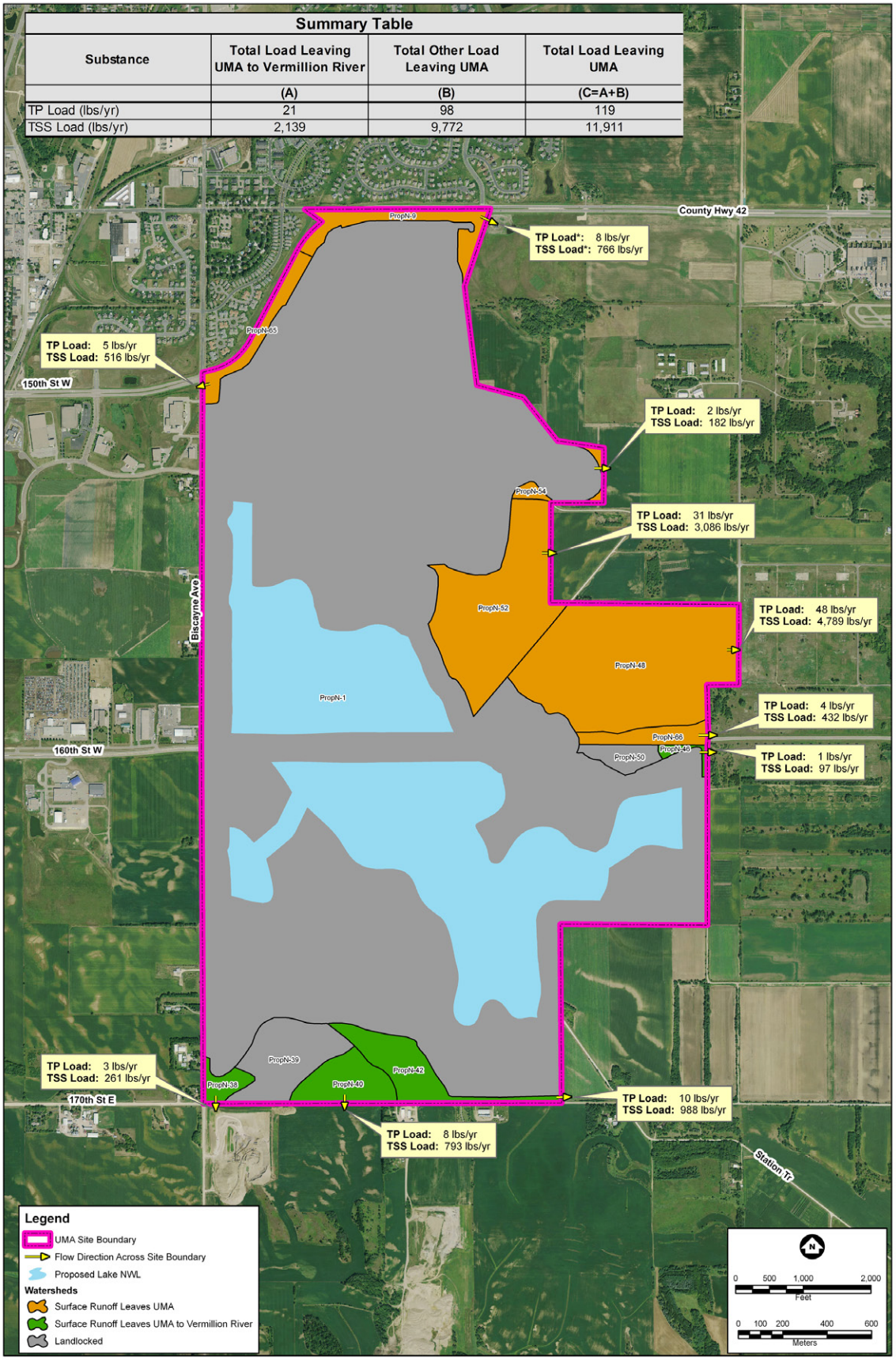

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Figure 17

Proposed Conditions
Water Quality Offsite
TP and TSS Loading

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Impacts of Storm Water on Downstream Areas

The analysis of design storm events indicates runoff volumes and peak rates will decrease for discrete storm events under the proposed action compared to existing conditions. Following the proposed action, storm water will discharge from the UMA through existing culverts crossing County Road 42 and 170th Street, existing culverts located on the east portion of the UMA, and at various other locations where water follows the natural overland drainage patterns. Discharges north of 160th Street follow existing natural drainage patterns toward the Mississippi River. Some of this discharge will enter landlocked depressions and some will reach the Mississippi River. Discharges that leave the site from the southern portion of the study area follow existing natural drainage patterns to Vermillion River tributary streams.

Storm water discharges from the UMA should have negligible impact on wildlife. By maintaining or reducing existing runoff discharge rates, volumes, and improving water quality, the project is unlikely to result in increased erosion potential or sediment loads, if runoff were to reach downstream trout habitat, bury vegetation, or reduce water clarity. By reducing nutrient loading in storm water runoff below existing levels, the proposed action should not generate any increase in invasive vegetation, which would reduce habitat value for wildlife.

Impacts on the Vermillion River

The Vermillion River is the largest stream in Dakota County and a notable trout stream located in the Twin Cities Metropolitan Area. Major portions of the Vermillion River upstream of Hastings are included on the MPCA's impaired waters list. Therefore, it is important to manage storm water runoff rates, volumes, and quality that reach the Vermillion River.

The proposed action model of the UMA was added to the VRWJPO watershed XP-SWMM model, and the results were compared to results from the existing conditions VRWJPO XP-SWMM model to assess the impacts of the project on the Vermillion River and three streams tributary to the Vermillion River (Tributary C, North Branch of the Vermillion River, and Tributary 5), which are shown on Figure 18. Previous studies of the Vermillion River watershed, including studies completed by the USACE in July 1998[32] and Barr Engineering in July 2009[33], found the 4-day duration design event to be the critical design event for the Vermillion River watershed. Therefore, the 4-day duration, 100- and 1-year frequency precipitation events were used to analyze impacts of the proposed action on the Vermillion River. The existing conditions and proposed peak flow rates and total volumes from the 4-day duration, 100- and 1-year frequency events were compared on each tributary immediately upstream from the confluence with the Vermillion River as well as along the main stem of the Vermillion River immediately downstream from the confluence with each tributary.

Existing and proposed 100-year, 4-day hydrographs at each location upstream of the confluence with the Vermillion River shown in Figure 18 are presented in Figures 19 to 21. As shown, in each tributary to the Vermillion River, the proposed mining operation does not increase the peak flow rate reaching the Vermillion River for the 100-year 4-day event.

The total volume reaching the Vermillion River is predicted to be reduced by 83 ac-ft or 3.4 percent for the 100-year 4-day event. The small reduction in volume is expected because the mine pit lake on the UMA creates additional landlocked area that does not contribute runoff to the Vermillion River. The reduction in tributary area causes a reduction in the volume of storm water runoff reaching the Vermillion River.

[32] U.S. Army Corps of Engineers, July 1998. *Vermillion River Watershed Hydrologic Study*. For the Vermillion River Watershed Management Organization. St. Paul, MN.

[33] Barr Engineering Co. July 2009. *Vermillion River Watershed Hydrologic Study of Existing Conditions*. Prepared for the Vermillion River Watershed Joint Powers Organization. Minneapolis, MN

The surface water analysis performed for the 100-year event was also completed for the 1-year, 4-day event to aid in confirming that the proposed action would have an insignificant impact on the Vermillion River for precipitation events of varying magnitude. The analysis demonstrates that the majority of precipitation infiltrates during smaller events because the existing soils are exceptionally sandy and permeable. Therefore, only a relatively small amount of runoff leaves the site during small, lower intensity, frequent events for existing conditions. The modeling results for the 1-year, 4-day rainfall event presented in the Table 17 reveal that for the 1-year, 4-day event the volume reaching the Vermillion River is only reduced by a total of 7 ac-ft or only 3.3%. Additionally, the volume in the Vermillion River immediately downstream from the confluence with each Tributary is reduced by less than 0.2% in all three locations. In addition, model results indicate the 1-year, 4-day peak flow rates in the Vermillion River will be unchanged following the proposed action.

The reduction in volume leaving the site across the spectrum of precipitation events included in this analysis is in compliance with the existing VRWJPO rules which are discussed in Section 3.7.2 that state that runoff volume should not increase following a land disturbing activity. Additionally, the small reduction in volume seems to comply with Section 7.1 item 6 of the VRWJPO standards states that "…it is the action of the VRWJPO to mitigate and reduce impacts of past increases in stormwater discharge on downstream conveyance systems." Table 17 summarizes the peak flow rate and volume in each impacted tributary for existing conditions and after the proposed action for both the 100- and 1-year 4-day events

Table 17– Downstream Vermillion River Impacts

Location	Existing Conditions Peak Flow (cfs)[1]	Existing Conditions Total Volume (ac-ft)[1]	Proposed Action Peak Flow (cfs)[1]	Proposed Action Total Volume (ac-ft)[1]
1-Year 4-Day Event				
Tributary C at Vermillion River Confluence	71	101	71	100
North Branch of the Vermillion River at Vermillion River Confluence	41	32	41	26
Tributary 5 at Vermillion River Confluence	24	76	24	76
Vermillion River Downstream of Tributary C	523	12,334	523	12,330
Vermillion River Downstream of North Branch of the Vermillion River	545	10,074	545	10,057
Vermillion River Downstream of Tributary 5	551	8,929	551	8,918
100-Year 4-Day Event				
Tributary C at Vermillion River Confluence	669	1,144	669	1,134
North Branch of the Vermillion River at Vermillion River Confluence	489	510	489	438
Tributary 5 at Vermillion River Confluence	1,046	739	1,046	738
Vermillion River Downstream of Tributary C	4,568	33,541	4,627	33,461
Vermillion River Downstream of North Branch of the Vermillion River	4,307	27,050	4,281	26,971
Vermillion River Downstream of Tributary 5	4,379	24,911	4,378	24,907

- – Peak flow rates and total runoff volume calculated based aerial adjusted precipitation at the outlet from each tributary.

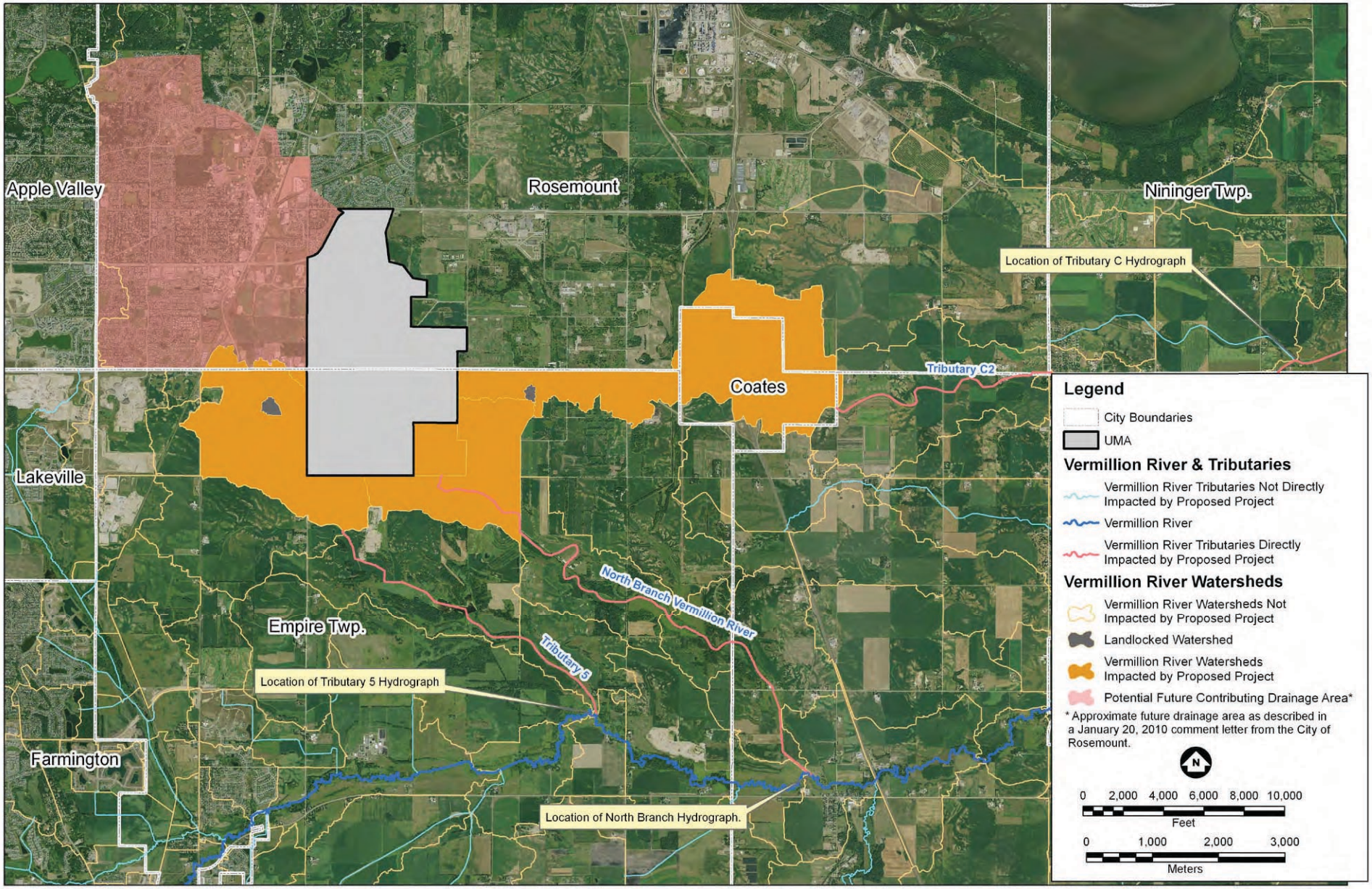

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Figure 18
Impacts on Vermillion River

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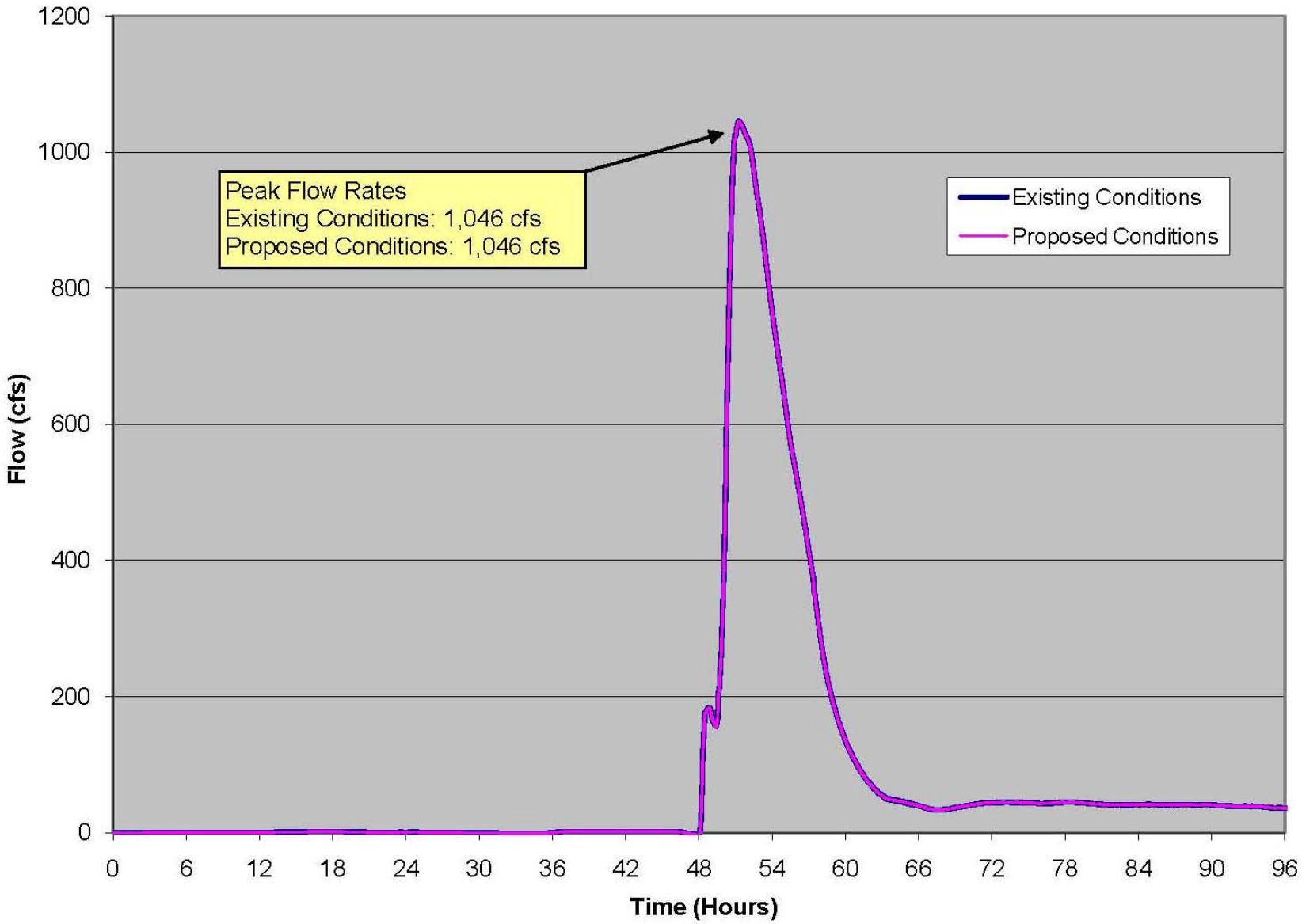

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Figure 19

Tributary 5 100-Year, 4-Day Hydrograph
Upstream of Confluence with Vermillion River

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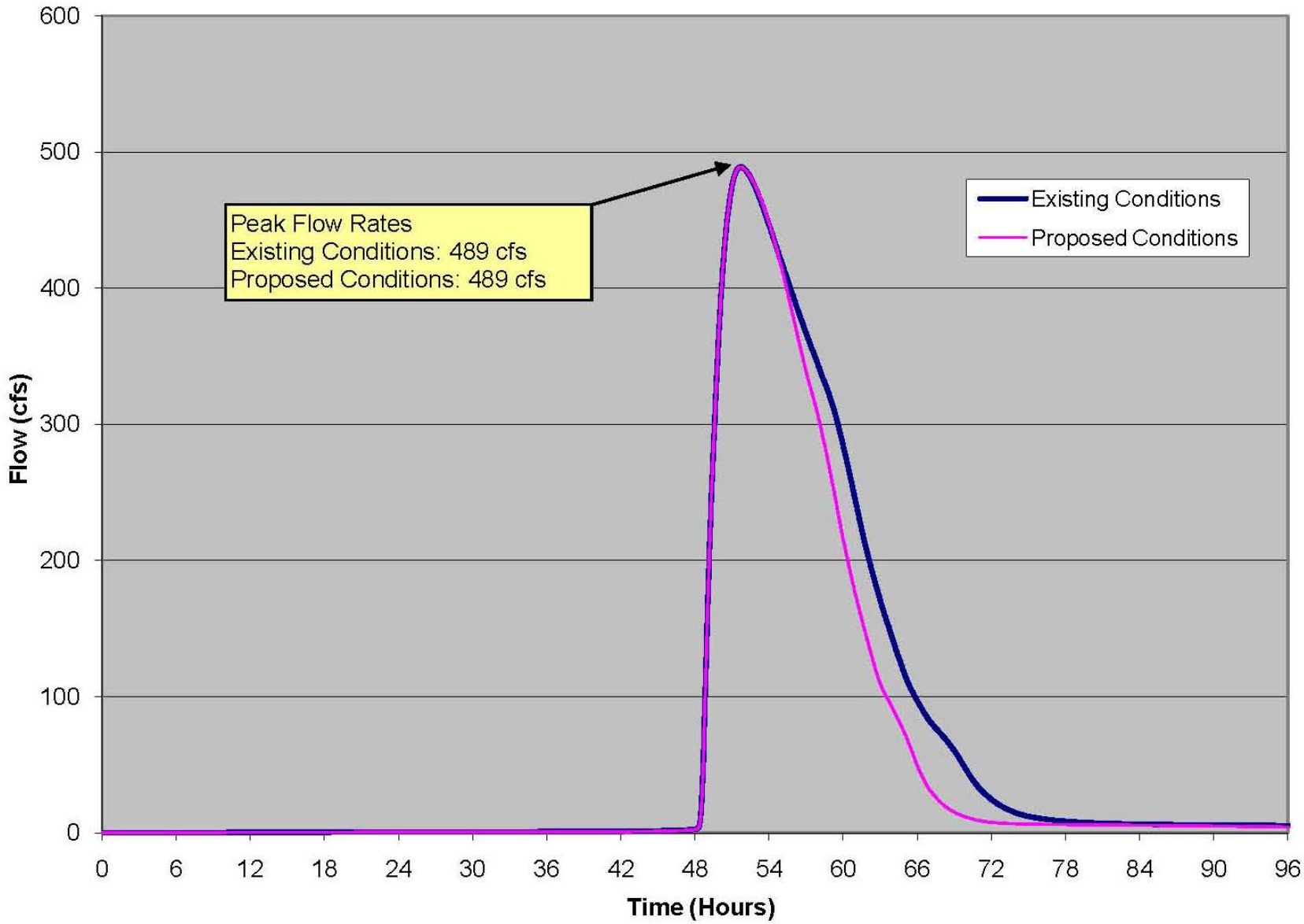

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Figure 20

North Branch 100-Year, 4-Day Hydrograph
Upstream of Confluence with Vermillion River

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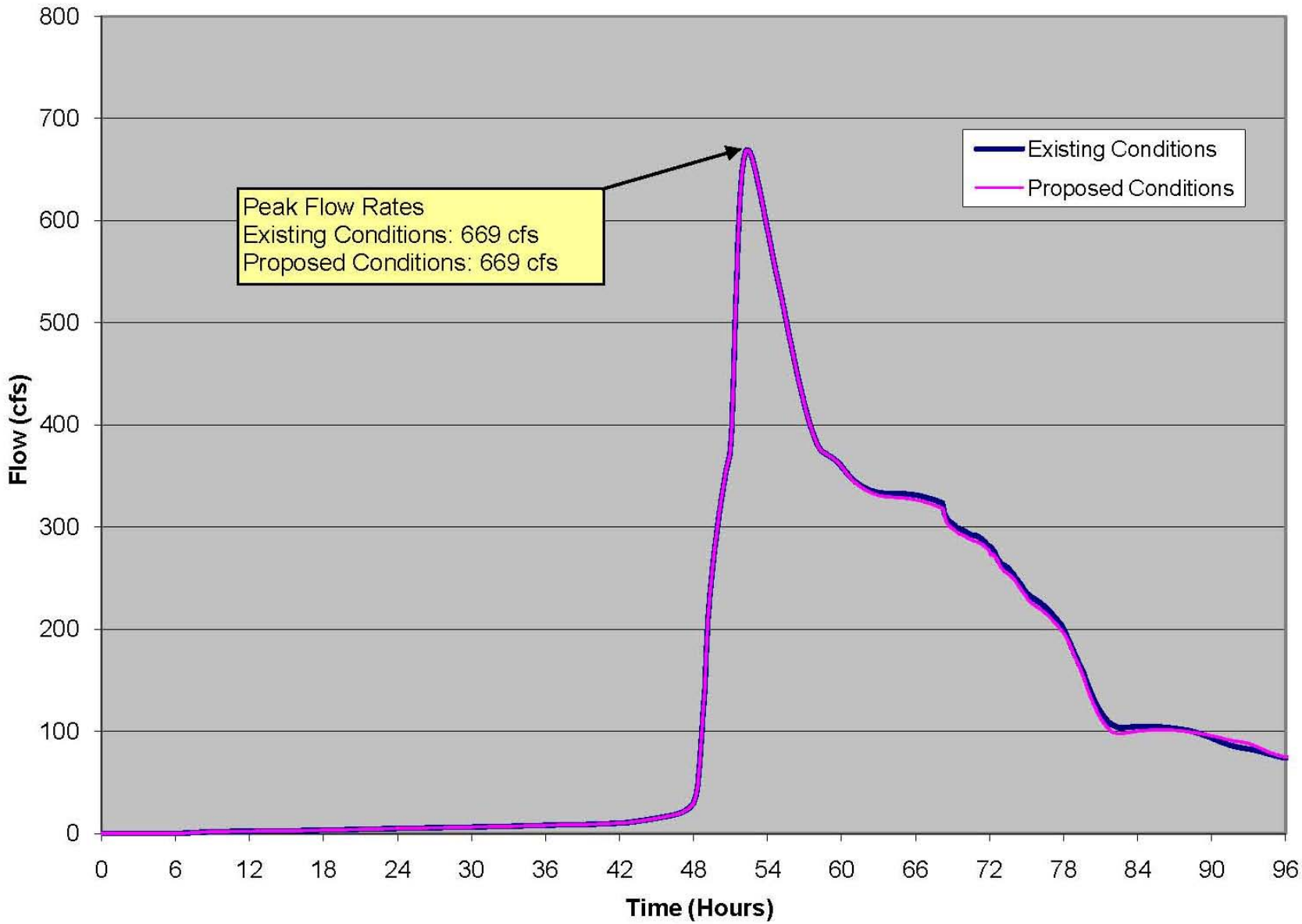

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Figure 21

Tributary C 100-Year, 4-Day Hydrograph
Upstream of Confluence with Vermillion River

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As shown, under the proposed action, peak discharges and runoff volumes reaching the Vermillion River will be reduced slightly. Additionally, the proposed action will improve the quality of the surface water (reducing total suspended solids and total phosphorus) reaching the Vermillion River. The decrease in runoff volume resulting from the proposed action will not, by itself, substantially impact the hydrology or ecological characteristics downstream of the UMA because it is a small volume compared to the overall water volume carried by the tributaries.

3.7.3 Mitigation

The analysis indicates the proposed UMore Sand and Gravel Resources Project will perform well in terms of controlling surface runoff rate and volume. The proposed mine pit lake will reduce offsite nutrient and sediment loadings compared to existing conditions. Pre- and post-project monitoring should be performed to measure (rather than estimate) discharge rates and pollutant loadings coming from the site under existing and proposed action conditions. In addition, the nutrient concentrations in the mine pit lake should be monitored following the completion of the proposed mining project.

Unavoidable Adverse Impacts

This evaluation revealed no unavoidable significant adverse impacts from the UMore Sand and Gravel Resources Project. The proposed action would reduce storm water runoff rate and volume, and reduce nutrient and sediment loads leaving the UMA. Additionally onsite receiving water impacts would meet existing MPCA criteria for deep lakes.

3.7.4 No-Build Alternative

The No-Build Alternative would not modify the existing UMA conditions; therefore there would be no additional impact of the No-Build Alternative compared to existing conditions. Because the No-Build Alternative does not change UMA conditions no additional storm water runoff or water quality evaluations have been performed.

3.8 Groundwater Flow Modeling

3.8.1 Affected Environment

The geologic and groundwater flow conditions are documented in the Groundwater Assessment Study (Barr, 2009a). The study utilized the extensive geologic information collected in previous investigations at UMore Park (ProSource, 2008[34]) to develop and install a network of deep borings and monitoring wells. The field data along with hydraulic testing of the aquifer provided data that were then used to construct a three-dimensional (MODFLOW) model of groundwater flow.

Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a schematic description of how water enters, moves through, and leaves the groundwater system. The model's purpose is to define the major sources and sinks of water, the organization of hydrostratigraphic units into aquifers and aquitards, the direction of groundwater flow, the interflow of groundwater between aquifers, and the interflow between surface water and groundwater. The hydrogeologic conceptual model is both scale-dependent (i.e., local conditions may not be identical to regional

[34] ProSource 2008. Geological Assessment UMore Park Rosemount and Empire Township, Minnesota; Prepared for University of Minnesota, ProSource Technologies, Inc, in association with J.D. Lehr, PA. June 3, 2008.

conditions) and dependent upon the questions being asked. A generalized conceptual model of flow and hydrostratigraphy for the UMA is shown on Figure 22.

An important hydrogeologic feature of the UMA is the presence of a thick sequence of glacial clay till on the eastern edge of the UMA. This area has been selected as the location for the ancillary use facility area. The majority of the ancillary activities will be associated with mine offices, wash operations, concrete batch plant, asphalt plant, fuel and chemical storage. Although each of these activities will have their own redundant spill control systems and containment and countermeasures to prevent releases, the presence of the clay till and a relatively thick unsaturated zone provides and intrinsically protective setting that will enhance protection of groundwater resources.

Model Construction

The field data along with hydraulic testing of the aquifer materials provided a conceptual model of flow and data that were used to construct a three-dimensional (MODFLOW) model of groundwater flow. Details of the model construction are in Barr, 2009a and are shown schematically in Figure 23. The model is based on the Twin Cities Metropolitan Area, Regional Groundwater Flow Model, Version 2 (Metro Model 2; Metropolitan Council, 2008). The Metro Model 2 was developed by Barr Engineering for the Metropolitan Council to assist in evaluating groundwater use and sustainability issues, regional water planning, and groundwater appropriations. This model was selected as an initial starting point for modeling the UMA because it reasonably represents groundwater flow near the area of interest allowing for the appropriate selection of boundary conditions. Groundwater Vistas was used to extract geometry and parameters from the Metro Model 2. The Metro Model 2 data were then used to produce a refined, site-specific, model for this study.

The site-specific UMore model was further refined by adding additional layers and hydraulic conductivity zones based on field data to better simulate groundwater flow at the UMA. The model domain and boundary conditions are shown on Figure 24. A cross section of the model through the UMore area showing the major hydrostratigraphic units is shown on Figure 23.

The site specific UMore model was calibrated using data collected as part of the groundwater assessment study (Barr 2009a) along with data used in the development of the Metro Model 2 (Metropolitan Council, 2008[35]). Details of the model development and calibration are included in Barr (2009a).

Model Simulations

As shown in Figure 25, the calibrated modeled heads correspond to field measured heads. Additional calibration data were also used to provide a best fit with field measured data. The ability of the model to reasonably represent field data indicates that it is a useful tool in assessing potential environmental effects of the proposed mining operations on the groundwater flow system.

Based on the data collected, groundwater originating within the UMA flows to the northeast toward the Mississippi River. The field data and the modeling results do not indicate that groundwater flow from the UMA is likely to move toward the Vermillion River.

[35] Metropolitan Council, 2008. Twin Cities Metropolitan Area Regional Groundwater Flow Model Version 2.00: Technical Report in Support of the Metropolitan Area Master Water Supply Plan (Draft).

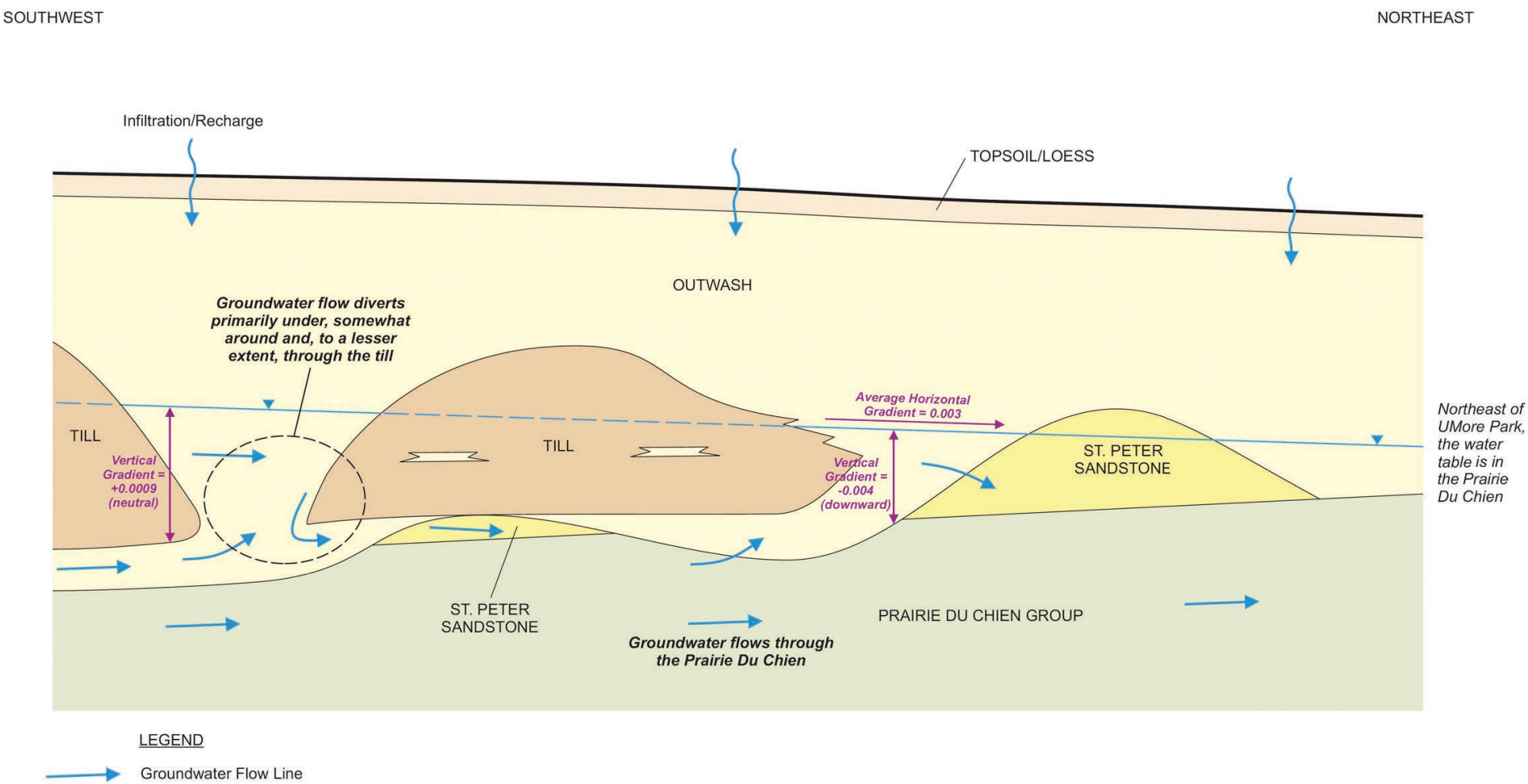

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Figure 22
Conceptual Model Hydrostratigraphy

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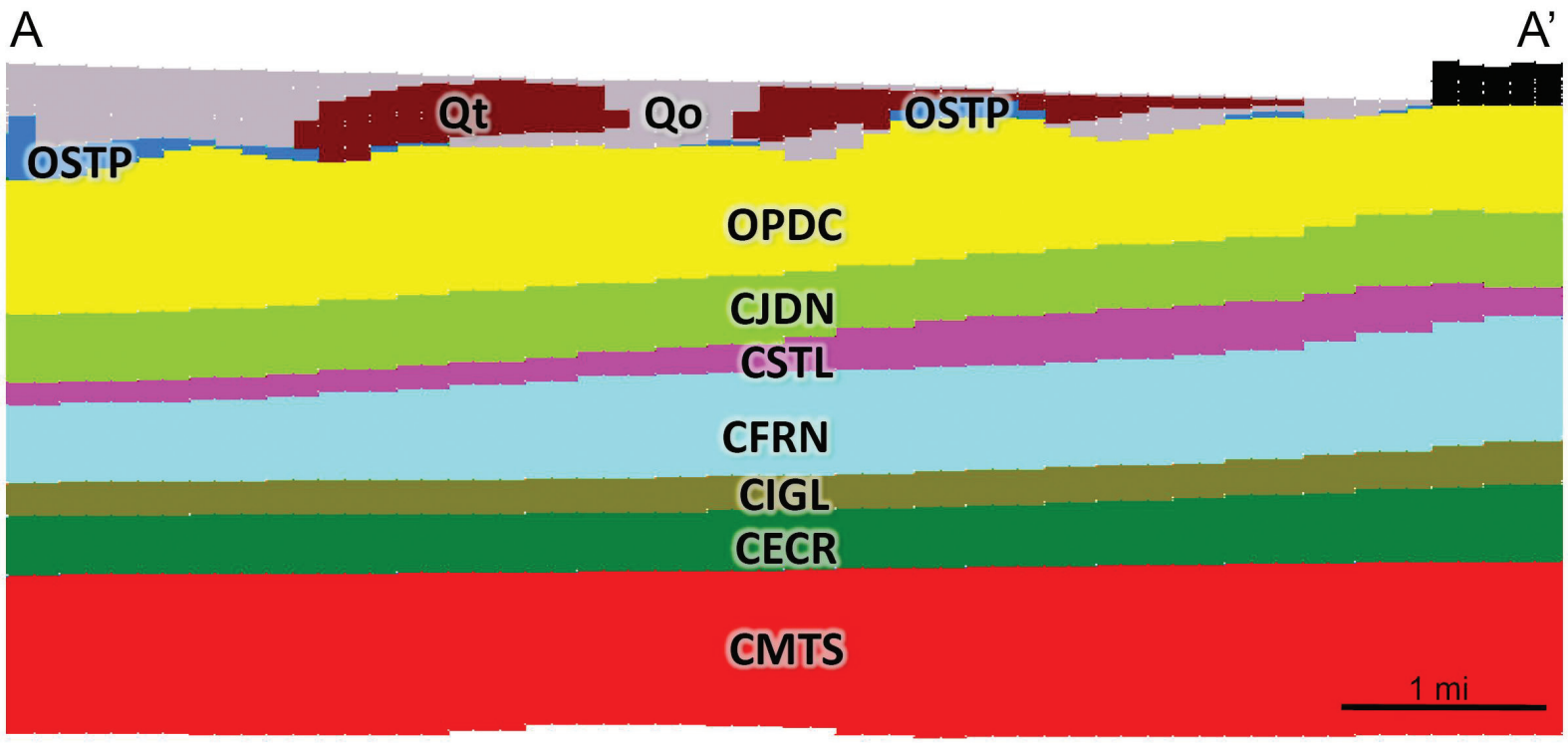

Vertical exaggeration = ~18x

- Till (Qt)
- Outwash / Quaternary Undifferentiated (Qo)
- St Peter Sandstone (OSTP)
- Prairie du Chien Group (OPDC)
- Jordan Sandstone (CJDN)
- St. Lawrence Formation (CSTL)
- Franconia Formation (CFRN)
- Ironton and Galesville Sandstone (CIGL)
- Eau Claire Formation (CECR)
- Mt. Simon Sandstone (CMTS)

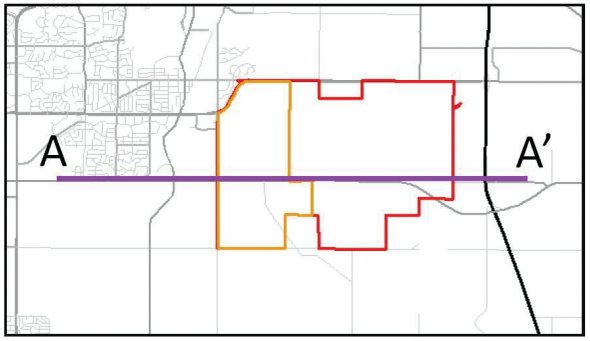

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Figure 23
Model Cross-Section

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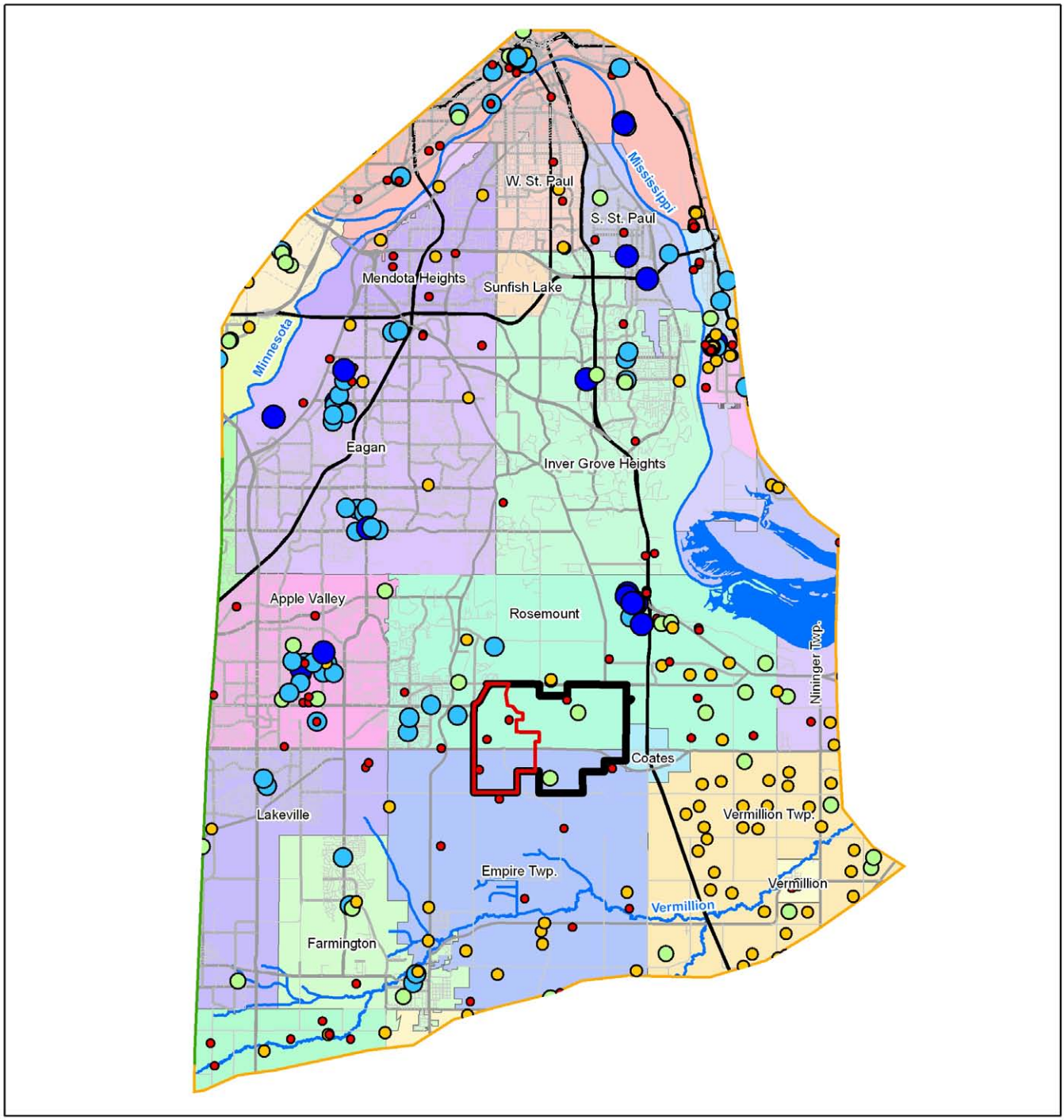

Supply Wells
Pumping Rate (gpm)
- < 10
- 10 - 50
- 50 - 100
- 100 - 500
- > 500

- Specified Flux Boundary
- Constant Head Boundary
- UMore Mining Area (UMA)
- UMore Park Boundary

N

Miles
2 0 2 4

Source: MnDOT, MN DNR, Barr, SEH.

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Figure 24
Model Domain and Boundary Conditions

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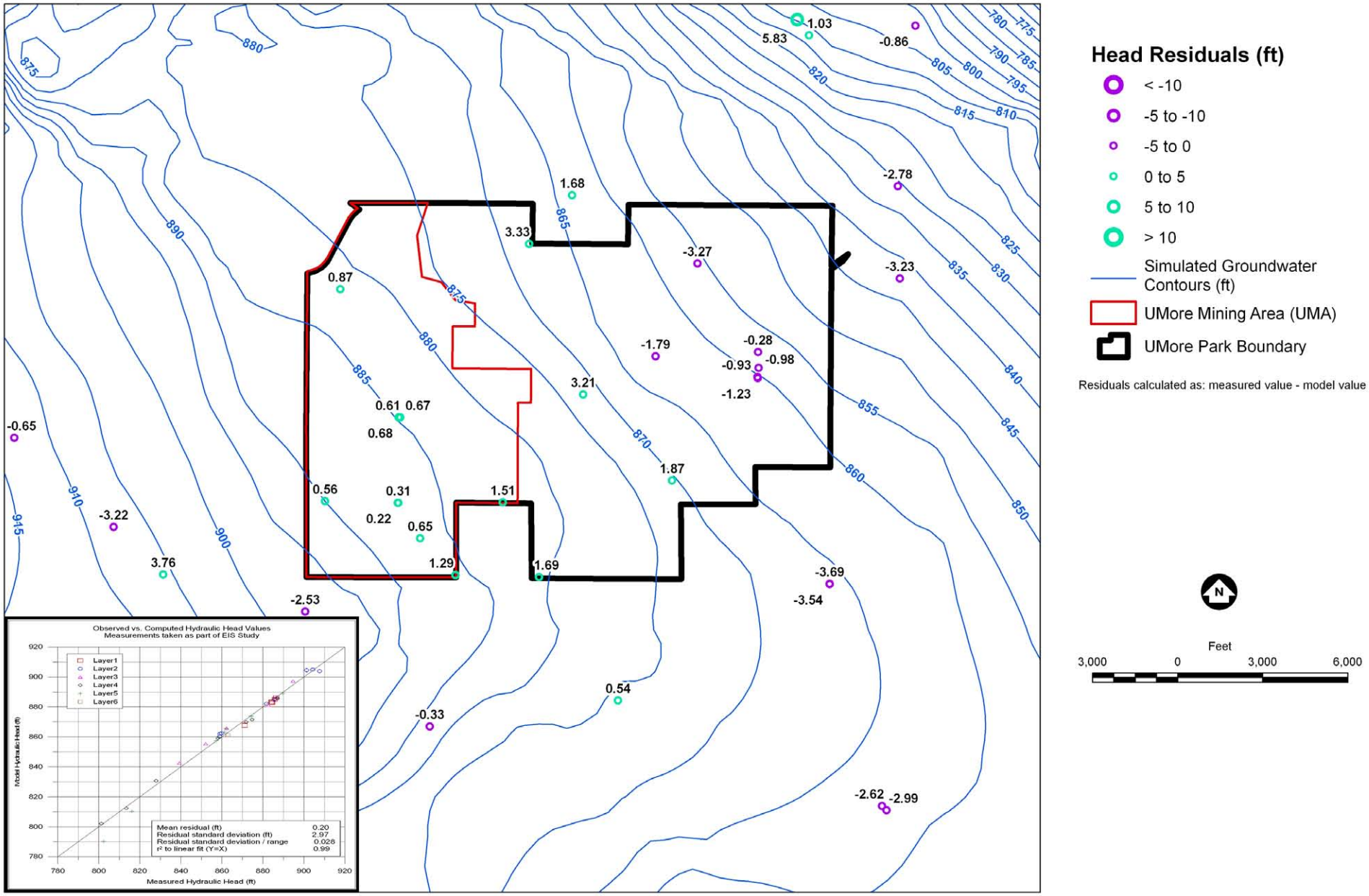

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Figure 25
Model Residuals

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The field data and model results indicate a slight downward vertical gradient so that recharge entering the ground within some portions of the UMA could potentially migrate downward to underlying Jordan aquifer. Therefore, the groundwater model was used to run additional simulations to address several hypothetical scenarios regarding mining operations on localwater supply wells and to better describe potential environmental effects.

These simulations included:

- Particle tracking was used to visualize the flow direction and depth of groundwater movement from the UMA (Figure 26). The particles in the simulation represent discrete particles that are released from various depths around the UMA. The paths of the particles each demonstrate an individual flow path that taken together allows a simple representation of groundwater flow directions.

- Simulation of a hypothetical release of petroleum within the AUF area of the proposed action (Figure 27). The simulation is intended to represent a hypothetical release of a large volume of potential hazardous substances or petroleum products from the AUF area.

- The model was used along with information on projected future (~2050) pumping conditions to develop a preliminary DWSMA map and to help determine which mine operations will be located within the DWSMA (Figure 28).

- Simulation of future post mining (~2050) conditions incorporating the formation of a mine lake and increased municipal water demand to assess how the presence of a mine lake may affect groundwater resources in the future. Simulation of the mine lake under current water demand scenario and future conditions simulating future (2050) demand to assess whether the mine lake would result in changes to the current flow direction or quantity (Figure 29).

Each of these simulations is described below. Simulations related to operational groundwater supply are described in Section 3.8.

Particle Tracking (Barr, 2009a)

Initial particle tracking simulations were conducted to evaluate flow paths from the UMA and to help guide the scope of future simulations. Particle tracking was implemented using the US Geological Survey (USGS) program MODPATH (Pollock, 1994[36]) to simulate groundwater flow from the UMA. Particle tracking simulates the flow of particles within a groundwater flow model. The particle within the model is transported by advection only – transport by dispersion is not simulated. Particles were released from the boundary of the UMA at various depths represented by model layers 1-4 at a spacing of 50 m. Particles were tracked forward until the particle was captured by a sink within the model (river cell or pumping well).

Particle tracking results indicate that groundwater flow is to the northeast. A few particles released from the southern boundary of the UMA flow east-southeast for one to two miles prior to flowing to the northeast. All particles are captured either at the Mississippi River or by high capacity wells at the Flint Hills Resources refinery. Groundwater flow from the UMA is not predicted to move toward the Vermillion River. This conclusion is also supported by the March, April, and July 2009 field results that show hydraulic gradients and flow to the

[36] Pollock, D.W., 1994. *Source Code and Ancillary Data Files for the MODPATH Particle Tracking Package of the Ground-Water Flow Model MODFLOW* -- Version 3, Release 1: U.S Geological Survey Open-File Report 94-463.

northeast. Also, groundwater flow from the UMA is consistent with flow directions shown from a separate groundwater flow model constructed to assess impacts of sand and gravel mining southwest of UMore Park (URS, 2005[37]).

Figure 26 shows the trajectory of select particle paths originating at the water table around the UMA boundary. These paths are color coded by the hydrostratigraphic units in which the particle resides. As shown on Figure 26, flow is within the glacial deposits including the outwash and till within the western and north-central part of UMore Park. As particles continue to the northeast, the particles move into the Prairie du Chien Group (PDC) dolostone and Jordan Formation sandstone aquifers. As shown on Figure 26, a very limited number of flow paths have the potential to be captured by the Rosemount water supply wells located north of the UMA (completed in the Jordan sandstone).

Hypothetical Release Scenario (Barr, 2009g[38])

Mining operations will involve two 12,000-gallon double-walled fuel tanks used for fueling on-site equipment and large capacity tanks to contain asphalt cement and/or asphalt binder.

Other sources of potential environmental releases include recycled asphalt product. While these tanks and areas will have safeguards against spills and leaks, the fate and transport of a hypothetical release of a large quantity of diesel fuel near the fuel storage tanks was simulated to demonstrate the potential for environmental impacts in a "worst-case" scenario. The diesel fuel release scenario was selected as a proxy for the other potential hazardous substances or petroleum products because fuel constituents are typically more mobile in the subsurface than products such as heavy oils or asphalt hydrocarbon constituents.

For this simulation, it was assumed the primary constituents of concern are common fuel constituents benzene, toluene, ethyl benzene, and xylenes (BTEX). The use of BTEX provides a conservative proxy for a release of other organic compounds potentially stored or used at the UMA because they are typically more soluble than heavier hydrocarbons, and benzene is considered a potential human carcinogen. This simulation does not incorporate denser than water phases of hydrocarbons or liquid mixtures because these materials are not anticipated to be used within the UMA.

The simulation assumes that the petroleum release would bypass containment and remain undiscovered by routine monitoring and inspection so that a free-phase layer of petroleum migrates downward to the water table to act as a constant stationary source for a dissolved phase plume of BTEX. The source concentration was set to be equal to the effective solubility of BTEX from diesel fuel in water. BTEX compounds were simulated to only biodegrade under aerobic conditions (i.e., O_2 as the only electron receptor). Other electron receptors under anaerobic conditions, such as nitrate, manganese, ferric iron, and carbon dioxide are likely available locally (especially nitrate); however, they are not considered in this study. Another attenuating factor not considered in the model is degradation and retardation of the release that would be likely occur as the release migrated vertically the over 50 feet of unsaturated sand and silt above the water table that will remain in the AUF area. The results are thus likely to conservatively overestimate the length of the plume in groundwater.

[37] URS, 2005. *Revised Groundwater Impact Study: Sand & Gravel Mining and Accessory Uses*, Empire Township, Dakota County, MN.

[38] Barr Engineering Co. 2010. *Predictive Simulations to Assess Potential Effect of Mining Activities on Groundwater, Resource Document for Environmental Impact Statement, UMore Mining Area*, prepared by Barr Engineering for the University of Minnesota, April 23, 2010.

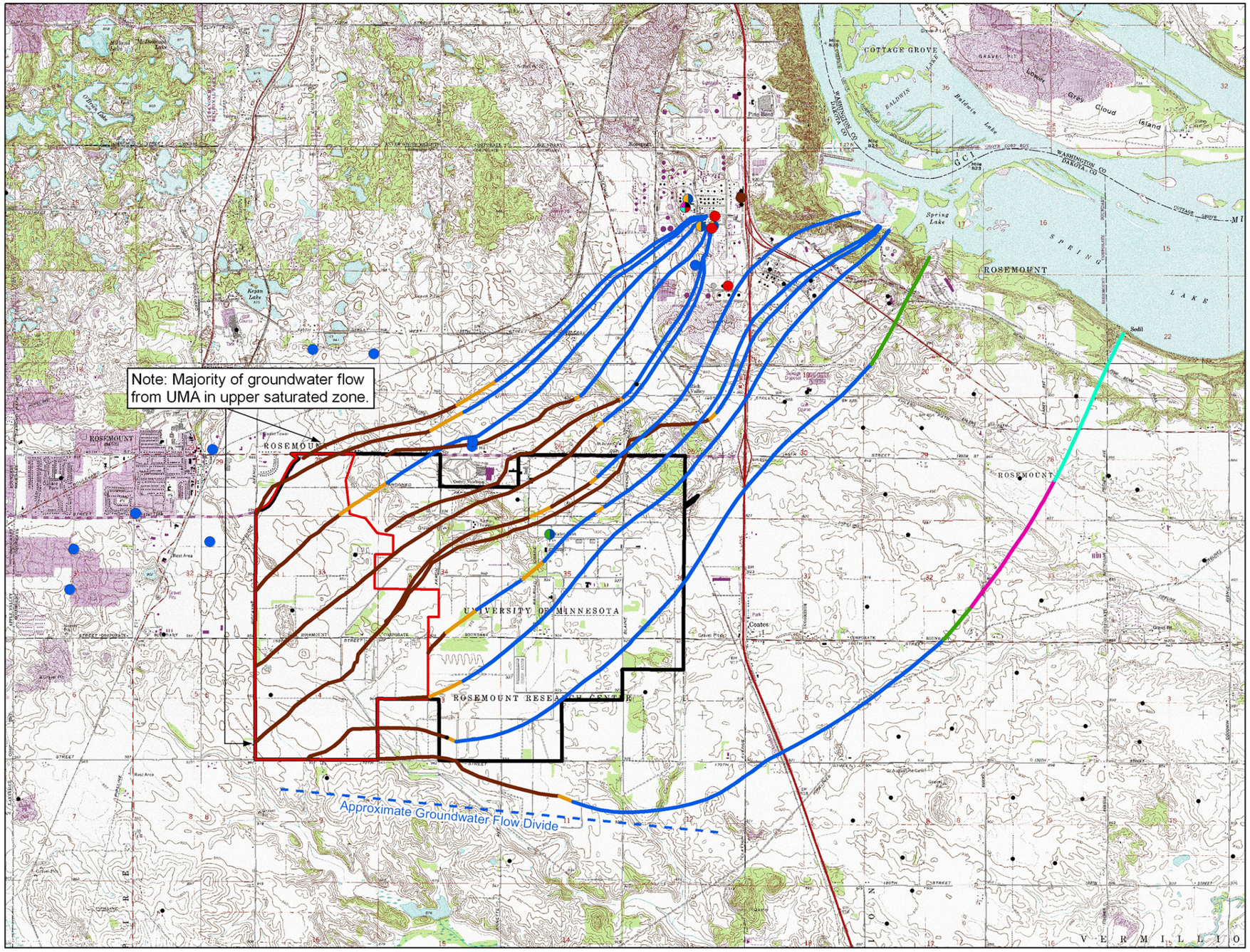

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Figure 26
Selected Flow Path by Layer

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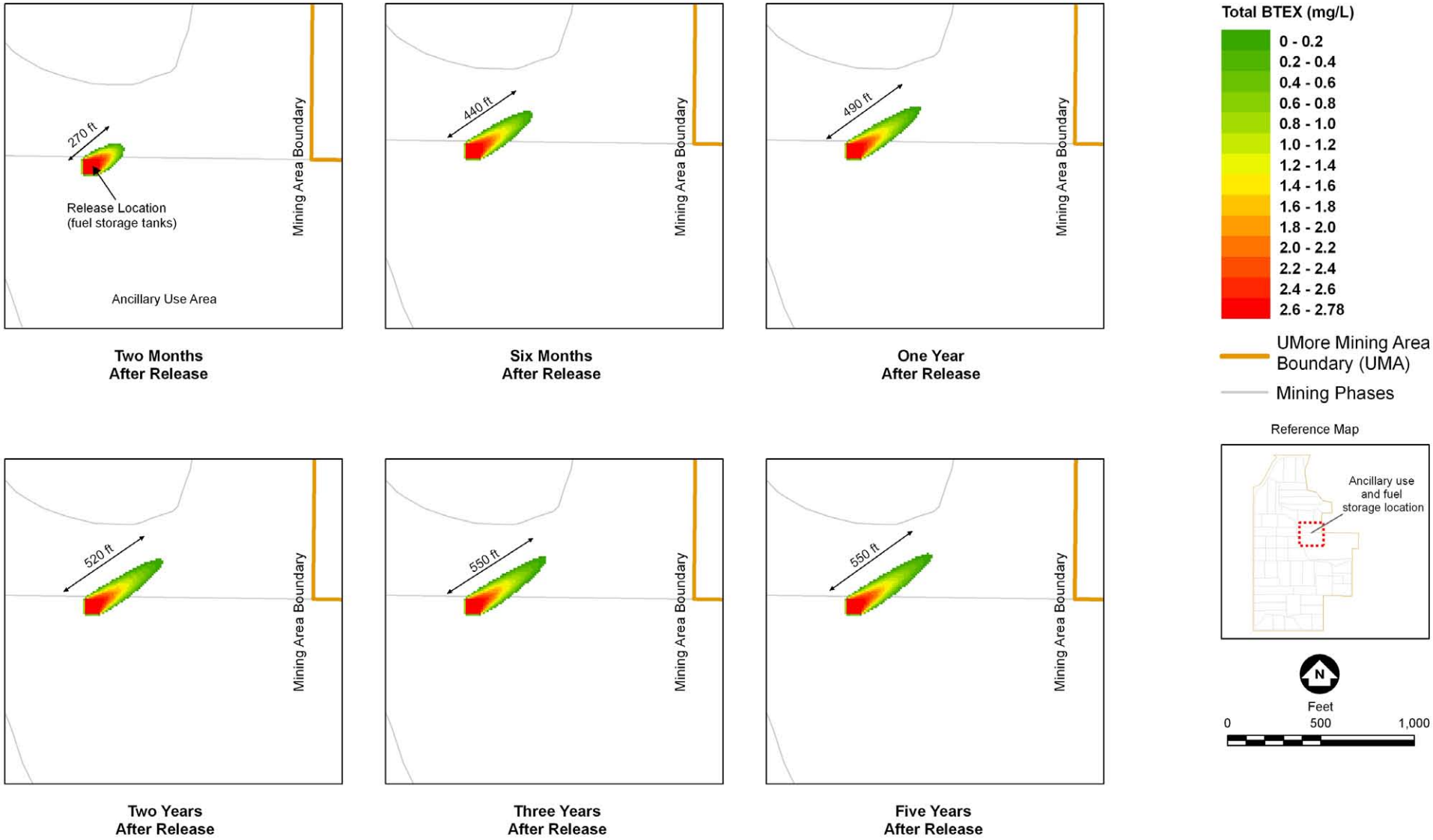

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Figure 27
Petroleum Release Simulation

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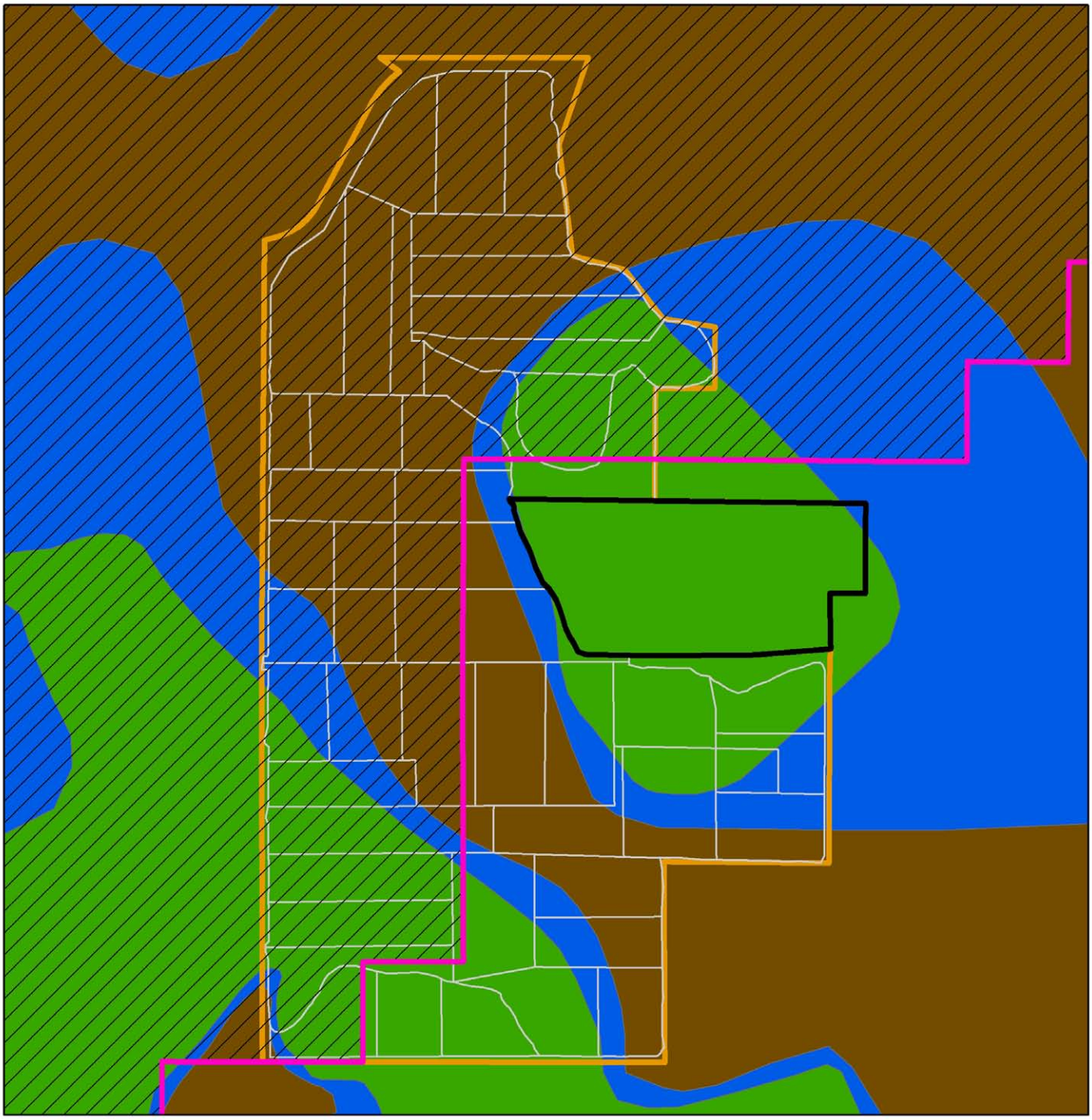

Simulated Conceptual Future Drinking Water Supply Management Area (DWSMA)

Aggregate Plant and Ancillary Facilities

UMore Mining Area (UMA)

Mining Phases

Aquifer Vulnerability

High

Moderate

Low

N

Feet

0 2,000 4,000

Meters

0 500 1,000

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Figure 28

Future DWSMA and Aquifer Vulnerability

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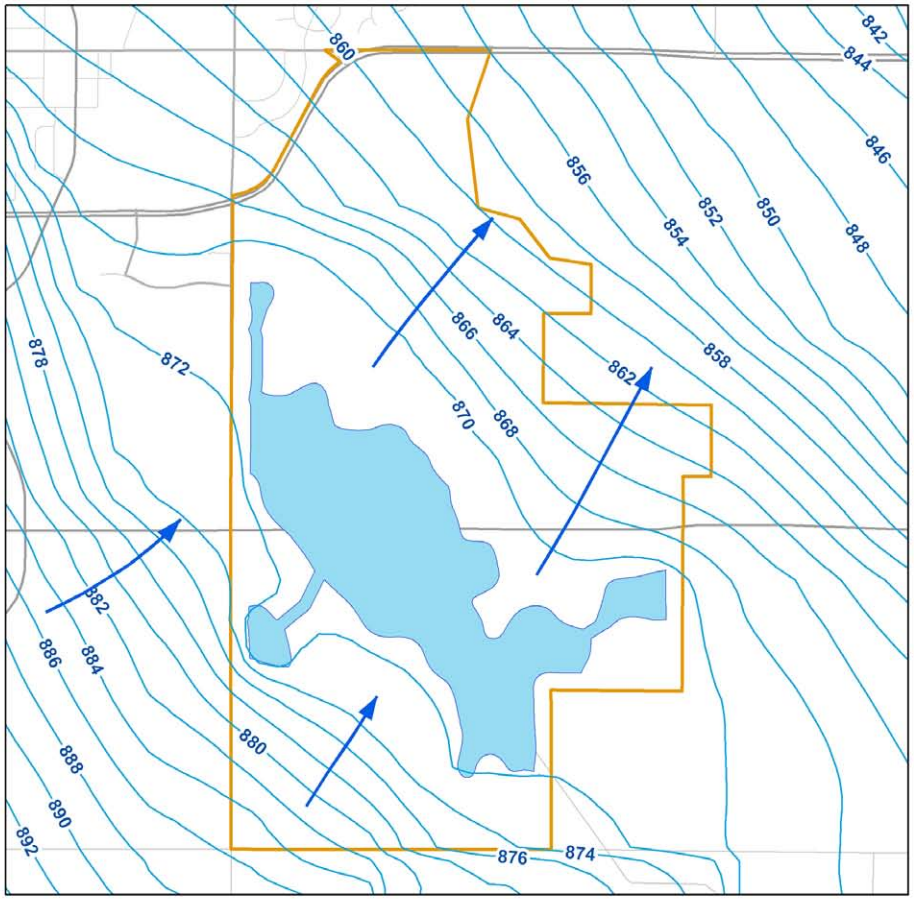

Simulated future water level elevations with increased municipal water demand, changes in recharge due to land use change, and full development of the mine pit-lake. Arrows indicate the groundwater flow direction.

Comparison of simulated future water level elevations with and without the mine pit-lake. Contours indicate the net difference in simulated future water level elevations attributed to the formation of the mine pit lake. Positive values indicate a net water level rise in feet. Negative values indicate a net water level drop in feet.

Groundwater contour (ft, msl)

Net difference in water level (ft)

Mine Pit-Lake

UMore Mining Area (UMA)

N

Feet

2,000 0 2,000 4,000

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Figure 29
Future Simulation Lake vs. No Lake

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Results from the simulation show the BTEX plume migrates approximately 550 feet to the northeast, reaching static equilibrium after approximately 3 years. This means that the concentrations dissolving into the groundwater from the free-phase petroleum are in balance with the concentration that is being removed by degradation within into the aquifer. The simulation indicates that none of the BTEX constituents migrate laterally past the UMore property boundary or vertically below the outwash/glacial till saturated interval.

Mine Layout and Preliminary Conceptual DWSMA Map (Barr 2009g)

Parts of the UMA are located within the DWSMA for the City of Rosemount. A DWSMA is typically established to help water and land use managers plan development within areas that could conceivably result in an impact to groundwater resources supplying water to a city or serving a jurisdictional area.

The purpose of this simulation was to evaluate aquifer vulnerability in the area of the UMA and establish the extent of a conceptual DWSMA that may be developed during the life of the mining operations. MDH guidance (MDH, 2005[39]) was used to develop the map as described in Barr (2009g).

Over the course of mining operations, the extent of the DWSMA for nearby communities is likely to expand due to increased pumping and the installation of additional wells to meet future demand. In order to evaluate potential conflicts between the mining operation and the potential future DWSMAs for Rosemount and Empire Township, future pumping conditions were projected out to approximately the year 2050.

There are considerable challenges involved in preparing a simulation that attempts to predict conditions in the relatively distant future. Primary reasons for this include the uncertainty in what and where future development will occur, and hence, uncertainty in the amount of increased pumping that will be needed. Also changes in policy regarding water conservation and sustainable development, and the availability of groundwater may significantly change in the future. In order to avoid predictions that are biased by arbitrary assumptions, Barr used the published water demand projections compiled by the Met Council as described in the Predictive Simulations Report (Barr 2010).

Consistent with these projections and the scope of the EIS, no additional pumping was added to account for hypothetical future UMore residents. While future development of UMore may by postulated, there are no published data available that would indicate the specific volume and location information needed to simulate future pumping at UMore at the end of the mining operations. The projected DWSMA based on the projected pumping is likely to represent a conservative representation of the fullest extent of DWSMAs near the end of UMA operations.

The conceptual DWSMA and aquifer vulnerability map developed for this simulation is shown on Figure 28. The planned location for the AUF area is where most of the aquifer is classified as having a low vulnerability corresponding to the underlying glacial till geology in this area. The delineation of the DWSMA shows that all of the planned ancillary facilities are located outside of the future DWSMA. Storage of fuels, recycled asphalt products , and concrete production liquids within the AUF area pose little threat to drinking water supplies as such storage will be in an area of low aquifer vulnerability and outside of the potential DWSMAs for the duration of mining.

[39] MDH, 2005. *Guidance for Delineating Wellhead Protection Areas in Fractured and Solution-Weathered Bedrock in Minnesota*. Minnesota Department of Health 2005.

It is possible that changes in future groundwater demand could alter the configuration of the DWSMA to include other portions of the UMA. Because these changes may include placement of wells in areas other than those modeled, the configuration of the DWSMA may deviate from the condition conceptualized in the model. If these changes occur, the City of Rosemount will implement modification to the Wellhead Protection plan, generate a new DWSMA and take appropriate actions that will protect municipal water supplies.

Future (Post-mining) Mine Lake Simulation (Barr 2009g)

A range of comments on the SEAW were directed at the presumed and potential effects of the future mine lake on the groundwater flow system. Similar to the DWSMA simulation above, future conditions in the year 2050 were simulated to evaluate the configuration of flow around the mine lake after mining operations would be completed.

The latest land use projections from Rosemount, Empire Township, Coates, and UMore Park, along with final reclamation topography for the mining operations, were incorporated into the Soil Water Balance (SWB) recharge model (Barr, 2009a). The SWB model is used in conjunction with the flow model to simulate the differences in recharge related to soil cover. The recharge calculated with the SWB model was then incorporated in the groundwater flow model.

The results of the simulation are shown on Figure 29. The mine lake that will form as a result of planned gravel extraction below the water table was also incorporated into the groundwater flow model. Recharge applied to the lake area was calculated as the average precipitation rate plus the calculated runoff volume into the lake (via pretreatment storm water management features) from the area adjacent to the lake. The average precipitation was calculated to be 32.6 inches per year and the average runoff into the lake was calculated to be equivalent to an additional 11.2 inches per year of recharge over the lake area. Evaporation from the lake surface was estimated to be 27.4 inches per year.

Results show that a decline in groundwater level (up to 15 feet) is predicted to occur over the UMA due to the future water consumption. The model calculated water balance indicates that the decline in groundwater level is not related to the UMA or post-UMA configuration of the mine lake. The decline in head shown on the figure is attributed to the substantial increase in projected regional municipal water demand.

The presence of the mine lake reduces the predicted decline in groundwater level within the model because of increased recharge to the groundwater system via direct precipitation onto the lake surface and surface-water runoff into the lake. The increase in water levels resulting from the mine lake is estimated to be 1 to 2 feet compared to simulations where the mine lake is not included (Figure 29). Locally, near the shore of the mine lake, groundwater flow directions will change slightly. However, groundwater flow from the UMA will still be to the northeast toward the Mississippi River.

3.8.2 Environmental Consequences

Based on the above simulation, it does not appear the proposed mining operation will have substantial effects on groundwater flow directions or have a negative effect on heads in the aquifer. Water quality was not modeled because all stormwater runoff will be pretreated prior to infiltration in accordance with appropriate surface water management plans and BMPs included in the mining permit. Future effects of regional pumping are beyond the scope of this study. However, it is likely that future pumping issues will be resolved through on-going regulatory approvals and management.

3.8.3 Mitigation

The predicted effect of a spill will be confined to the area immediately down gradient of the UMA within the UMore property boundary. Ancillary operations will be located in area underlain by a relatively thick unsaturated zone (relative to the active aggregate extraction areas) and the low permeability clay till. Potential hazardous substances and petroleum products will also be managed in accordance with appropriate spill prevention, control, and containment measures.

Detailed plans for environmental protection and/or monitoring will be addressed during the mine permitting stage and as required by City ordinance. Consideration for future monitoring should include the geology and groundwater flow directions in the UMA relative to drinking water supply wells (e.g. RR1 and RR2 shown on Figure 26) in order to evaluate appropriate locations for monitoring wells for the monitoring network.

The hypothetical release simulation indicates that the constituents of concern may not be easily detected because of the limited transport distance within the aquifer relative to the source area. The simulation suggests that field or other indicator parameters may be more effective monitoring parameters than the source constituents themselves. This is because these indicator parameters reflect changes in general aquifer chemistry (e.g. reduction in dissolved oxygen) that often precede the plume and that may serve as an early warning of a release. If an increase in the indicator parameters is observed, then additional parameters can be added in subsequent monitoring events to determine if a release has occurred.

3.8.4 No Build Alternative

Groundwater flow patterns will likely be similar under either the preferred alternative or the no build alternative. The future simulation indicates there will be a decrease in groundwater levels from future municipal pumping demand (i.e., unrelated to the mining operations) relative to the current condition. The future simulation also indicates that the groundwater recharge rates under the no build alternative are lower than recharge rates predicted for the preferred alternative. The increased rate of groundwater recharge associated with the preferred alternative is primarily due to the increase in direct recharge due to precipitation and runoff into the future mine pit lake. Although this is likely a net positive environmental effect, it does not constitute a significant environmental effect in the context of the EIS.

3.9 Water Use

3.9.1 Affected Environment

Two water supply wells will be utilized in the UMA. One well will be used to supply water for gravel washing operations (to remove the fine particles from the mined aggregate) and a second well will be used for concrete production and ancillary operational purposes (e.g., water trucks, general washing). An existing test well, screened in the sand and gravel outwash, will be used for the wash well. This well will be used to initially fill the site wash ponds. After the wash ponds have been filled, the well will be used to supplement recycled wash water and site storm water to maintain the pond water level, as necessary. Once dredging begins, the mine lake will be used as the primary source of wash water and the wash well will be used only intermittently.

Because the wash well is located in a future mining area, it will eventually be decommissioned and sealed in accordance with Minnesota Rules Chapter 4725 and Dakota County Ordnance. Water for concrete production will be supplied by a new well to be drilled onsite and open to the Prairie du Chien (PDC) aquifer. A new well in the outwash is not possible east of the mining limits (e.g. in the AUF area) because the outwash aquifer is not of

sufficient thickness in the area underlain by glacial clay till. Both the wash well and the concrete production well will likely operate seasonally, however, the concrete production well will likely operate on a more intermittent basis at both daily and seasonal time scales.

The location of the concrete production well will depend on the location of the operational areas and will be selected to minimize impacts to surrounding water users. The new well will be designed and constructed in accordance with Minnesota Rules Chapter 4725 to withdraw groundwater from PDC aquifer. Groundwater pumping rates are anticipated to vary from zero (during non-production hours) to up to approximately 150 gallons per minute (gpm).

No changes to the public water supply system will be made as a result of the project. There are several irrigation and private supply wells owned by the University of Minnesota that will be permanently sealed as part of preparation for each mining phase and prior to the commencement of mining operations. These wells will be permanently sealed in accordance with Minnesota Department of Health rules and the Dakota County ordinance.

3.9.2 Environmental Consequences

The primary environmental effect related to water use is the potential for pumping to drawdown the upper aquifer or reduce hydraulic heads in underlying aquifers. It is assumed that if significant drawdown extends far enough from the UMA, it could potentially affect other groundwater users. That is, water captured by the mining operations would theoretically not be available to be pumped by other wells. Another potential consequence is if drawdown from pumping (whether from the mining water supply or other groundwater supply wells) are great enough over time, surface waters and wetlands that are groundwater dependent could receive less groundwater inflow. This potential effect is not related to capture of water directly from the surface water body. Rather, it is the potential for the well(s) to capture groundwater or reduce gradients that would otherwise (in the absence of pumping) allow more flow toward the surface water receptor.

Pre-Simulation Sustainability Evaluation

The water circulation rate needed for normal wash operations is estimated to be several thousand gallons per minute. A conceptual schematic of water consumption for the operation is shown on Figure 30. In order to meet the University's goal of employing sustainable groundwater use at UMore, several iterative simulations of groundwater pumping effects were evaluated. Based on the initial analysis, a pumping rate of 2,500 gpm was found to be theoretically possible over time if distributed laterally to several pumping wells and multiple aquifers. This is because much of the water would infiltrate back to the upper water table aquifer to offset drawdown.

However, due to its limited saturated thickness, the outwash aquifer would not be able to sustain pumping at this rate. Placing multiple wells from several aquifer units would be potentially expensive and could interfere with other groundwater users. The effects of recharging the upper portion of the outwash aquifer would also lag the withdrawals from deeper aquifers; therefore, drawdown from the mining operation would potentially extend far off site before recharge to the lower aquifer units would be able to partially offset the effects of the water being withdrawn. It was concluded that pumping at such a high rate would likely have had significant financial and regulatory concerns regarding well construction, appropriations, and energy consumption.

Therefore, engineering controls were considered to reduce the groundwater withdrawal. It was proposed that constructing one or more clay-lined settlement and recirculation basins using clay excavated from the deposits at the UMA would reduce the seepage rate and allow water to be withdrawn from the outwash aquifer at a much lower rate. The operation would

still circulate several thousand gallons per minute of water, but groundwater would only be needed to initially fill the basins and then as makeup water for seepage and evaporation loss from the basin. Because the seepage would be recharging directly to the aquifer being pumped, the infiltration from the basin could partially offset the drawdown due to pumping.

In order to evaluate this alternative, groundwater demand was calculated assuming that wash water would be recirculated from an approximate 4.5 acre clay-lined settlement basin (Barr 2009g). The clay liner would be constructed with a relatively low permeability (3×10^{-8} ft/sec) material to limit infiltration. The calculations indicate an estimated groundwater pumping rate of 70 gpm will be needed to make up for losses due to seepage and evaporation from the basin. Of the 70 gpm, an estimated 64 gpm will be returned to the groundwater system via seepage from the settlement basin. The operational conceptual model also assumes that a concrete production well will be operated intermittently during wash operations and will consume about four million gallons a year or an annual average of about 7.6 gpm with an estimated maximum capacity of 100 to 150 gpm.

Simulation Results

Two separate simulations were conducted to assess the potential impacts to the groundwater flow system associated with both the creation of a mine lake and pumping of groundwater related to mining operations. The separate simulations are necessary because the mine operation plan calls for a decrease in groundwater pumping once the mine lake is open and water can be derived directly from the lake. While still a net withdrawal from the overall system, the water pumped from the mine lake would have a different effect on water levels than will a groundwater supply well.

The first simulation (mining simulation 1) evaluated groundwater pumping associated with mining operations prior to the formation of a mine lake (see Figure 31). The second simulation (mining simulation 2) evaluated groundwater associated with mining after the formation of the mine lake and included both the effects from the mine lake and groundwater pumping.

Results from the groundwater flow simulations indicate withdrawal under either scenario is unlikely to result in significant environmental effects on the groundwater system. Seepage from the settlement basin is expected to result in an increase in the groundwater levels below the recirculation basin of approximately +0.3 ft. The seepage from the basin therefore helps to offset the drawdown in the aquifer.

As shown in Figure 31, prior to the formation of the mine lake, groundwater pumping results in approximately 0.1 feet of drawdown at the UMA boundary. This is a very low value relative to the calibrated accuracy of the model. It is also less than the combined variability resulting from measurable field differences and variation in water level observed seasonally. This value is therefore near the lower limit of the model's ability to detect the predicted extent of impact from pumping.

After the formation of the mine lake (see Figure 32), groundwater levels are expected to rise one to two feet, particularly on the downgradient side of the lake. This increase in water level is associated with an increase in recharge to the groundwater system via direct precipitation onto the lake surface, a decrease in evapotranspirative losses and local surface water runoff into the lake. The mine lake will act as a flow-through lake with groundwater entering on the west/southwest side and flowing out on the east/northeast side. Locally, near the shore of the mine lake, groundwater flow directions will change slightly. However, the increase in water level will not change overall flow directions and groundwater flow from the UMA will still

flow to the northeast toward the Mississippi River. No groundwater flow from the UMA is predicted to flow toward the Vermillion River.

3.9.3 Mitigation

Mitigation has been incorporated into the mining operations to limit the use of groundwater. The potential effects of groundwater withdrawal will be mitigated primarily by use of a clay-lined wash basin, seepage from the basin to groundwater, and the intermittent pumping of the concrete production well. Increasing the thickness of the liner would theoretically decrease the demand for makeup water, depending on the concentration of fine sediment in circulation, but would come at the cost of increased energy and infrastructure to construct the liner. The increased cost would not significantly reduce the effect on the resource at the UMA boundary; therefore, it was concluded that a thicker liner would not enhance the sustainability of the operation.

The mine lake itself would result in a net increase in water level elevation relative to current conditions. Although this effect may be significant, it is likely a positive effect and therefore is unlikely to result in environmental impact to other users or habitats that rely on groundwater.

3.9.4 No Build Alternative

If the preferred alternative does not occur and the site remains agricultural, the only significant drawdown in the aquifer would be from local irrigation pumping and municipal supply. Both municipal supply and irrigation pumping in the UMA area tends to be intermittent pumping of a relatively low volume. Therefore neither pumping stress would currently be likely to result in significant drawdown within the aquifers under the UMA. The effect of future pumping depends on changes in land use that cannot be evaluated under the No Build Alternative.

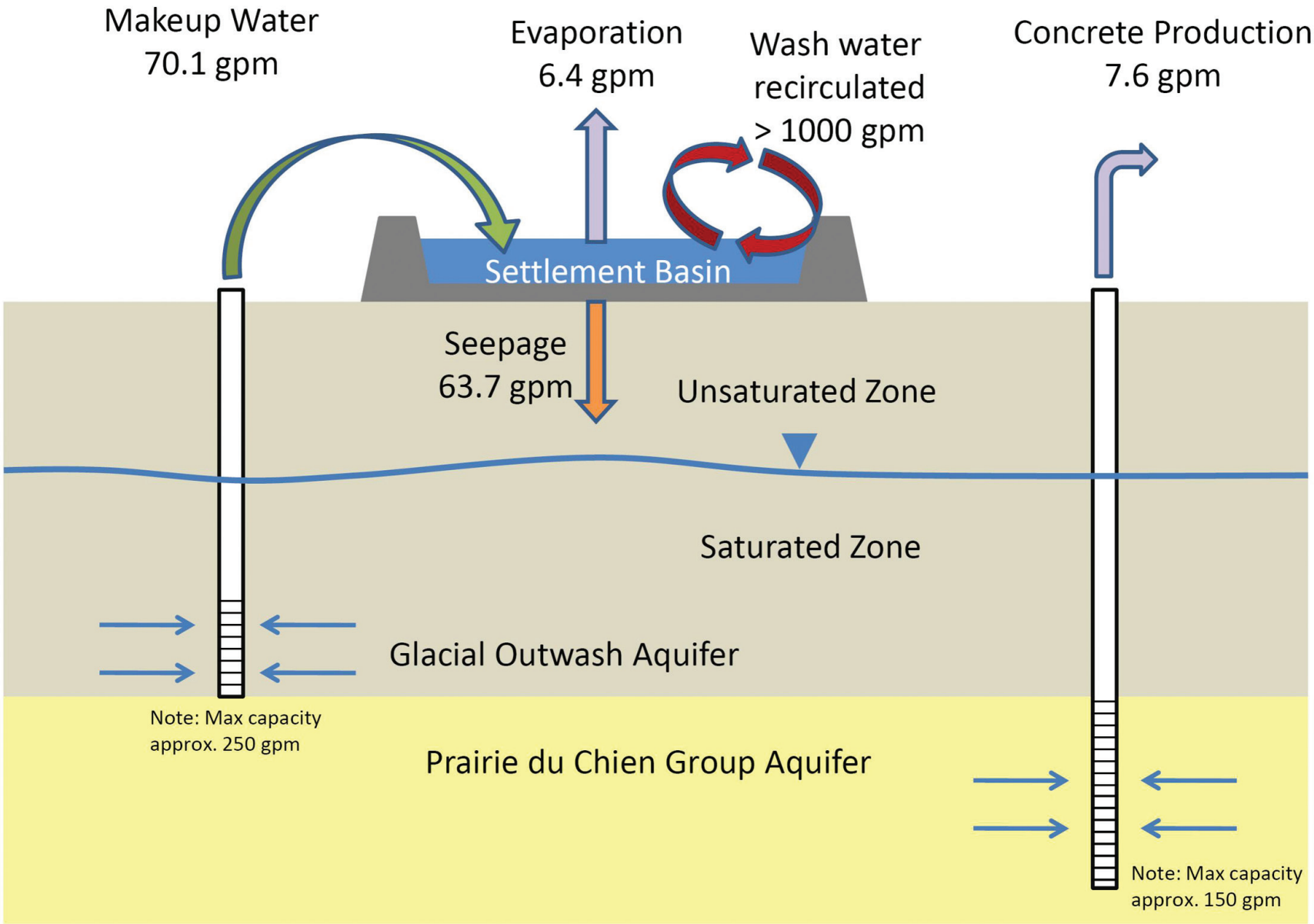

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Figure 30
Conceptual Water Use

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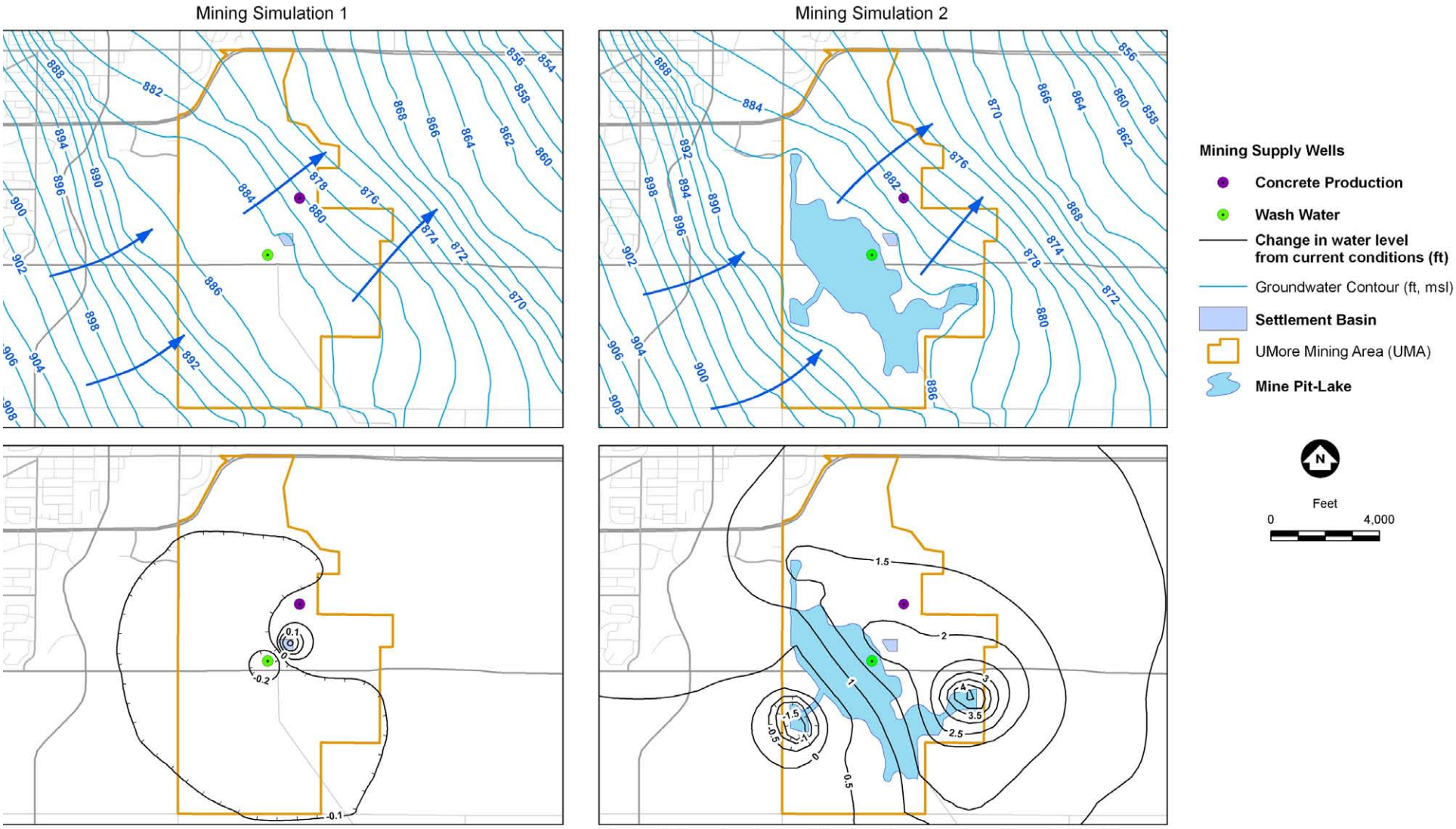

imulated change in water level elevations from current conditions due to groundwater umping related to mining activities, assuming that a mine pit-lake is not present. Vash water is withdrawn from a well open to the sand and gravel outwash. Concrete roduction water is withdrawn from a well open to the Prairie du Chien Group aquifer. 'ositive values indicate an increase in water levels from current conditions. Negative alues indicate a decrease in water levels from current conditions.

Simulated change in water level elevations from current conditions due to mining activities, assuming the mine pit-lake is fully developed. Wash water is withdrawn from the mine pit-lake. Concrete production water is withdrawn from a well open to the Prairie du Chien Group aquifer. Positive values indicate an increase in water levels from current conditions. Negative values indicate a decrease in water levels from current conditions.

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Figure 31

Pre- and Post-Mine Pit Lake Development (Groundwater Flow and Projected Head Decline in Outwash Aquifer

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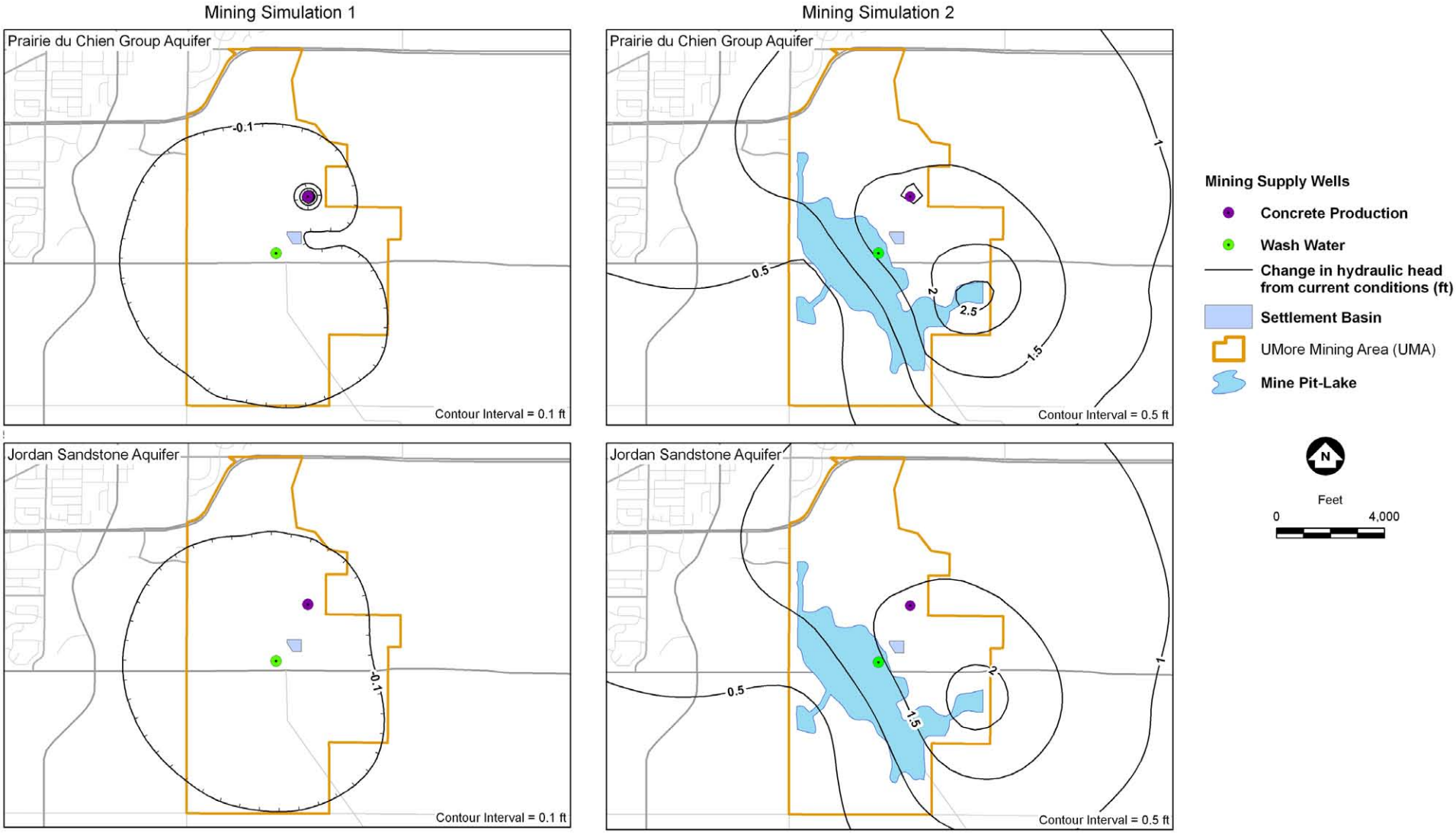

Simulated change in hydraulic head from current conditions due to groundwater pumping related to mining activities, assuming that a mine pit-lake is not present. Wash water is withdrawn from a well open to the sand and gravel outwash. Concrete production water is withdrawn from a well open to the Prairie du Chien Group aquifer. Positive values indicate an increase in hydraulic head from current conditions. Negative values indicate a decrease in hydraulic head from current conditions.

Simulated change in hydraulic head from current conditions due to mining activities, assuming the mine pit-lake is fully developed. Wash water is withdrawn from the mine pit-lake. Concrete production water is withdrawn from a well open to the Prairie du Chien Group aquifer. Positive values indicate an increase in hydraulic head from current conditions. Negative values indicate a decrease in hydraulic head from current conditions.

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Figure 32

Pre- and Post-Mine Pit Lake Development (Projected Head Decline in Prairie Du Chien and Jordan Aquifers)

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3.10 Traffic

A detailed Traffic Impact Study has been prepared and documented in a technical memorandum, which is available for review at the UMore Park Administrative Offices. To facilitate presentation of the analysis procedures and results, the No-Build conditions have been incorporated within the discussion of the Build conditions.

Generally accepted practice for traffic impact studies is to examine the traffic impacts of the proposed action for opening year and for a long-range future year (usually a 20 year forecast). Since County Road 46 will be the primary roadway impacted by the project, Dakota County staff was contacted to discuss the design years for the traffic analysis. The County indicated that the impacts of the project should be examined for the years 2011 and 2030. Therefore, traffic impacts with and without the UMA were investigated for these design years.

The purpose of the traffic analysis is to examine the effects that the UMA traffic will impose on the supporting roadway system and key intersections (See Figure 33). In pursuit of this purpose, the following procedures were undertaken:

1. Determine the traffic that will be generated by the proposed project in terms of weekday and peak hour volumes.

2. Develop, for the years 2011 and 2030, the average daily traffic (ADT) projections on the supporting roadway system and the AM and PM peak hour volumes for the key intersections. The key intersections are as follows:

    - UMA access points to public roadways
    - County Road 42/Highway 3 intersection
    - County Road 42/Biscayne Avenue intersection
    - County Road 42/145th Street intersection
    - County Road 42/County Road 73 (Akron Avenue) intersection
    - County Road 42/County Road 71 (Blaine Avenue) intersection
    - County Road 42/US 52 West Ramp intersection
    - County Road 42/US 52 East Ramp intersection
    - County Road 46/Highway 3 intersection
    - County Road 46/Biscayne Avenue intersection
    - County Road 46/Akron Avenue intersection
    - County Road 46/US 52 West Ramp/Service Road intersection
    - County Road 46/US 52 East Ramp/Service Road intersection

3. From the traffic forecasts, determine the key intersections that may be substantially impacted by site-generated traffic from the proposed action, and, for these intersections, perform a level of service (LOS) analysis for the design years 2011 and 2030 to determine the capacity of these intersections to accommodate the projected peak hour volumes.

4. Identify roadway improvements that may be necessary to mitigate the traffic impacts of the projected traffic volumes.

5. Based on the foregoing, develop conclusions and recommendations for the roadways and intersections affected y the proposed mining project.

3.10.1 Affected Environment

Roadway Network

The regional transportation routes that serve the proposed UMA include County Road 42, US 52, I-35, I-35E, I-35W, and I-494. County Road 42 is adjacent to the northern border of the UMA. Other major highways connecting the site to the regional roadway system are County Road 46, 170th Street, Highway 3, Biscayne Avenue, and Akron Avenue. Direct access to the UMA is proposed to be from County Road 42, County Road 46, 170th Avenue, Biscayne Avenue, and Akron Avenue, and these five roadways will be the main roadways impacted by the proposed action.

County Road 42 is a principal arterial roadway bordering the north side of the proposed UMA. The segment of County Road 42 near the UMA is a rural four-lane divided roadway with left turn lanes and right turn lanes at intersections. It is recognized by Mn/DOT and Dakota County that the US 52/County Road 42 interchange should be upgraded in the future, but this interchange upgrade project is not currently scheduled.

County Road 46 is an east-west minor arterial roadway that passes through the center of the UMA. East of the UMA, County Road 46 intersects US 52 via a folded diamond grade separated interchange. Near the UMA, County Road 46 is a rural two-lane roadway with left turn lanes and/or right turn lanes at most intersections. No improvements are currently scheduled for this section of County Road 46. However, Dakota County, the City of Rosemount, Empire Township, the University of Minnesota, and the Minnesota Department of Natural Resources have completed a transportation system study for the UMore and Vermillion Highlands area that has identified long-term major east/west and north/south highway corridors and improvements. Once of the proposed long-term east/west corridors is CSAH 46.

170th Avenue is a local roadway bordering the south side of the UMA. The segment of 170th Avenue near the UMA is a rural two-lane roadway. 170th Avenue is currently a gravel road east of Biscayne Avenue and is currently a paved County Road (CR 58) west of Biscayne Avenue. The 2030 forecast volumes for 170th Avenue are expected to be at levels where all existing gravel road segments should be paved. The exact timing of when the paving of the gravel road segments will occur is not known at this time. Development activity in the area will determine the timing of when the gravel road segments will be paved. For this study, it is assumed the existing gravel road segments will remain unpaved in 2011 but will be paved by 2030.

Biscayne Avenue borders the west side of the UMA, and it is a major collector roadway north of County Road 46 and is a local roadway south of County Road 46. The segment of Biscayne Avenue near the UMA is a rural two-lane roadway and is mostly a gravel road, though some portions are paved near the north end. The 2030 forecast volumes for Biscayne Avenue are expected to be at levels where all existing gravel road segments should be paved. The exact timing of when the paving of the gravel road segments will occur is not known at this time. Development activity in the area will determine the timing of when the gravel road segments will be paved. For this study, it is assumed the existing gravel road segments will remain unpaved in 2011 but will be paved by 2030.

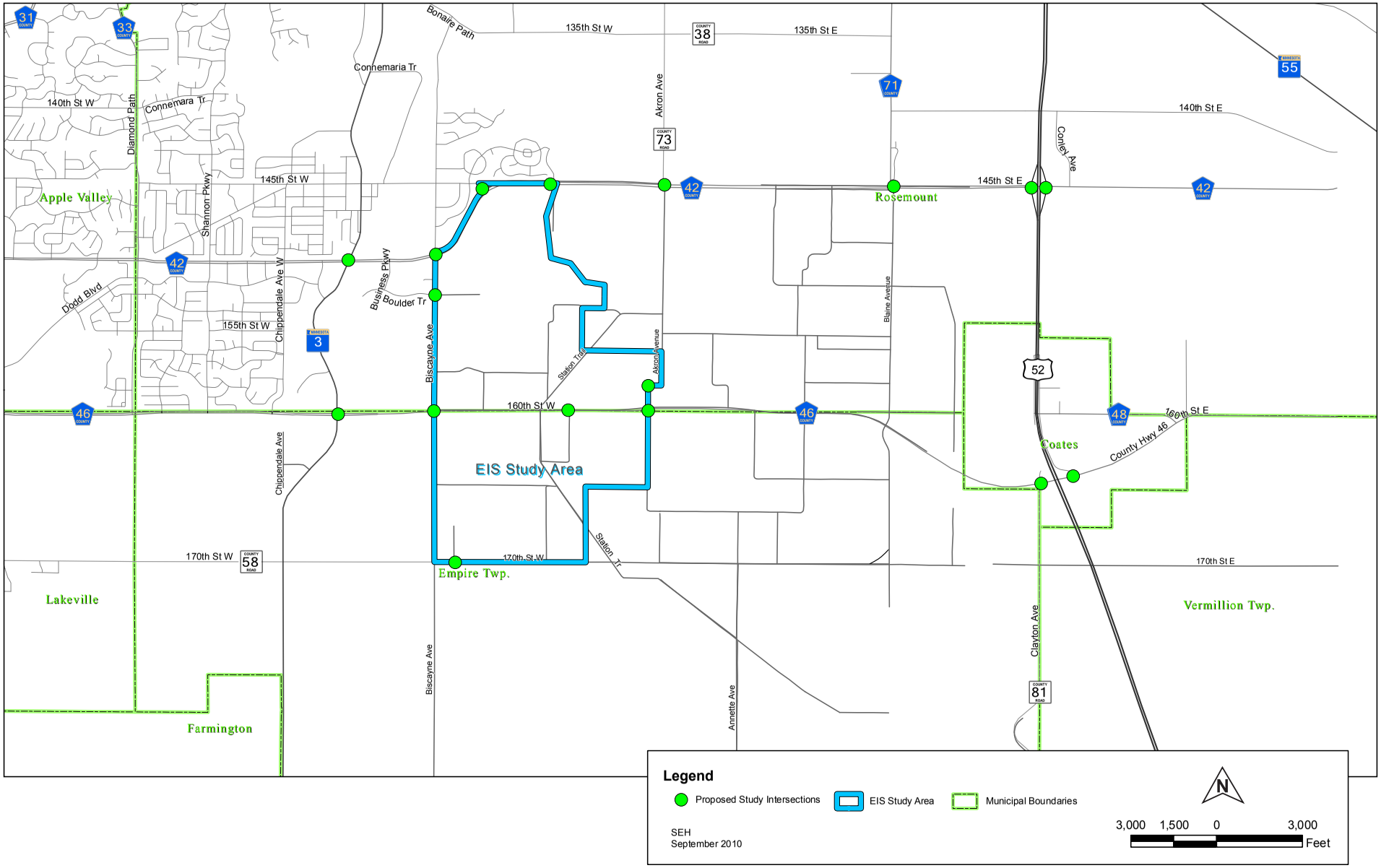

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Figure 33
Traffic Study Area

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Akron Avenue is a local roadway east of the UMA. The segment of Akron Avenue near the UMA is a rural two-lane roadway and is mostly a gravel road, though a segment at the north end is paved. The 2030 forecast volumes for Akron Avenue are expected to be at levels where all existing gravel road segments should be paved. The exact timing of when the paving of the gravel road segments will occur is not known at this time. Development activity in the area will determine the timing of when the gravel road segments will be paved. For this study, it is assumed the existing gravel road segments will remain unpaved in 2011 but will be paved by 2030.

There are several existing access points to the UMA. The Draft Mining Plan proposes to make use of several of these accesses for the mining operation (see Figure 34). Although there are approximately 25 access points located along the UMA boundary, the Draft Mining Plan indicates that no more than six accesses to the operations will be open at any one time. Two types of accesses to the mining operations are proposed: primary access and secondary accesses. There will be two primary accesses, and the primary accesses will serve the main aggregate processing facilities, the asphalt production facilities, and the concrete production facilities. Secondary accesses will provide direct access to each mining zone that is active, and it is expected that only three or four mining zones will be active at any one time.

The primary accesses to the UMA are proposed to be on County Road 46 at the existing access to the UMore Park Administrative Office and on Akron Avenue approximately 800 feet north of the County Road 46/Akron Avenue intersection. The primary access on Akron Avenue may need to be adjusted when improvements to Akron Avenue are made in the future. Currently, Akron Avenue is a gravel road north of County Road 46, and there is a sharp reverse curve on Akron Avenue near the proposed primary access point.

Future development in the area will likely result in Akron Avenue being paved and the sharp reverse curve being realigned. The timing of the future development in this area is not known at this time, but it is assumed for this study that the improvements to this section of Akron Avenue will be in place by 2030. It should be noted that, with the construction of the aggregate plant and ancillary facilities, Station Trail north of County Road 46 is proposed to be eliminated as a public street, and the access at the County Road 46/Station Trail intersection is proposed to be closed.

The initial secondary accesses to the UMA are expected to be on County Road 42, Biscayne Avenue, and 170th Street. After the mining zones that the County Road 42 and Biscayne Avenue accesses serve are “mined out”, these secondary accesses will be closed, and new secondary accesses to the next mining zones to be activated will be constructed. The secondary access on 170th Street serves a clay mining zone that is expected to be active from 2011 through 2051. The initial secondary access on 170th Street is expected to be close to the 170th Street/Biscayne Avenue intersection. However, as this zone is mined, the location of this secondary access may be shifted farther east along 170th Street.

The exact location of each secondary access will need to be determined when a driveway permit is obtained from the road authority for each requested location. Several factors, such as mainline traffic volumes, access spacing, and intersection sight distance, will need to be considered in the final determination of the location of a secondary access point. Any existing access points to a mining phase being opened will be closed after the approved access point to the mining phase is opened. It is expected that the driveway permit for the new mining access point will indicate what actions are needed by the requestor to close any existing access points serving the mining phase. After a mining phase has been mined out, the approved access to the mining phase will be closed, unless this same access point is approved by the roadway authority as the access to the next mining phase to be opened.

Dakota County has access spacing guidelines for its roadways. For County Road 42 near the UMA, the County guidelines indicate that full access points will be allowed at Biscayne Avenue and 145th Street and that a ¾ access point will be allowed at Auburn Avenue. The access on County Road 42 at Auburn Avenue is currently a full access point, but the County's intent is that this access point will be changed to a ¾ access point at a future date. The County access guidelines for County Road 46 near the proposed UMA indicate that full access points should have a minimum of ¼-mile spacing. The County may allow access points at a spacing of less than ¼-mile along County Road 46, but these access points would be limited to right-in/right-out only access.

For the 2011 and 2030 traffic analysis, it was assumed that access to the proposed mining project site would be from accesses located as follows:

- On County Road 46 at the existing access to the UMore Park Administrative Office (Primary #1)
- On Akron Avenue approximately 800 feet north of County Road 46 (Primary #2)
- On County Road 42 opposite Auburn Avenue (Secondary #1)
- On Biscayne Avenue opposite Boulder Trail (Secondary #2)
- On 170th Street within 500 feet of Biscayne Avenue (Secondary #3)

For 2011, it is assumed that the County Road 42/Auburn Avenue/Secondary #1 intersection is a full access intersection. For 2030, it is assumed that the County Road 42/Auburn Avenue intersection is a ¾ access intersection with or without Secondary #1.

Trip Generation

Typically, trip generation for a development is based on trip rates from the manual, Trip Generation, published by the Institute of Transportation Engineers (ITE). However, there are no available trip rates from this standard ITE source for the proposed mining operation. Trip generation for the proposed UMA is based on mining operation estimates provided in the UMA Draft Mining Plan. The estimates are provided by type of trucking operations (aggregate trucks, asphalt trucks, and ready mixed concrete trucks), by yearly time period (2011-2020, 2021-2030, and 2031-2051), and by quarter of the year (1st quarter is January-March, 2nd quarter is April-June, etc.). The estimates were also made for a moderate gravel extraction estimate for the year ("Average Daily" numbers) and a high gravel extraction estimate for the year ("Average Peak Daily" numbers). The actual amount of activity at the proposed mining site will be dependent upon the economy and market demand.

In order to present a "worst case scenario" for traffic impacts by the proposed UMA, the site-generated traffic estimates for the 3rd quarter and average peak daily volumes were used. The 3rd quarter traffic volumes are the highest of the four quarterly volumes, and the average peak daily volume represents the higher expected average daily site-generated volume for the two extraction scenarios. The average daily traffic (ADT) estimated for the proposed UMA is shown in Table 18.

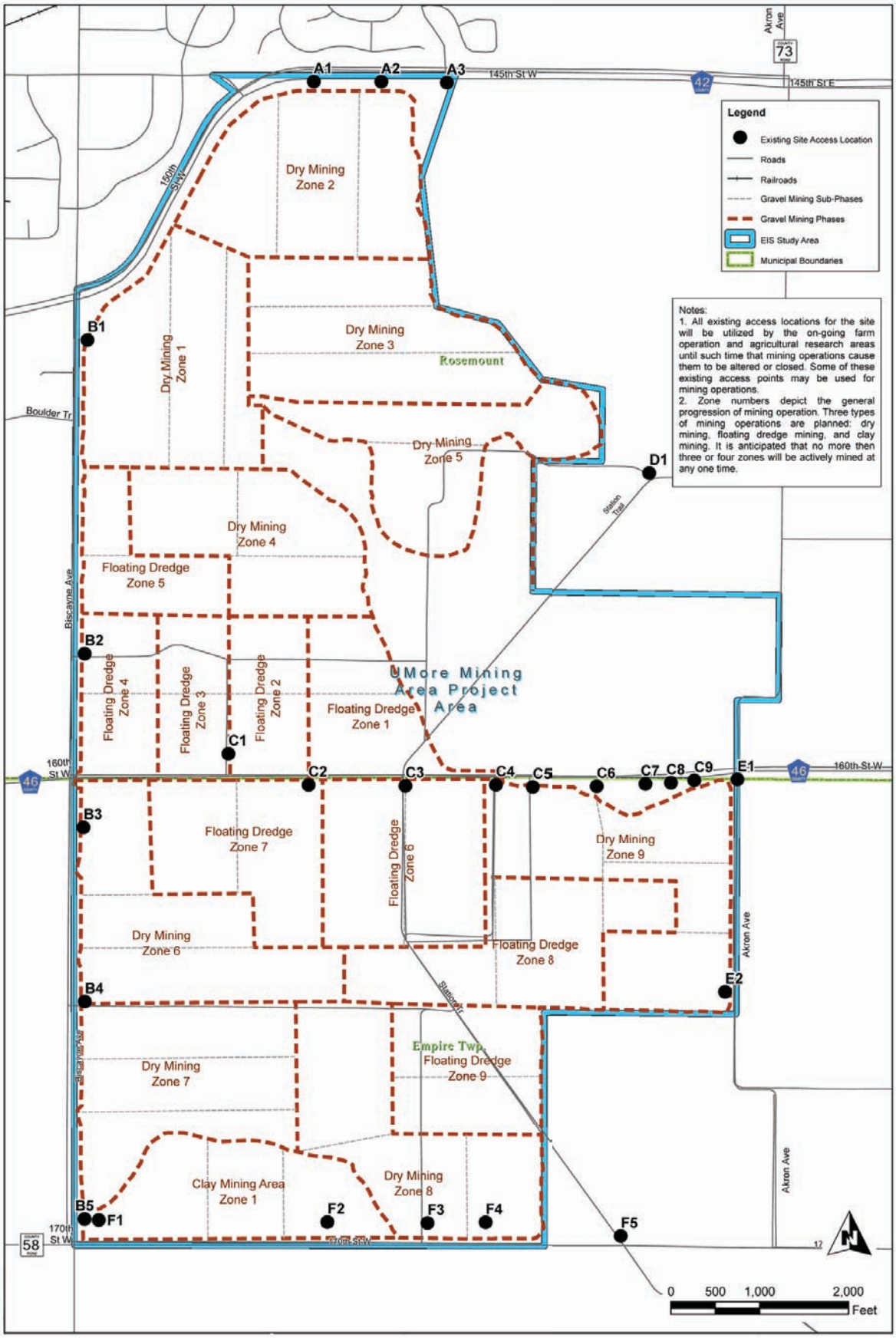

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Figure 34
Mining Zones and Access Points

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Table 18 – Site-Generated Average Daily Traffic (ADT) for UMA

Time Period	Average Daily Traffic (ADT)				
	Aggregate Operations	Asphalt Operations	Concrete Operations	Employee and Other	Total
2011-2020	556	136	133	22	847
2021-2030	1174	159	133	22	1488
2031-2051	1225	182	133	22	1562

The AM and PM peak hour site-generated traffic is also needed for the proposed UMA. Peak hour site-generated traffic estimates for the proposed mining site were estimated based on information from, "Traffic Impact Study – Sand & Gravel Mining and Accessory Uses, Empire Township, Dakota County, MN", December 2004, prepared by URS. As part of its traffic impact study, traffic counts were conducted at existing mining operations. Based on these counts, for the studied mining operations, it was found that the AM peak hour traffic ranged from 5.65 percent to 9.78 percent of the ADT and the PM peak hour traffic ranged from 3.35 percent to 6.07 percent of the ADT. For the UMA, the AM peak hour traffic was assumed to be 10 percent of the ADT (50 percent entering and 50 percent exiting), and the PM peak hour traffic was assumed to be 6 percent of the ADT (30 percent entering and 70 percent exiting). The AM and PM peak hour traffic volumes for the UMA are shown in Table 19. The AM peak hour volume is also the peak hour site-generated traffic volume for the proposed mining site.

Table 19 – AM and PM Peak Hour Traffic Volumes for UMA

Time Period	AM Peak Hour Volume			PM Peak Hour Volume		
	Total	Enter	Exit	Total	Enter	Exit
2011 -2020	86	43	43	50	14	36
2021-2030	150	75	75	90	26	64
2031-2051	160	80	80	95	29	66

The proposed mining operation is expected to provide gravel, asphalt, and concrete products to construction projects in the Minneapolis-St. Paul Metro area. Based on the likely location of these projects, the general directional distribution of site-generated trips from the UMA will be 80 percent north, 10 percent east, 5 percent west, and 5 percent south. This estimated directional distribution of site-generated trips for mining operations is similar to that used in the "Traffic Impact Study – Sand & Gravel Mining and Accessory Uses, Empire Township, Dakota County, MN", December 2004. The mining site examined in the 2004 Empire Township study is located southwest of the proposed UMA. The final project location and shortest time-path to that location will determine the actual path site-generated traffic will take. Considering this and using the general directional distribution percentages as a guide, site-generated traffic was assigned to the roadways and intersections surrounding the UMA.

Since the traffic operations analysis will investigate Build traffic conditions in 2011 and 2030, site-generated traffic volumes were developed for area roadways and intersections only for these two future years. To be conservative the site-generated ADT and peak hour volumes for the time period 2031-2051 were used for 2030 traffic forecasts.

The directional distribution of site-generated ADT trips for the UMA for 2011 and 2030 is shown in Figure 35. As can be seen on Figure 35, most (45 percent to 50 percent) of the site-generated traffic from the proposed UMA is expected to use County Road 46 to access US 52. This situation is expected to continue after 2030, since the primary accesses to the proposed UMA will continue to direct mining traffic toward County Road 46 and the new secondary accesses are likely to be along the south side of County Road 46. It is expected that as the mining operations shift toward the south, the site-generated ADT on roads, such as Biscayne Avenue South of County Road 46, Akron Avenue, and 170th Street, will be similar to the site-generated ADT shown in Figure 35 for roads such as County Road 42 and Biscayne Avenue north of County Road 46.

The AM peak hour site-generated traffic was assigned to the key intersections in the study area for the two scenarios (2011and 2030) and is shown in Figure 36. The PM peak hour site-generated traffic assignment for the two scenarios is shown in Figure 37. As can be seen on Figures 36 and 37, the amount of site-generated peak hour traffic at the study intersections is expected to be relatively small. Table 20 provides a summary of the site-generated traffic assignments to the primary and secondary accesses proposed for 2011 and 2030.

Table 20 – Summary of Site-Generated Traffic Assignments to Accesses for 2011 and 2030

2011	ADT	AM Peak Hour			PM Peak Hour		
		total	enter	exit	total	enter	exit
Primary Access #1	270	28	14	14	16	4	12
Primary Access #2	268	27	13	14	16	5	11
Secondary Access #1	131	13	7	6	8	2	6
Secondary Access #2	131	13	6	7	8	2	6
Secondary Access #3	47	5	3	2	2	1	1
Total	847	86	43	43	50	14	36
2030							
Primary Access #1	460	48	24	24	28	9	19
Primary Access #2	459	46	23	23	28	9	19
Secondary Access #1	298	30	15	15	18	5	13
Secondary Access #2	298	30	15	15	18	5	13
Secondary Access #3	47	6	3	3	3	1	2
Total	1562	160	80	80	95	29	66

Existing Traffic Volumes and Operations

ADT is one of the factors used in determining the quality of traffic operations on a roadway. ADT also provides a quick way to compare the importance of one roadway to another.

Existing ADT volumes for the traffic study area were generally obtained from 2007 and 2008 Mn/DOT traffic volume maps. For some local road segments, ADT was estimated based on peak hour counts or based on ADT volumes from adjacent segments. The existing ADT for the roadways in the study area are shown on Figure 38.

Intersections are key elements in determining the quality of traffic operations along roadways. The quality of traffic operations at an intersection is typically determined by examining traffic volumes during one or more peak hours of the day. These peak hours represent the worst traffic conditions during a typical day, and, by examining these hours, any traffic operations problems should be revealed.

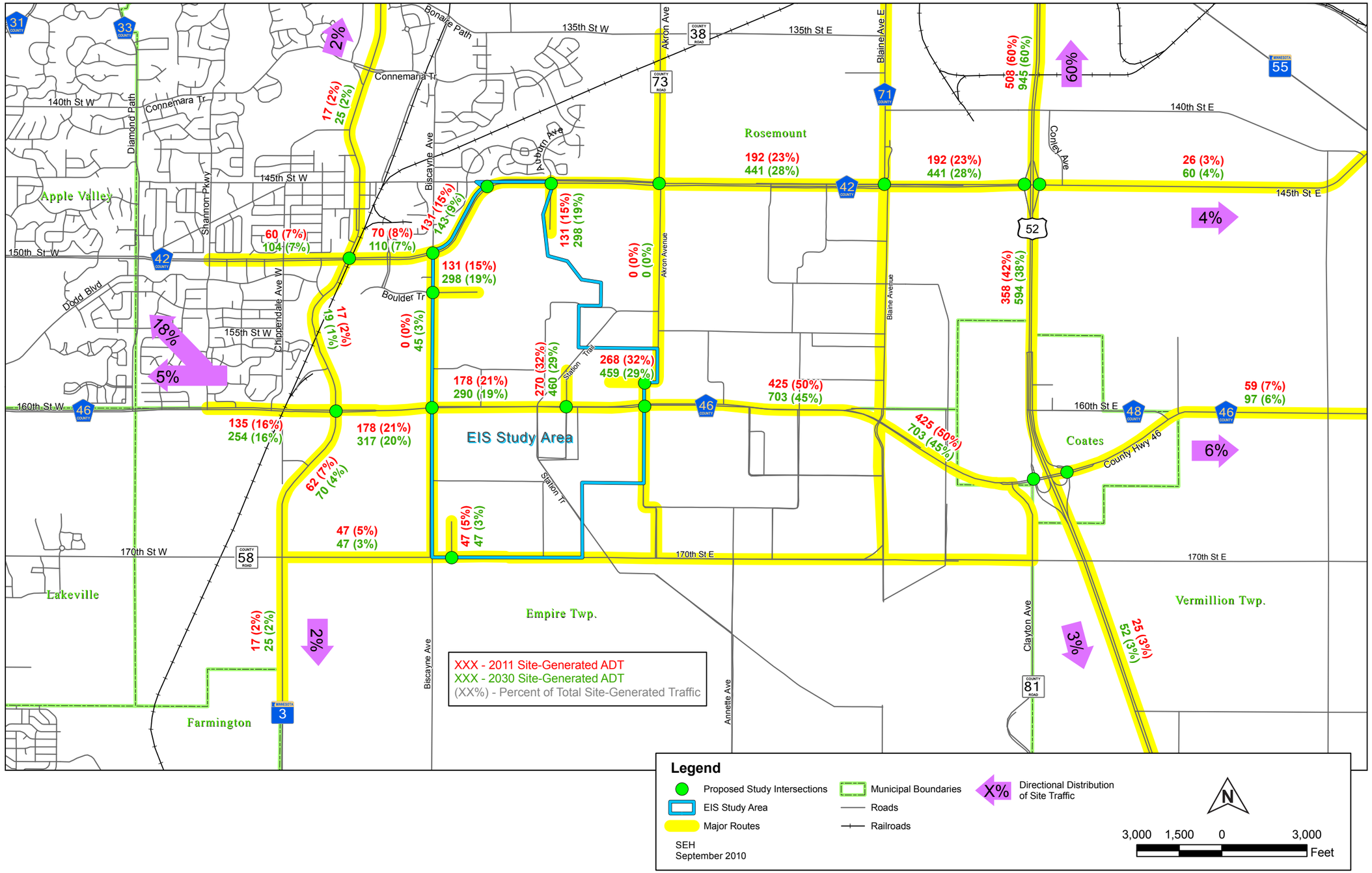

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Figure 35
Site-Generated ADT Distribution for 2011 and 2030

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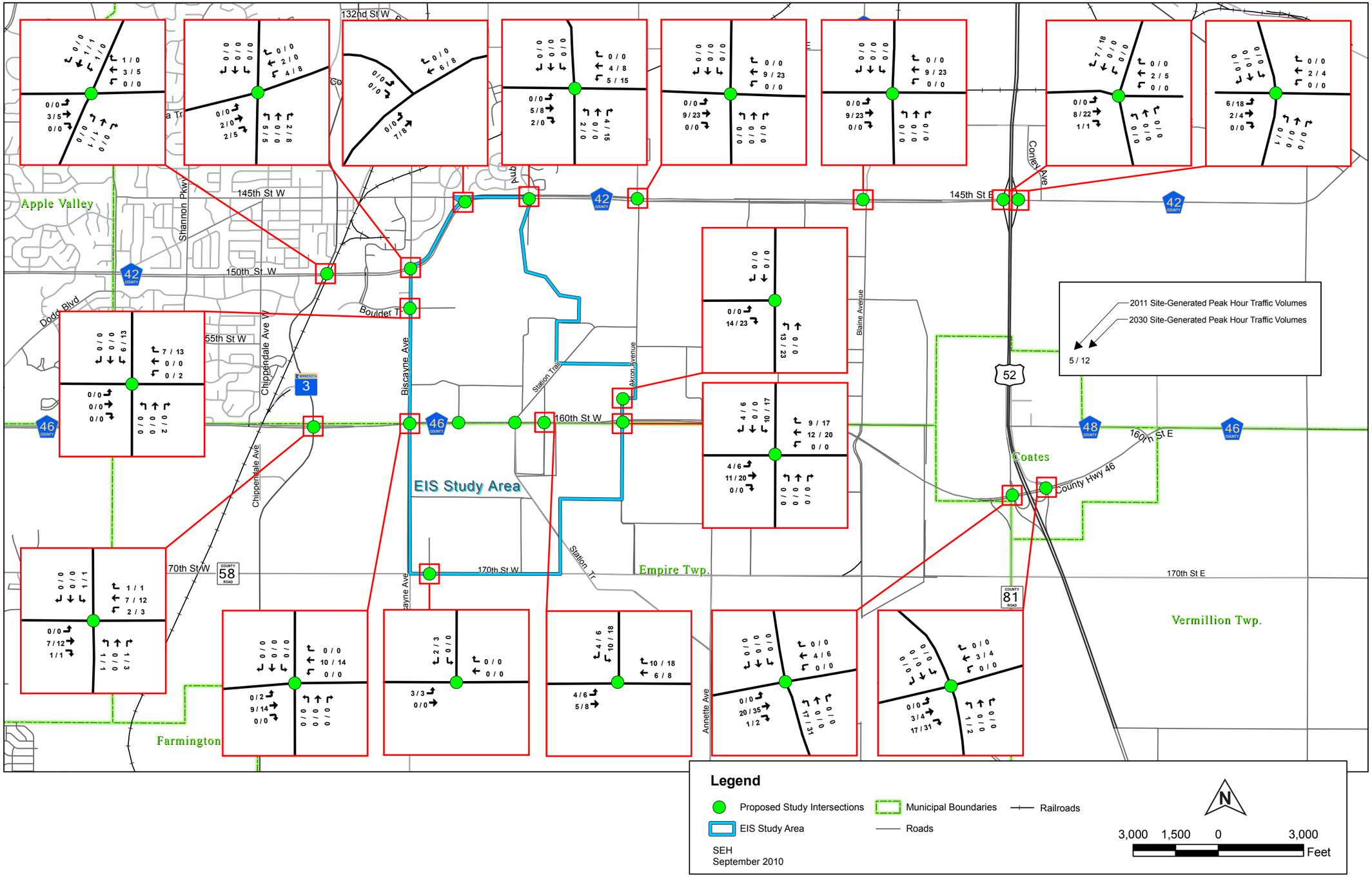

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Figure 36

AM Peak Hour Site-Generated Traffic Volumes for 2011 and 2030

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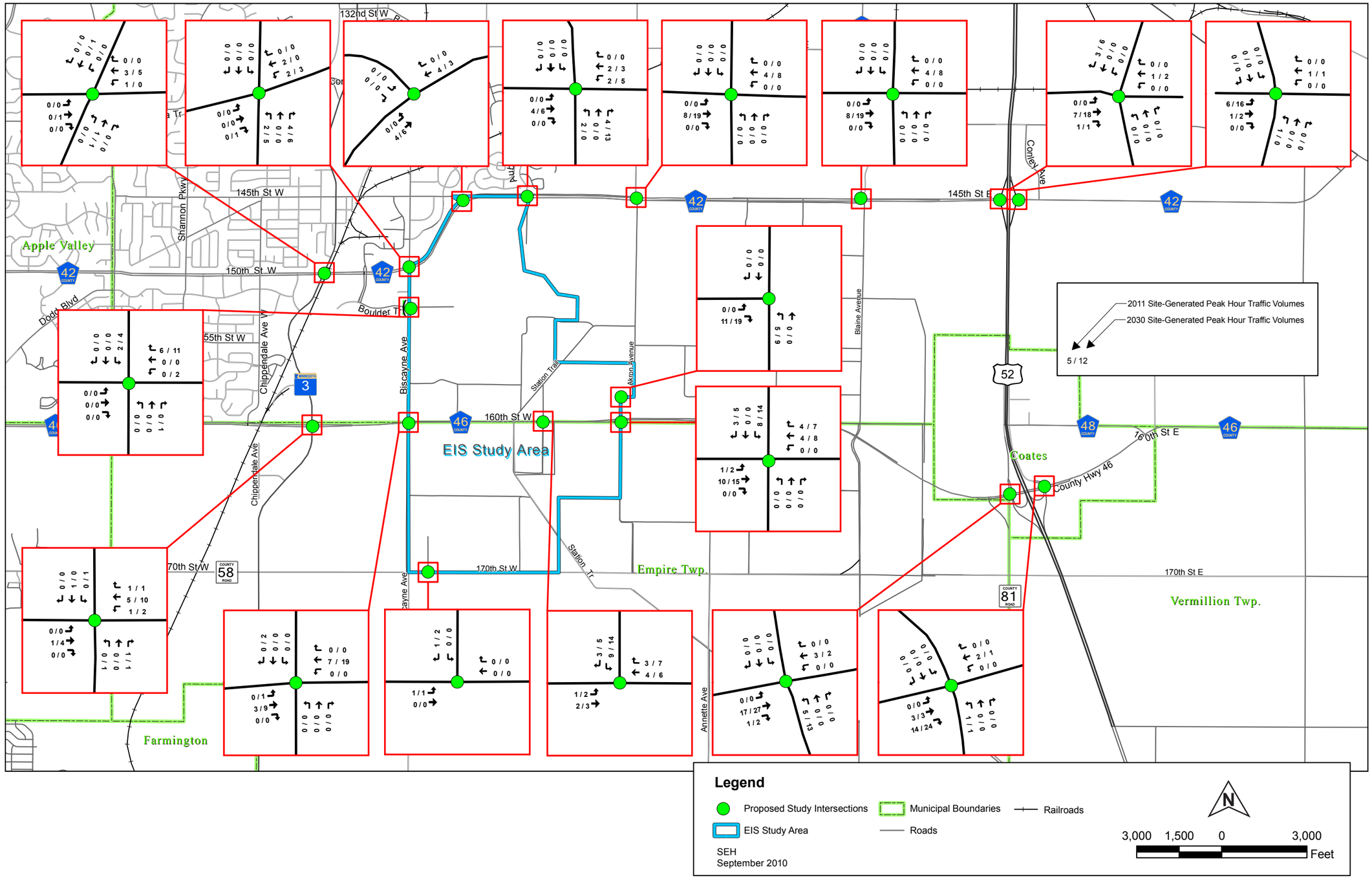

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Figure 37

PM Peak Hour Site-Generated Traffic Volumes for 2011 and 2030

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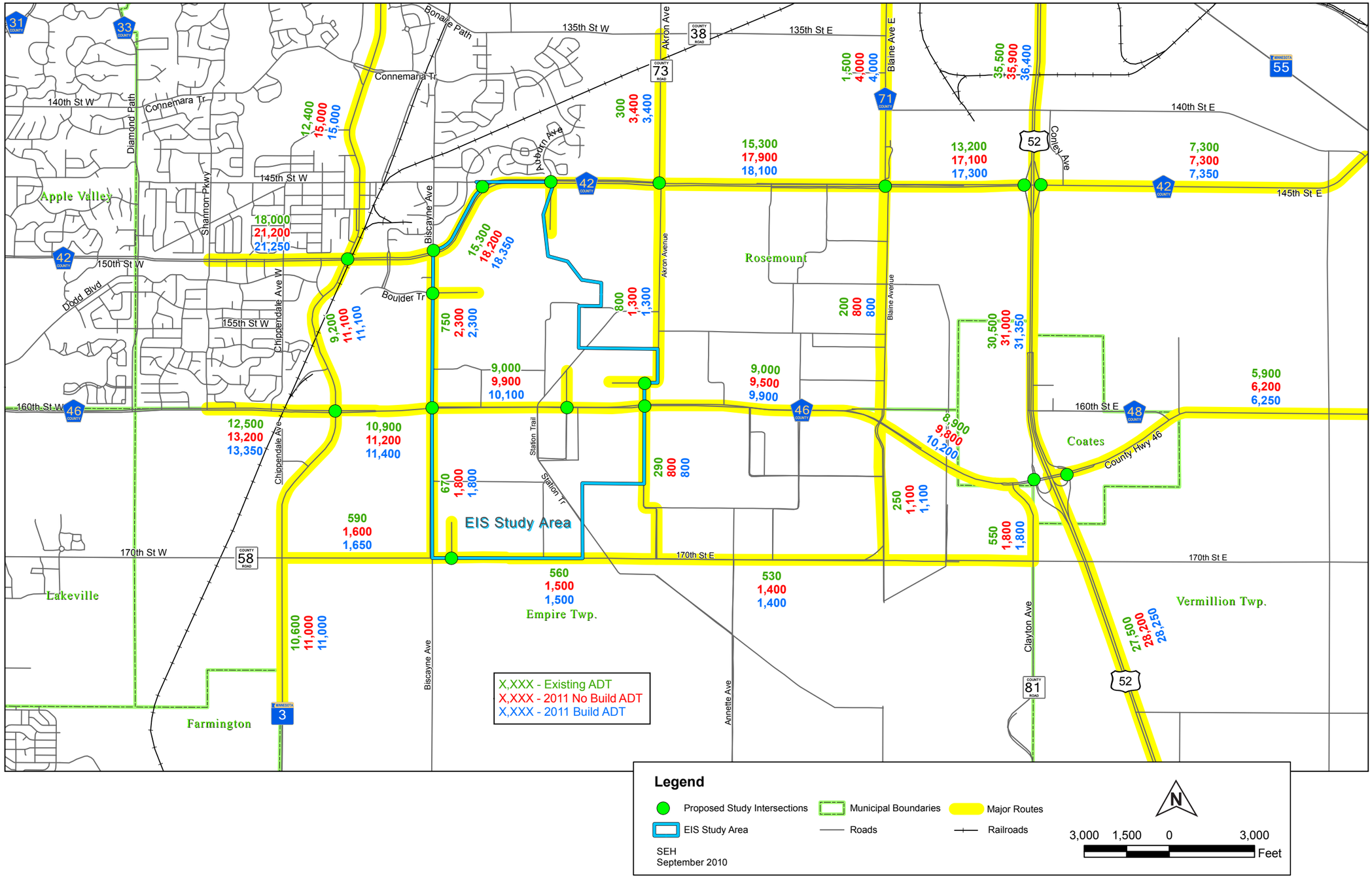

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Figure 38

Average Daily Traffic (ADT) Existing (2007), 2011 No-Build, and 2011 Build

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For the study area, the morning (AM) and afternoon (PM) peak hours were considered the critical hours for traffic operations and were investigated for the traffic analysis. AM and PM peak hour volumes at the key study intersections were obtained from peak period counts conducted at the intersections. When the peak period counts were taken and who conducted the counts is indicated in Table 21. The existing AM peak hour volumes for the key study intersections are shown in Figure 39, and the existing PM peak hour volumes for the key study intersections are shown in Figure 40.

Table 21– Peak Period Traffic Counts (Count Dates and Conducting Agency)

Location	Count Date	Conducting Agency
CSAH 42/TH 3	Oct. 14-15, 2008	SEH
CSAH 42/Biscayne Avenue	July 31, 2007	Dakota County
CSAH 42/145th Street	Aug. 14, 2007	Dakota County
CSAH 42/Auburn Avenue	Oct. 7, 2009	SEH
CSAH 42/CR 73	Oct. 14-15, 2008	SEH
CSAH 42/CSAH 71	Oct. 14-15, 2008	SEH
CSAH 42/US 52 West Ramp	Nov. 8, 2007	Mn/DOT
CSAH 42/US 52 East Ramp	Nov. 8, 2007	Mn/DOT
CSAH 46/TH 3	Oct. 14-15, 2008	SEH
CSAH 46/Biscayne Avenue	Oct. 14-15, 2008	SEH
CSAH 46/US 52 West Ramp	Oct. 14-15, 2008	SEH
CSAH 46/US 52 East Ramp	Oct. 14-15, 2008	SEH

3.10.2 Environmental Consequences

Forecast Traffic Volumes

Traffic forecasts for the design years 2011 and 2030 were developed for No Build (UMA not in operation) and Build (UMA in operation) conditions. The development of traffic forecasts for the design years was a two-step process. First, background traffic growth for the design year for No Build conditions was estimated. Next, Build traffic forecasts for the design year were determined by adding the site-generated traffic to the No Build traffic forecasts.

The 2030 No Build ADT forecasts were developed using the latest Twin Cities Regional Model which reflects the most recent comprehensive plan updates. A sub-area model for the traffic study area was developed that incorporated the more detailed Traffic Analysis Zones (TAZs) and data from the traffic demand model used by Dakota County. The results from the sub-area model were used for the 2030 No Build ADT forecasts. Using historical ADT data and the 2030 No Build ADT forecast, a regression analysis was performed to determine the 2011 No Build ADT forecasts.

Background traffic growth factors were developed for the study area roadways by comparing the 2011 and 2030 No Build ADT volumes to the existing ADT volumes. These background traffic growth factors were applied to the existing AM and PM peak hour volumes to develop the 2011 and 2030 AM and PM No Build peak hour volumes for the study intersections. For 2030, it was assumed that the County Road 42/Auburn Avenue intersection would change from a full access intersection to a ¾ access intersection. To account for this change, it was assumed that the southbound left turn traffic on Auburn Avenue at County Road 42 would shift to the southbound left turn on 145th Street at County Road 42.

The 2011 and 2030 Build ADT forecasts were developed by adding the appropriate site-generated ADT to the 2011 and 2030 No Build ADT forecasts. Similarly, forecast 2011 and 2030 Build AM and PM peak hour volumes were developed by adding the appropriate site-generated peak hour volumes to the 2011 and 2030 No Build AM and PM peak hour volumes. The Existing, 2011 No Build, and 2011 Build ADT volumes are shown on Figure 38. The 2030 No Build and 2030 Build ADT volumes are shown on Figure 41. The Existing, 2011 No Build, and 2011 Build AM peak hour volumes are shown on Figure 39. The 2030 No Build and 2030 Build AM peak hour volumes are shown on Figure 42. The Existing, 2011 No Build, and 2011 Build PM peak hour volumes are shown on Figure 40. The 2030 No Build and 2030 Build PM peak hour volumes are shown on Figure 43.

Traffic Operations Analyses

Though peak hour volumes are shown for seventeen different intersections in Figures 39, 40, 42, and 43, a detailed traffic operations analysis was not performed for all seventeen intersections to determine the impacts of the proposed mining project. As can be seen on the figures, the peak hour site-generated traffic at many intersections is very small (10 vehicles or less for most movements at most intersections). With these small peak hour volumes, the likelihood that the site-generated traffic at the intersection will have a significant impact on traffic operations at an intersection is small. In order to determine which intersections may be impacted by the site-generated mining project traffic, the 2030 peak hour site-generated traffic for each movement at each key intersection was compared to existing peak hour traffic volume for that particular movement. If the proposed mining site-generated traffic for at least one movement at an intersection was equal to 10 percent or more of the existing traffic volume for the corresponding movement at that intersection, then that intersection was included in the detailed traffic operations analysis.

Tables 22 and 23 indicate the results of the comparison of the 2030 site-generated traffic to the existing traffic for each movement at each intersection. From the results of this comparison, the following key intersections were included in the detailed traffic operations analysis:

- County Road 42/Auburn Avenue/Secondary Access #1
- County Road 42/Biscayne Avenue intersection
- Biscayne Avenue/Boulder Trail/Secondary Access #2
- County Road 46/Biscayne Avenue intersection
- County Road 46/US 52 West Ramp/Service Road intersection
- County Road 46/US 52 East Ramp/Service Road intersection
- County Road 46/Primary Access #1 intersection
- Akron Avenue/Primary Access #2 intersection
- County Road 46/Akron Avenue intersection
- 170th Street/Secondary Access #3 intersection

2. Traffic operations analyses were conducted for the study intersections to determine the level of service (LOS), delay, and queuing information for existing (2008), 2011, and 2030 conditions during the AM and PM peak hour. LOS is a qualitative rating system used to describe the efficiency of traffic operations at an intersection. LOS are defined, designated by letters A through F. LOS A represents the best operating conditions (no congestion), and LOS F represents the worst operating conditions (severe congestion). For the study area, it was assumed that LOS D or better represents acceptable operating conditions.

Table 22 – 2030 AM Trip Generation

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
CR 42 and US 52 East Ramp	1	0	0	0	0	0	18	4	0	0	4	0
CR 42 and US 52 West Ramp	0	0	0	0	0	18	0	22	1	0	5	0
CR 42 and CR 71	0	0	0	0	0	0	0	23	0	0	23	0
CR 42 and CR 73	0	0	0	0	0	0	0	23	0	0	23	0
CR 42 and Auburn Ave (Secondary Access #1)	0	0	15	0	0	0	0	8	0	15	8	0
CR 42 and 145th St W	0	0	0	0	0	0	0	8	0	0	8	0
CR 42 and Biscayne Ave	5	0	8	0	0	0	0	0	5	8	0	0
CR 42 and TH 3	0	1	0	0	1	0	0	5	0	0	5	0
CR 46 and US 52 East Ramp	2	0	0	0	0	0	0	4	31	0	4	0
CR 46 and US 52 West Ramp	31	0	0	0	0	0	0	35	2	0	6	0
CR 46 and TH 3	1	0	3	1	0	0	0	12	1	3	12	1
CR 46 and Biscayne Ave	0	0	0	0	0	2	2	14	0	0	14	0
CR 46 and Akron Ave	0	0	0	17	0	6	6	20	0	0	20	17
CR 46 and Primary Access #1	0	0	0	18	0	6	6	8	0	0	8	18
Akron Ave and Primary Access #2	23	0	0	0	0	0	0	0	23	0	0	0
Biscayne and Secondary Access #2	0	0	2	13	0	0	0	0	0	2	0	13
170th St and Secondary Access #3	0	0	0	0	0	3	3	0	0	0	0	0

Notes: Red shaded values where the 2030 site generated trips are 10% or more of the existing traffic for that movement

Existing AM Volume

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
CR 42 and US 52 East Ramp	73	3	11	0	0	0	516	140	0	0	167	21
CR 42 and US 52 West Ramp	0	0	0	17	1	261	0	639	66	5	235	0
CR 42 and CR 71	0	2	0	10	7	17	48	694	1	2	429	39
CR 42 and CR 73	7	0	7	2	0	3	3	818	118	5	339	1
CR 42 and Auburn Ave (Secondary Access #1)	0	0	0	94	0	47	14	845	0	0	342	7
CR 42and 145th St W	0	0	0	137	0	21	9	722	0	0	313	79
CR 42 and Biscayne Ave	2	10	24	7	10	54	40	700	2	14	315	5
CR 42 and TH 3	23	375	212	74	119	108	178	491	17	45	249	35
CR 46 and US 52 East Ramp	129	12	2	0	11	14	14	144	246	210	183	2
CR 46 and US 52 West Ramp	33	0	30	2	1	25	9	372	96	15	307	4
CR 46 and TH 3	165	388	124	41	119	68	240	365	50	40	257	48
CR 46 and Biscayne Ave	4	14	6	2	1	17	24	469	0	3	324	11
CR 46 and Akron Ave	4	14	6	2	1	17	24	469	0	3	324	11
CR 46 and Primary Access #1	0	0	0	0	0	0	0	493	0	0	345	0
Akron Ave and Primary Access #2	0	49	0	0	20	0	0	0	0	0	0	0
Biscayne and and Secondary Access #2	5	31	0	0	16	10	5	0	5	0	0	0
170th St and Secondary Access #3	0	0	0	0	0	0	0	30	0	0	20	0

Table 23 – 2030 AM Trip Generation

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
CR 42 and US 52 East Ramp	1	0	0	0	0	0	16	2	0	0	1	0
CR 42 and US 52 West Ramp	0	0	0	0	0	6	0	18	1	0	2	0
CR 42 and CR 71	0	0	0	0	0	0	0	19	0	0	8	0
CR 42 and CR 73	0	0	0	0	0	0	0	19	0	0	8	0
CR 42 and Auburn Ave (Secondary Access #1)	0	0	13	0	0	0	0	6	0	5	3	0
CR 42 and 145th St W	0	0	0	0	0	0	0	6	0	0	3	0
CR 42 and Biscayne Ave	5	0	6	0	0	0	0	0	1	3	0	0
CR 42 and TH 3	0	1	0	0	1	0	0	1	0	0	5	0
CR 46 and US 52 East Ramp	1	0	0	0	0	0	0	3	24	0	1	0
CR 46 and US 52 West Ramp	13	0	0	0	0	0	0	27	2	0	2	0
CR 46 and TH 3	1	0	1	1	0	0	0	4	0	2	10	1
CR 46 and Biscayne Ave	0	0	0	0	0	2	1	5	0	0	11	0
CR 46 and Akron Ave	0	0	0	14	0	5	2	15	0	0	8	7
CR 46 and Primary Access #1	0	0	0	14	0	5	2	3	0	0	6	7
Akron Ave and Primary Access #2	9	0	0	0	0	0	0	0	19	0	0	0
Biscayne and Secondary Access #2	0	0	1	4	0	0	0	0	0	2	0	11
170th St and Secondary Access #3	0	0	0	0	0	2	1	0	0	0	0	0

Notes: Red shaded values where the 2030 site generated trips are 10% or more of the existing traffic for that movement

Existing PM Volume

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
CR 42 and US 52 East Ramp	83	0	17	0	0	0	200	178	0	0	206	27
CR 42 and US 52 West Ramp	0	0	0	26	1	513	0	352	93	19	270	0
CR 42 and CR 71	4	3	3	42	5	76	27	400	1	1	762	20
CR 42 and CR 73	13	0	7	4	0	4	1	425	48	6	831	5
CR 42 and Auburn Ave (Secondary Access #1)	0	0	0	24	0	41	67	474	0	0	790	73
CR 42and 145th St W	0	0	0	93	0	17	40	448	0	0	643	197
CR 42 and Biscayne Ave	11	6	20	5	11	106	142	430	4	9	632	3
CR 42 and TH 3	34	217	88	31	384	330	319	400	42	157	497	53
CR 46 and US 52 East Ramp	133	20	11	2	2	40	57	357	83	22	154	6
CR 46 and US 52 West Ramp	128	0	177	15	1	36	5	311	166	34	289	5
CR 46 and TH 3	77	234	50	70	434	193	117	391	123	92	355	72
CR 46 and Biscayne Ave	2	3	0	11	4	23	23	444	2	1	448	4
CR 46 and Akron Ave	2	3	0	11	4	23	23	444	2	1	448	4
CR 46 and Primary Access #1	0	0	0	0	0	0	0	469	0	0	473	0
Akron Ave and Primary Access #2	0	30	0	0	38	0	0	0	0	0	0	0
Biscayne and and Secondary Access #2	5	32	0	0	19	5	10	0	5	0	0	0
170th St and Secondary Access #3	0	0	0	0	0	0	0	30	0	0	30	0

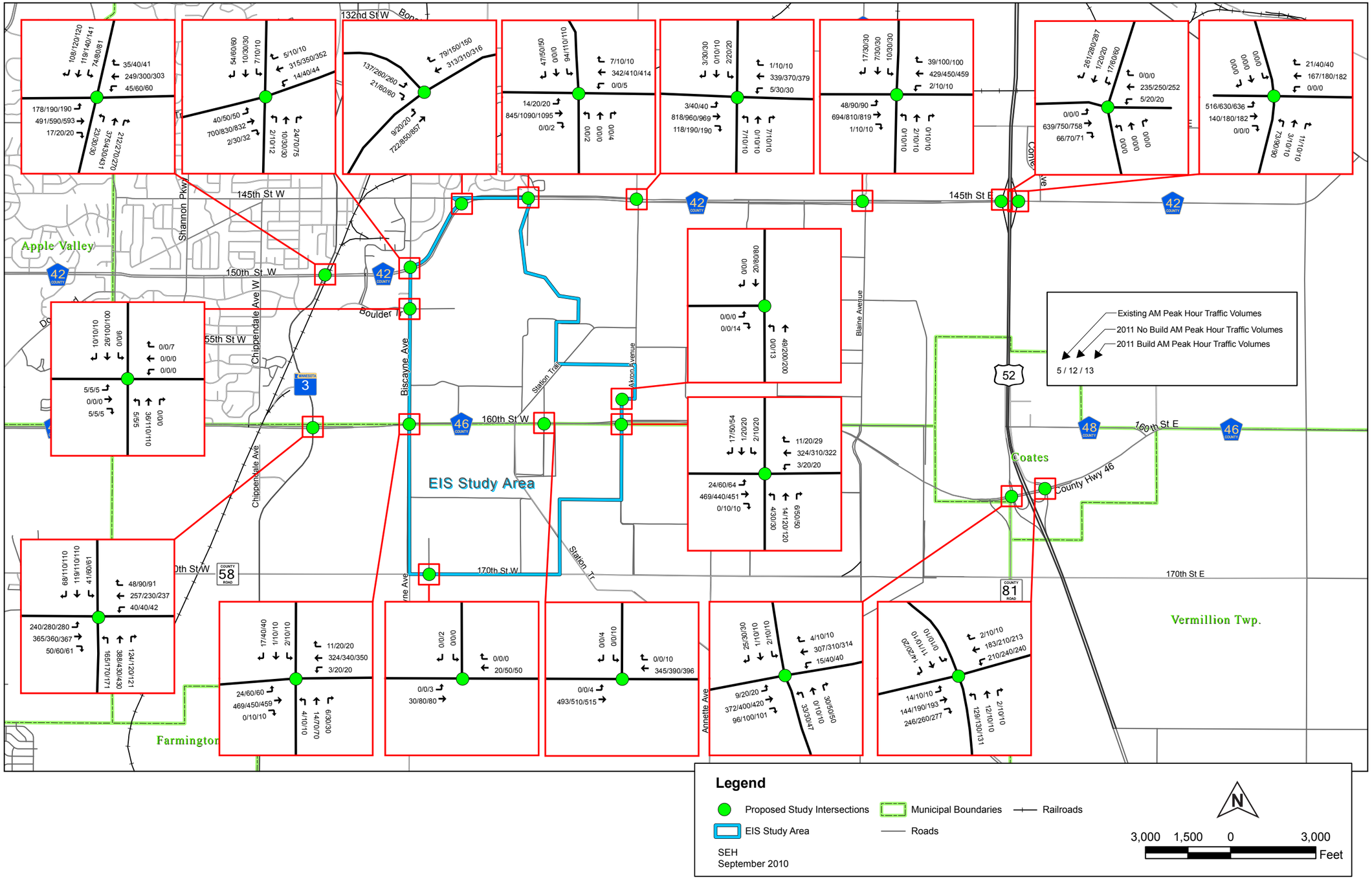

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Figure 39

AM Peak Hour Volumes for Existing, 2011 No-Build, and 2011 Build

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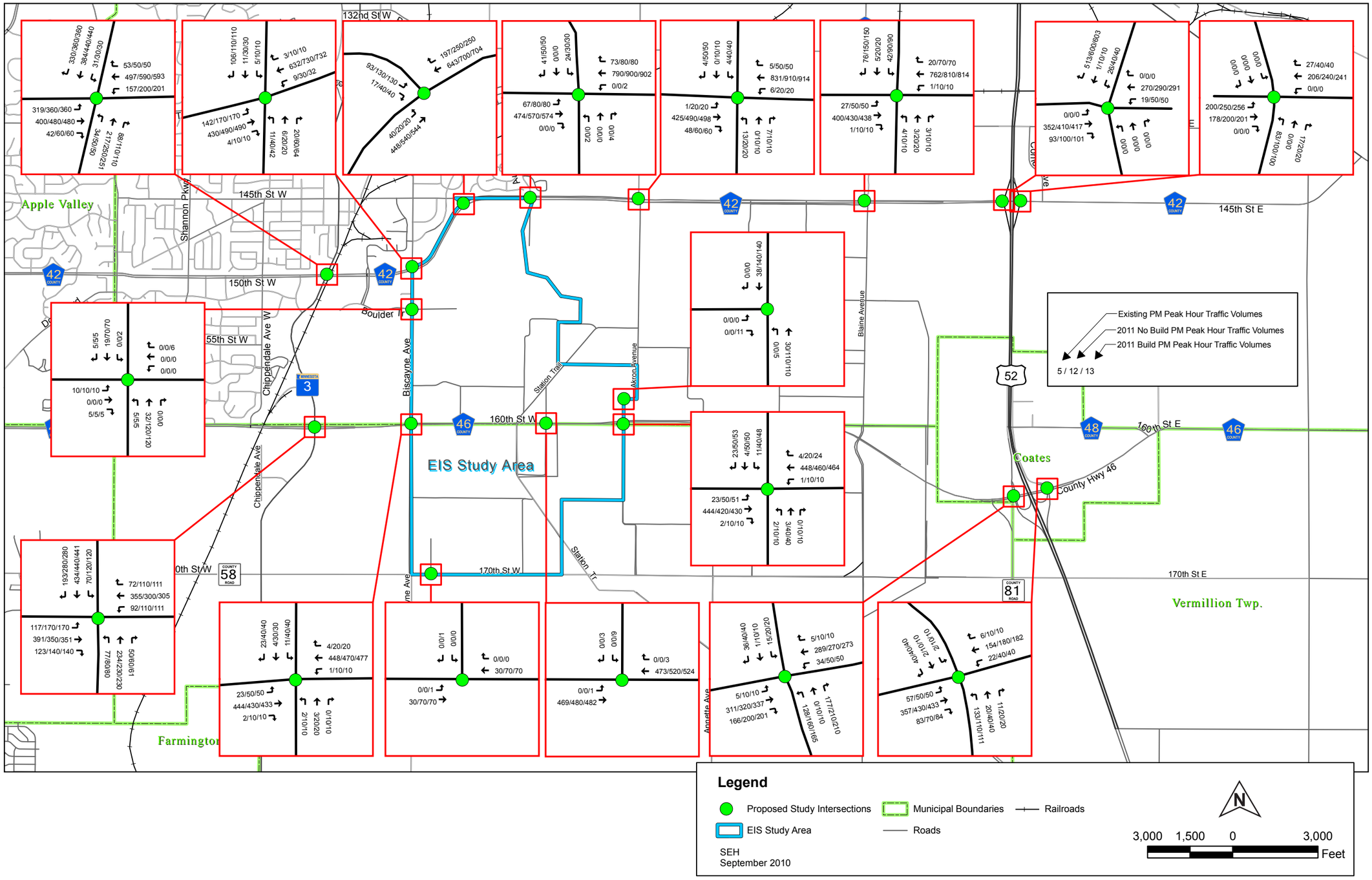

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Figure 40

PM Peak Hour Volumes for Existing, 2011 No-Build, and 2011 Build

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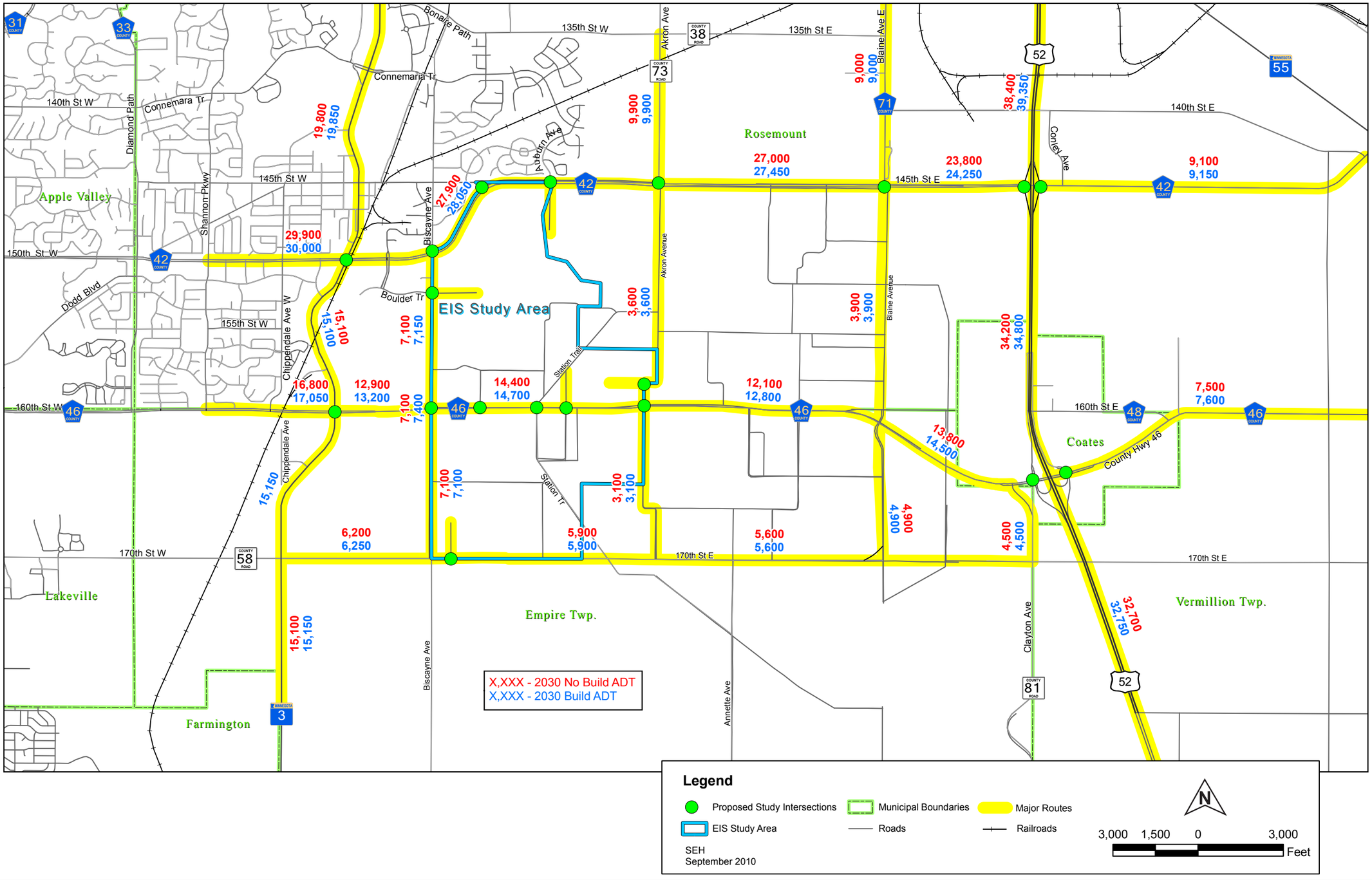

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Figure 41

Average Daily Traffic (ADT)
for 2030 No-Build and 2030 Build

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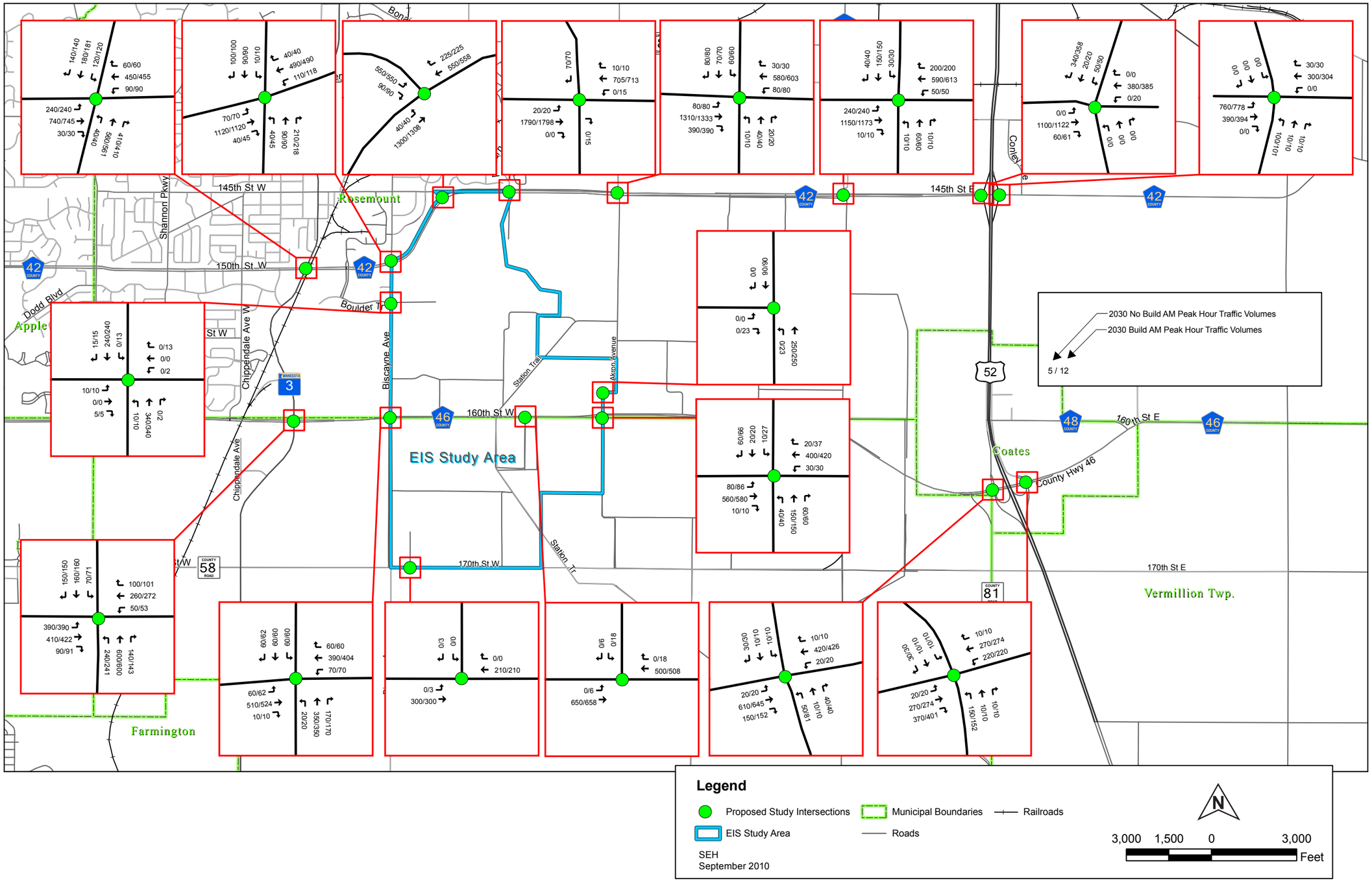

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Figure 42

AM Peak Hour Volumes for 2030 No-Build and 2030 Build

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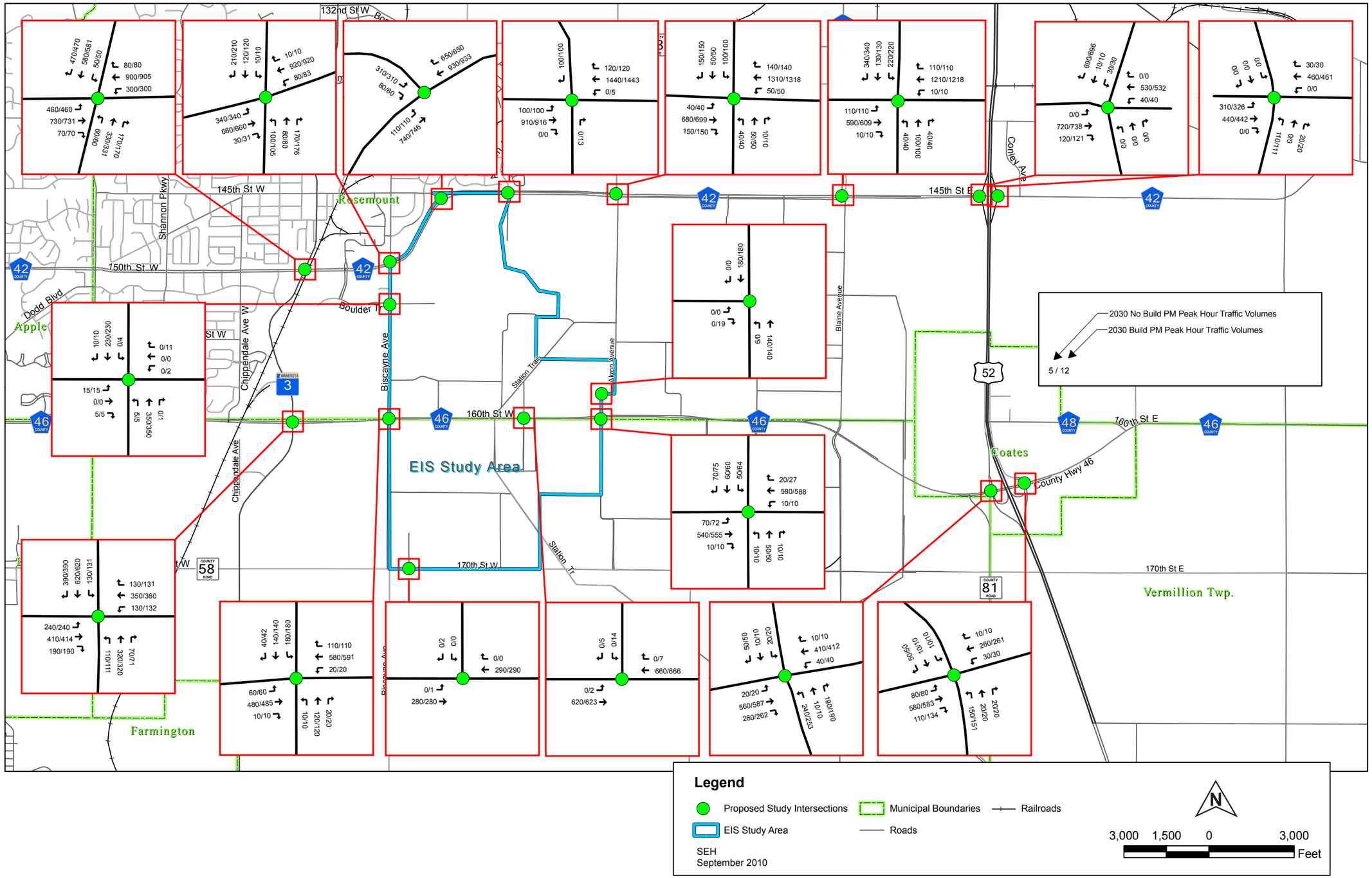

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Figure 43
PM Peak Hour Volumes for 2030 No-Build and 2030 Build

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The traffic operations analyses were performed using the Synchro/SimTraffic (version 7) software package. Synchro/SimTraffic uses the methods outlined in the 2000 Highway Capacity Manual (HCM). LOS for intersections is determined by the average control delay per vehicle. The range of control delay for each LOS is different for signalized and unsignalized intersections. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will experience greater delays than an unsignalized intersection.

In addition to the LOS and average vehicle delay information, queuing information was examined as part of the traffic operations analyses. The reason for considering this additional information is that the intersection LOS provided by Synchro assumes each intersection is isolated and does not consider the effects of queue spill-back from adjacent intersections or from designated turn lanes. Queue spill-back can have a substantial impact on traffic operations, especially for closely spaced intersections and for intersections with short turn lanes. The SimTraffic program accounts for queue spill-back effects, and, for this reason, the SimTraffic results were used for reporting LOS and queuing information.

Five scenarios were investigated as part of the detailed traffic operations analysis. The scenarios included Existing, 2011 No Build, 2011 Build, 2030 No Build, and 2030 Build. A Synchro model was built for each scenario. The SimTraffic micro-level simulation program was run using this model, and the average of five SimTraffic runs was used for reporting LOS and queuing results for the intersections.

Seven of the ten study intersections are existing intersections, while three study intersections (County Road 46/Primary Access #1 intersection, Akron Avenue/Primary Access #2 intersection, and 170th Street/Secondary Access #3 intersection) involve only UMA access road connections to public roads and would be in place only if the mining project is undertaken. The Existing and No Build traffic models included only the seven existing intersections. The Build models included all ten study intersections.

Figure 44 shows the lane geometry and intersection control for the existing study intersections. It is expected that the County Road 42/Auburn Avenue intersection will be changed from a full access intersection to a ¾ access intersection by 2030 (3/4 access means left and thru movements will not be allowed from the Auburn Avenue/Proposed Secondary Access #1 approaches), and Figure 44 also shows the lane geometry and intersection control assumed for this intersection for 2030 conditions.

A traffic operations analysis was performed for Existing (2008) conditions for the AM and PM peak hour. The results of the analysis are summarized in Table 24. Under existing conditions, all the study intersections are operating at LOS A and all the individual movements at the intersections are operating at LOS C or better for both the AM and PM peak hour. The existing conditions analysis provides a baseline reference which can be used for comparison purposes for the future year analysis.

2011 No Build Results

For the 2011 No Build analysis, the 2011 No Build AM and PM peak hour forecast volumes were utilized, and the lane geometry and intersection control at the intersections were assumed to be the same as for existing conditions. The existing gravel road segments of 170th Avenue, Biscayne Avenue, and Akron Avenue were assumed to remain unpaved. The intersections included in the analysis are as follows:

- County Road 42/Auburn Avenue intersection
- County Road 42/Biscayne Avenue intersection

- Biscayne Avenue/Boulder Trail intersection
- County Road 46/US 52 East Ramp intersection
- County Road 46/US 52 West Ramp intersection
- County Road 46 Akron Avenue intersection
- County Road 46/Biscayne Avenue intersection

The results of the 2011 No Build traffic operations analysis are shown in Table 25. The results of the analysis indicate that all seven intersections are expected to operate at an overall intersection level of service (LOS) of A for both the AM and PM peak hour. However, the CSAH 46/Biscayne Avenue intersection is expected to have certain individual movements operating at LOS E or LOS F (shaded cells in Table 25). In the AM peak hour, the southbound thru movement is expected to operate at LOS E. In the PM peak hour, the northbound left turn movement and southbound thru movement are expected to operate at LOS F, and the southbound right turn movement is expected to operate at LOS E.

Potential measures to address the identified No Build condition problems were explored. At the County Road 42/Biscayne Avenue intersection, changing the intersection control from the existing two-way stop control to traffic signal control addressed the problems at this intersection. Based on the forecast traffic volumes, it appears that the intersection will meet at least the Peak Hour Signal Warrant, and possibly other signal warrants, from the Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD). With the MnMUTCD signal warrant being met, this implies that signalizing the CSAH 42/Biscayne Avenue intersection is a reasonable improvement measure.

A traffic operations analysis was performed for 2011 No Build mitigated conditions with the County Road 42/Biscayne Avenue intersection signalized, and the results of this analysis are shown in Table 26. As can be seen from Table 24, the problems at the County Road 42/Biscayne Avenue intersection were addressed by signalizing the intersection. Figure 45 indicates the mitigation measures proposed for 2011 No Build conditions.

2011 Build Results

For the 2011 Build analysis, the 2011 Build AM and PM peak hour forecast volumes were utilized. The traffic analysis investigated operations at ten study intersections. These intersections are as follows:

- County Road 42/Auburn Avenue/Secondary Access #1 intersection
- County Road 42/Biscayne Avenue intersection
- Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection
- County Road 46/US 52 East Ramp intersection
- County Road 46/US 52 West Ramp intersection
- County Road 46/Biscayne Avenue intersection
- County Road 46/Primary Access #1 intersection
- Akron Avenue/Primary Access #2 intersection
- County Road 46/Akron Avenue intersection
- 170th Street/Secondary Access #3 intersection

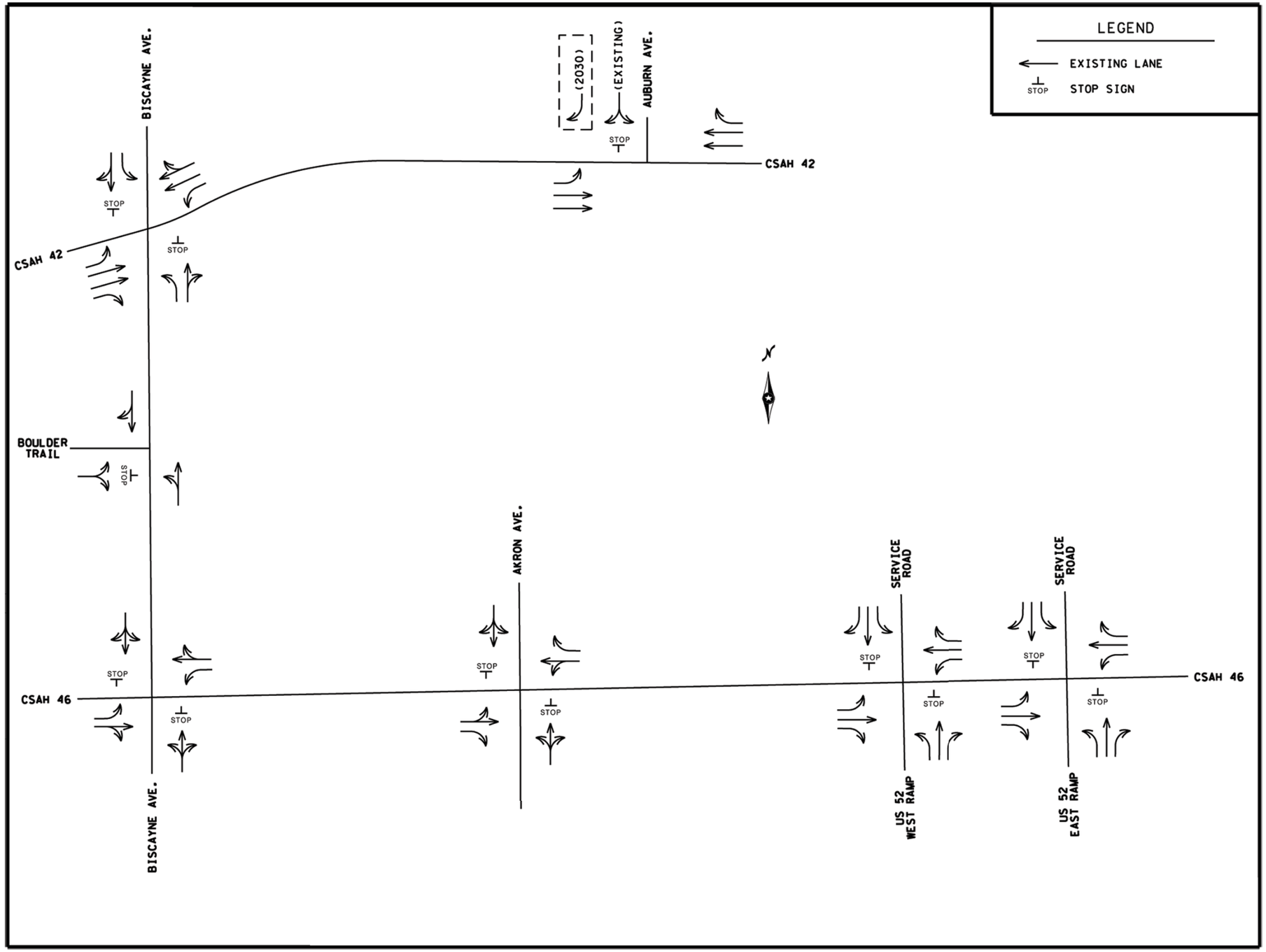

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Figure 44

Existing and Initial Lane Geometry and Intersection Control

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Table 24 – Existing Traffic Operations Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right		Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS									
AM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	1.9	A	0	0	0	0	0
		SB	94	0	47	141	10.6	B	0.0	A	8.3	A	9.8	A			70	0	0	50	48
		EB	14	845	0	859	2.1	A	1.1	A	0.0	A	1.1	A			0	300	12	0	0
		WB	0	342	7	349	0.0	A	0.8	A	1.5	A	0.8	A			0	0	0	300	0
	CSAH 42 and Biscayne Ave	NB	2	10	24	36	13.2	B	12.9	B	4.8	A	7.4	A	1.1	A	40	400	10	0	0
		SB	7	10	54	71	12.0	B	15.8	C	4.0	A	6.3	A			51	290	20	0	0
		EB	40	700	2	742	1.5	A	0.5	A	0.1	A	0.5	A			0	300	19	325	0
		WB	14	315	5	334	5.9	A	0.6	A	0.1	A	0.8	A			0	275	18	0	0
	Biscayne Ave and Boulder Tr	NB	5	31	0	36	2.3	A	0.2	A	0.0	A	0.4	A	1.2	A	6	0	0	0	0
		SB	0	16	10	26	0.0	A	1.5	A	1.5	A	1.5	A			0	0	0	0	0
		EB	5	0	5	10	4.1	A	0.0	A	2.3	A	3.1	A			35	0	0	325	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0
	CSAH 46 and Biscayne Ave	NB	4	14	6	24	9.9	A	9.3	A	7.3	A	8.9	A	1.8	A	43	0	0	50	23
		SB	2	1	17	20	9.1	A	6.4	A	4.0	A	4.5	A			18	0	0	50	41
		EB	24	469	0	493	1.4	A	0.8	A	0.0	A	0.8	A			0	200	16	0	0
		WB	3	324	11	338	4.2	A	2.6	A	1.6	A	2.6	A			0	200	8	0	0
	CSAH 46 and Akron Ave	NB	4	14	6	24	9.5	A	9.1	A	3.7	A	8.3	A	5.0	A	37	0	0	0	0
		SB	2	1	17	20	14.8	B	12.5	B	3.3	A	4.3	A			31	0	0	0	0
		EB	24	469	0	493	3.2	A	1.8	A	0.0	A	1.9	A			0	200	24	0	0
		WB	3	324	11	338	7.9	A	8.8	A	9.9	A	8.8	A			0	200	3	0	0
	CSAH 46 and US 52 East Ramp	NB	129	12	2	143	22.7	C	13.5	B	6.1	A	21.5	C	7.3	A	29	375	109	375	11
		SB	0	11	14	25	0.0	A	18.0	C	3.5	A	8.7	A			37	150	0	0	0
		EB	14	144	246	404	2.6	A	2.9	A	2.0	A	2.3	A			0	325	14	300	30
		WB	210	183	2	395	10.5	B	3.5	A	4.9	A	7.2	A			0	300	85	300	0
	CSAH 46 and US 52 West Ramp	NB	33	0	30	63	12.9	B	0.0	A	7.0	A	10.3	B	6.5	A	0	350	45	350	31
		SB	2	1	25	28	7.6	A	4.7	A	7.0	A	7.0	A			6	275	9	275	26
		EB	9	372	96	477	8.8	A	9.9	A	8.2	A	9.5	A			0	225	12	0	0
		WB	15	307	4	326	2.3	A	1.3	A	0.8	A	1.3	A			0	475	15	225	0
PM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.2	A	0	0	0	0	0
		SB	24	0	41	65	18.5	C	0.0	A	9.9	A	13.1	B			44	0	0	50	48
		EB	67	474	0	541	5.6	A	0.6	A	0.0	A	1.2	A			0	300	41	0	0
		WB	0	790	73	863	0.0	A	1.8	A	2.9	A	1.9	A			0	0	0	300	9
	CSAH 42 and Biscayne Ave	NB	11	6	20	37	20.2	C	10.9	B	6.4	A	10.5	B	2.3	A	40	400	27	0	0
		SB	5	11	106	122	22.6	C	24.3	C	7.6	A	9.6	A			73	290	18	0	0
		EB	142	430	4	576	6.0	A	0.4	A	0.1	A	1.8	A			0	300	63	325	0
		WB	9	632	3	644	3.0	A	1.2	A	0.2	A	1.2	A			2	275	12	0	0
	Biscayne Ave and Boulder Tr	NB	5	31	0	36	2.3	A	0.2	A	0.0	A	0.4	A	1.2	A	6	0	0	0	0
		SB	0	16	10	26	0.0	A	1.5	A	1.5	A	1.5	A			0	0	0	0	0
		EB	5	0	5	10	4.1	A	0.0	A	2.3	A	3.1	A			35	0	0	325	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0
	CSAH 46 and Biscayne Ave	NB	2	3	0	5	13.8	B	9.8	A	0.0	A	11.1	B	2.1	A	25	0	0	50	0
		SB	11	4	23	38	10.1	B	8.4	A	6.3	A	7.6	A			38	0	0	50	48
		EB	23	444	2	469	2.4	A	0.8	A	0.3	A	0.9	A			0	200	22	0	0
		WB	1	448	4	453	2.0	A	2.8	A	1.7	A	2.8	A			0	200	2	0	0
	CSAH 46 and Akron Ave	NB	2	3	0	5	9.4	A	11.5	B	0.0	A	11.1	B	6.1	A	16	0	0	50	0
		SB	11	4	23	38	8.5	A	8.9	A	3.9	A	5.6	A			38	0	0	0	0
		EB	23	444	2	469	3.4	A	1.9	A	0.5	A	2.0	A			0	200	21	0	0
		WB	1	448	4	453	3.4	A	10.3	B	8.7	A	10.3	B			0	200	3	0	0
	CSAH 46 and US 52 East Ramp	NB	133	20	11	164	15.5	C	11.2	B	8.2	A	14.4	B	4.4	A	35	375	80	375	27
		SB	2	2	40	44	14.8	B	12.6	B	3.2	A	4.0	A			43	150	7	0	0
		EB	57	357	83	497	2.1	A	2.0	A	1.2	A	1.9	A			0	325	27	300	2
		WB	22	154	6	182	5.4	A	1.6	A	3.8	A	2.2	A			0	300	23	300	0
	CSAH 46 and US 52 West Ramp	NB	128	0	177	305	19.1	C	0.0	A	10.0	B	13.8	B	8.8	A	0	350	91	350	63
		SB	15	1	36	52	12.3	B	14.5	B	8.0	A	9.3	A			8	275	28	275	34
		EB	5	311	166	482	7.8	A	11.1	B	8.7	A	10.2	B			0	225	11	225	11
		WB	34	289	5	328	3.4	A	1.9	A	0.9	A	2.0	A			0	475	27	225	0

Table 25 – 2011 No Build Traffic Operations Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right		Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS									
AM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.6	A	0	0	0	0	0
		SB	110	0	50	160	18.8	C	0.0	A	10.1	B	16.1	C			103	0	0	50	66
		EB	20	1090	0	1,110	3.4	A	1.3	A	0.0	A	1.3	A			0	300	20	0	0
		WB	0	410	10	420	0.0	A	1.0	A	1.3	A	1.0	A			3	0	0	300	0
	CSAH 42 and Biscayne Ave	NB	10	30	70	110	26.6	D	28.7	D	18.1	C	22.1	C	4.2	A	108	400	28	0	0
		SB	10	30	60	100	18.5	C	39.3	E	14.6	B	23.5	C			102	290	27	0	0
		EB	50	830	30	910	2.3	A	0.9	A	0.2	A	1.0	A			2	300	27	325	4
		WB	40	350	10	400	7.8	A	0.8	A	0.3	A	1.4	A			0	275	36	0	0
	Biscayne Ave and Boulder Tr	NB	5	110	0	115	2.3	A	1.3	A	0.0	A	1.3	A	1.5	A	4	0	0	0	0
		SB	0	100	10	110	0.0	A	1.5	A	1.3	A	1.5	A			0	150	0	0	0
		EB	5	0	5	10	6.3	A	0.0	A	2.4	A	3.9	A			29	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	70	30	110	12.0	B	12.6	B	9.4	A	11.6	B	3.3	A	75	0	0	50	53
		SB	10	10	40	60	13.3	B	1.8	A	5.0	A	4.1	A			49	0	0	50	56
		EB	60	450	10	520	2.5	A	1.5	A	0.5	A	1.6	A			0	200	32	0	0
		WB	20	340	20	380	2.9	A	2.8	A	1.3	A	2.7	A			0	200	19	0	0
	CSAH 46 and Akron Ave	NB	30	120	50	200	16.3	C	16.3	C	9.6	A	14.6	B	7.3	A	114	0	0	0	0
		SB	10	20	50	80	13.2	B	11.4	B	5.2	A	7.6	A			59	0	0	0	0
		EB	60	440	10	510	3.1	A	2.7	A	1.5	A	2.7	A			0	200	39	0	0
		WB	20	310	20	350	11.0	B	9.7	A	8.0	A	9.7	A			0	200	21	200	10
	CSAH 46 and US 52 East Ramp	NB	130	10	10	150	32.6	D	16.7	C	6.3	A	29.8	D	9	A	31	375	126	375	25
		SB	10	10	20	40	16.6	C	20.7	C	5.0	A	11.6	B			43	150	22	0	0
		EB	10	190	260	460	2.6	A	3.2	A	2.1	A	2.6	A			0	325	9	300	29
		WB	240	210	10	460	11.5	B	4.7	A	5.7	A	8.3	A			2	300	90	300	0
	CSAH 46 and US 52 West Ramp	NB	30	10	50	90	14.9	B	9.3	A	7.1	A	10.0	B	6.8	A	22	350	36	350	34
		SB	10	10	30	50	13.5	B	13.1	B	6.8	A	9.4	A			28	275	24	275	35
		EB	20	400	100	520	10.7	B	10.0	B	8.5	A	9.7	A			0	225	17	225	2
		WB	40	310	10	360	3.4	A	1.5	A	0.9	A	1.7	A			0	475	27	225	0
PM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.6	A	0	0	0	0	0
		SB	30	0	50	80	22.9	C	0.0	A	10.4	B	15.5	C			61	0	0	50	57
		EB	80	570	0	650	7.2	A	0.7	A	0.0	A	1.5	A			0	300	54	0	0
		WB	0	900	80	980	0.0	A	2.3	A	3.4	A	2.4	A			0	0	0	300	12
	CSAH 42 and Biscayne Ave	NB	40	20	60	120	51.4	F	29.8	D	16.3	C	30.7	D	7.9	A	85	400	75	0	0
		SB	10	30	110	150	34.1	D	74.4	F	47.8	E	52.2	F			263	290	55	0	0
		EB	170	490	10	670	8.2	A	0.8	A	0.1	A	2.6	A			2	300	83	325	4
		WB	30	730	10	770	3.6	A	1.6	A	0.6	A	1.7	A			10	275	24	0	0
	Biscayne Ave and Boulder Tr	NB	5	120	0	125	2.8	A	0.8	A	0.0	A	0.9	A	1.3	A	4	0	0	0	0
		SB	0	70	5	75	0.0	A	1.6	A	1.1	A	1.6	A			0	0	0	0	0
		EB	10	0	5	15	4.8	A	0.0	A	2.3	A	3.7	A			37	0	0	325	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0
	CSAH 46 and Biscayne Ave	NB	10	20	10	40	15.2	C	14.0	B	8.8	A	12.8	B	3.6	A	62	0	0	50	39
		SB	40	30	40	110	14.9	B	14.7	B	7.1	A	12.0	B			83	0	0	50	64
		EB	50	430	10	490	2.9	A	1.3	A	0.2	A	1.4	A			0	200	32	0	0
		WB	10	470	20	500	3.4	A	3.1	A	1.6	A	3.0	A			0	200	11	0	0
	CSAH 46 and Akron Ave	NB	10	40	10	60	10.3	B	11.7	B	4.6	A	10.2	B	7.2	A	50	0	0	50	0
		SB	40	50	50	140	11.8	B	12.6	B	7.5	A	10.6	B			80	0	0	0	0
		EB	50	420	10	480	3.7	A	2.3	A	1.6	A	2.4	A			0	200	40	200	15
		WB	10	460	20	490	13.1	B	10.6	B	7.9	A	10.5	B			0	200	15	200	3
	CSAH 46 and US 52 East Ramp	NB	110	40	20	170	18.4	C	11.9	B	7.8	A	15.6	C	4.6	A	46	375	79	375	28
		SB	10	10	40	60	12.6	B	12.9	B	3.5	A	6.3	A			49	150	23	0	0
		EB	50	430	70	550	2.3	A	2.1	A	1.4	A	2.0	A			0	325	26	300	3
		WB	40	180	10	230	6.1	A	1.6	A	4.3	A	2.5	A			0	300	31	300	0
	CSAH 46 and US 52 West Ramp	NB	160	10	210	380	21.0	C	14.2	B	11.4	B	15.5	C	9.7	A	32	350	100	350	75
		SB	20	10	40	70	14.1	B	14.9	B	8.6	A	10.9	B			25	275	29	275	34
		EB	10	320	200	530	8.5	A	10.6	B	8.6	A	9.8	A			0	225	13	225	14
		WB	50	270	10	330	4.4	A	2.1	A	0.8	A	2.4	A			0	475	38	225	0

Table 26 – 2011 No Build Mitigated: Traffic Operations Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.6	A	0	0	0	0	0
		SB	110	0	50	160	16.2	C	0.0	A	9.7	A	14.3	B			91	0	0	50	64
		EB	20	1090	0	1,110	3.5	A	1.6	A	0.0	A	1.6	A			0	300	19	0	0
		WB	0	410	10	420	0.0	A	1.0	A	1.2	A	1.0	A			0	0	0	300	0
	CSAH 42 and Biscayne Ave (Signal)	NB	10	30	70	110	20.9	C	13.7	B	7.9	A	10.7	B	11.7	B	72	400	23	0	0
		SB	10	30	60	100	17.3	B	14.5	B	4.9	A	8.9	A			65	290	17	0	0
		EB	50	830	30	910	25.6	C	11.8	B	2.3	A	12.3	B			156	300	64	325	35
		WB	40	350	10	400	27.0	C	10.0	B	8.0	A	11.4	B			101	275	56	0	0
	Biscayne Ave and Boulder Tr	NB	5	110	0	115	2.5	A	1.1	A	0.0	A	1.1	A	1.3	A	11	0	0	0	0
		SB	0	100	10	110	0.0	A	1.3	A	1.1	A	1.3	A			0	150	0	0	0
		EB	5	0	5	10	5.3	A	0.0	A	2.8	A	3.9	A			31	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	70	30	110	11.6	B	12.6	B	9.5	A	11.7	B	3.3	A	76	0	0	50	57
		SB	10	10	40	60	13.2	B	2.2	A	5.2	A	4.2	A			47	0	0	50	56
		EB	60	450	10	520	2.3	A	1.5	A	0.4	A	1.6	A			2	200	33	0	0
		WB	20	340	20	380	3.3	A	2.7	A	1.3	A	2.7	A			3	200	22	0	0
	CSAH 46 and Akron Ave	NB	30	120	50	200	13.3	B	15.4	C	9.9	A	13.6	B	7	A	105	0	0	0	0
		SB	10	20	50	80	12.9	B	12.2	B	5.1	A	7.8	A			57	0	0	0	0
		EB	60	440	10	510	3.0	A	2.7	A	1.2	A	2.7	A			0	200	35	0	0
		WB	20	310	20	350	11.5	B	9.4	A	7.9	A	9.4	A			0	200	26	200	3
	CSAH 46 and US 52 East Ramp	NB	130	10	10	150	30.2	D	15.0	C	6.5	A	27.5	D	8.6	A	33	375	120	375	27
		SB	10	10	20	40	22.9	C	17.5	C	4.4	A	12.1	B			45	150	26	0	0
		EB	10	190	260	460	2.4	A	3.3	A	2.0	A	2.6	A			0	325	9	300	28
		WB	240	210	10	460	11.3	B	4.5	A	6.2	A	8.1	A			2	300	86	300	0
	CSAH 46 and US 52 West Ramp	NB	30	10	50	90	14.8	B	11.0	B	7.4	A	10.3	B	7	A	23	350	38	350	34
		SB	10	10	30	50	13.5	B	11.7	B	6.9	A	9.1	A			27	275	24	275	35
		EB	20	400	100	520	10.8	B	10.1	B	8.3	A	9.8	A			0	225	17	225	9
		WB	40	310	10	360	3.7	A	1.5	A	0.8	A	1.7	A			0	475	27	225	0
PM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.7	A	0	0	0	0	0
		SB	30	0	50	80	24.2	C	0.0	A	10.8	B	15.6	C			59	0	0	50	57
		EB	80	570	0	650	7.7	A	0.9	A	0.0	A	1.7	A			0	300	53	0	0
		WB	0	900	80	980	0.0	A	2.3	A	3.2	A	2.4	A			3	0	0	300	14
	CSAH 42 and Biscayne Ave (Signal)	NB	40	20	60	120	22.4	C	13.1	B	5.0	A	12.0	B	15.6	B	59	400	50	0	0
		SB	10	30	110	150	19.5	B	20.0	C	7.9	A	10.9	B			92	290	30	0	0
		EB	170	490	10	670	30.0	C	10.3	B	1.9	A	15.1	B			112	300	140	325	25
		WB	30	730	10	770	33.4	C	16.7	B	12.4	B	17.2	B			199	275	48	0	0
	Biscayne Ave and Boulder Tr	NB	5	120	0	125	2.7	A	0.9	A	0.0	A	1.0	A	1.4	A	4	0	0	0	0
		SB	0	70	5	75	0.0	A	1.5	A	1.6	A	1.5	A			0	0	0	0	0
		EB	10	0	5	15	4.3	A	0.0	A	2.8	A	3.7	A			39	0	0	325	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0
	CSAH 46 and Biscayne Ave	NB	10	20	10	40	12.7	B	11.9	B	8.8	A	11.3	B	3.6	A	50	0	0	50	40
		SB	40	30	40	110	15.0	C	13.7	B	8.0	A	12.1	B			81	0	0	50	62
		EB	50	430	10	490	3.3	A	1.3	A	0.2	A	1.5	A			5	200	34	0	0
		WB	10	470	20	500	3.6	A	3.3	A	1.3	A	3.2	A			2	200	11	0	0
	CSAH 46 and Akron Ave	NB	10	40	10	60	12.0	B	12.6	B	5.7	A	11.3	B	7.4	A	50	0	0	50	0
		SB	40	50	50	140	12.5	B	13.1	B	6.7	A	10.5	B			75	0	0	0	0
		EB	50	420	10	480	4.0	A	2.2	A	0.7	A	2.3	A			0	200	38	0	0
		WB	10	460	20	490	10.4	B	11.0	B	8.7	A	10.9	B			0	200	11	200	4
	CSAH 46 and US 52 East Ramp	NB	110	40	20	170	16.7	C	13.2	B	8.0	A	14.8	B	4.6	A	45	375	73	375	29
		SB	10	10	40	60	14.7	B	13.4	B	4.3	A	7.2	A			48	150	24	0	0
		EB	50	430	70	550	2.3	A	2.1	A	1.2	A	2.0	A			0	325	25	300	0
		WB	40	180	10	230	6.5	A	1.6	A	4.4	A	2.6	A			0	300	29	300	0
	CSAH 46 and US 52 West Ramp	NB	160	10	210	380	20.7	C	15.0	C	11.3	B	15.2	C	9.5	A	33	350	92	350	75
		SB	20	10	40	70	15.0	C	16.9	C	8.8	A	11.6	B			28	275	30	275	38
		EB	10	320	200	530	10.6	B	10.5	B	8.4	A	9.7	A			0	225	14	225	12
		WB	50	270	10	330	4.5	A	2.0	A	0.6	A	2.3	A			2	475	36	225	2

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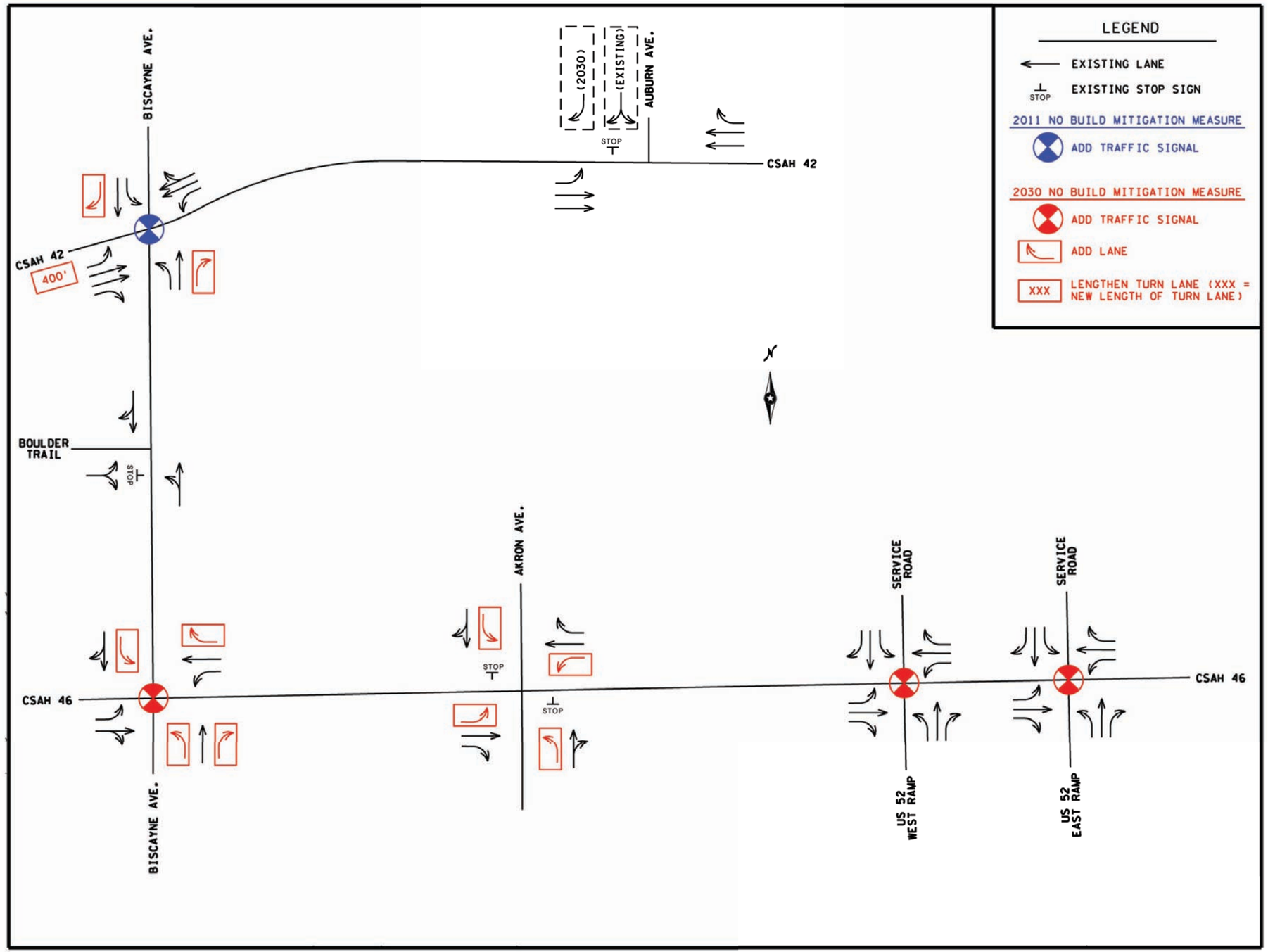

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Figure 45

Mitigation Measures for 2011 and 2030 No-Build Conditions

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The lane geometry and intersection control at the intersections were assumed to be that indicated in Figure 46. At all the proposed UMA access driveways, it was assumed that there would be only a single lane on the driveway approach and the driveway approach would be controlled by a stop sign. At the County Road 42/Biscayne intersection, it was assumed that control at the intersection would be a traffic signal instead of two-way stop control (as suggested from the 2011 No Build traffic analysis). At the County Road 42/Auburn Avenue/Secondary Access #1 intersection, it was assumed that a westbound left turn lane and an eastbound right turn lane would be added to County Road 42 for the proposed UMA access driveway. At the Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection, it was assumed that a southbound left turn lane would be added to Biscayne Avenue for the proposed UMA access driveway, and it was also assumed that mining trucks would be prohibited from using the existing unpaved section of Biscayne Avenue from Boulder Trail to County Road 46. At the County Road 46/Primary Access #1 intersection, it was assumed that an eastbound left turn lane and a westbound right turn lane would be added to County Road 46 for the proposed UMA access driveway. At the County Road 46/Akron Avenue intersection, it was assumed that an eastbound and westbound left turn lane would be added to County Road 46. At the Akron Avenue/Primary Access #2 intersection, it was assumed that a northbound left turn lane would be added to Akron Avenue for the proposed UMA access driveway and that Akron Avenue from County Road 46 to the UMA Primary Access #2 would be paved (Akron Avenue north of County Road 46 is currently a gravel road.). The timing of the opening of UMA Primary Access #2 and the paving of the section of Akron Avenue between County Road 46 and Primary Access #2 is expected to be tied to the opening of the proposed UMA asphalt plant.

The results of the 2011 Build traffic operations analysis are shown on the following page in Table 27. The results of the analysis indicate that all ten intersections are expected to operate at an overall intersection LOS of A or B for both the AM and PM peak hour and that all individual movements at all ten intersections are expected to operate at LOS D or better for both peak hours.

Though traffic congestion problems are not indicating the need for improvement measures at the study intersections, mitigation measures to address safety concerns at five of the study intersections are being recommended. With mining trucks slowing down and possibly stopping on high speed and/or high volume mainline roads at several study intersections, especially those at the proposed mining access driveways, there is a potential for rear-end and sideswipe crashes at these intersections. To address the safety concern, turn lane additions are recommended on the mainline roadway at the following intersections:

- At the County Road 42/Auburn Avenue/Secondary Access #1 intersection, a westbound left turn lane and an eastbound right turn lane added to County Road 42.
- At the Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection, a southbound left turn lane added to Biscayne Avenue.
- At the County Road 46/Primary Access #1 intersection, an eastbound left turn lane and a westbound right turn lane added to Count Road 46.
- At the County Road 46/Akron Avenue intersection, an eastbound and westbound left turn lane added to County Road 46.
- At the Akron Avenue/Primary Access #2 intersection, a northbound left turn lane added to Akron Avenue.

Table 27 – 2011 Build Traffic Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	29.4	D	0.0	A	11.0	B	16.3	C	2.8	A	42	0	0	0	0
		SB	110	0	50	160	19.2	C	0.0	A	10.2	B	15.8	C			96	0	0	50	66
		EB	20	1095	2	1,117	3.8	A	1.6	A	1.8	A	1.6	A			0	300	20	300	0
		WB	5	414	10	429	9.6	A	1.0	A	1.7	A	1.1	A			0	300	32	300	0
	CSAH 42 and Biscayne Ave (Signal)	NB	12	30	75	117	21.9	C	12.2	B	7.5	A	10.2	B	11.2	B	77	400	32	0	0
		SB	10	30	60	100	22.2	C	14.5	B	4.3	A	9.1	A			58	290	24	0	0
		EB	50	832	32	914	25.4	C	11.4	B	2.6	A	11.8	B			152	300	59	325	34
		WB	44	352	10	406	26.8	C	9.4	A	5.5	A	10.7	B			101	275	50	0	0
	Biscayne Ave and Boulder Tr	NB	5	110	0	115	1.9	A	1.1	A	0.0	A	1.1	A	1.4	A	0	0	0	0	0
		SB	6	100	10	116	5.0	A	1.4	A	1.1	A	1.5	A			0	150	13	0	0
		EB	5	0	5	10	4.2	A	0.0	A	2.7	A	3.3	A			26	0	0	0	0
		WB	0	0	7	7	0.0	A	0.0	A	3.2	A	3.2	A			52	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	70	30	110	12.8	B	13.4	B	9.3	A	12.0	B	3.3	A	80	0	0	50	57
		SB	10	10	40	60	16.6	C	2.5	A	5.1	A	4.4	A			40	0	0	50	57
		EB	60	459	10	529	2.4	A	1.5	A	0.3	A	1.6	A			2	200	33	0	0
		WB	20	350	20	390	3.5	A	2.9	A	1.2	A	2.9	A			0	200	25	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.4	A	0	0	0	0	0
		SB	10	0	4	14	12.7	B	0.0	A	3.7	A	10.1	B			60	0	0	0	0
		EB	4	515	0	519	3.5	A	1.6	A	0.0	A	1.6	A			0	300	21	0	0
		WB	0	396	10	406	0.0	A	3.0	A	1.6	A	3.0	A			0	0	0	0	0
	CSAH 46 and Akron Ave	NB	30	120	50	200	25.5	D	23.1	C	17.8	C	22.2	C	8.5	A	175	0	0	0	0
		SB	20	20	54	94	17.5	C	3.2	A	7.7	A	6.6	A			115	0	0	0	0
		EB	64	451	10	525	7.0	A	2.7	A	1.8	A	3.2	A			3	200	74	0	0
		WB	20	322	29	371	9.8	A	10.0	B	4.6	A	9.6	A			0	200	27	300	24
	CSAH 46 and US 52 East Ramp	NB	131	10	10	151	32.8	D	16.5	C	6.6	A	30.1	D	8.6	A	30	375	144	375	23
		SB	10	10	20	40	16.6	C	21.9	C	4.4	A	11.2	B			39	150	24	0	0
		EB	10	193	277	480	3.1	A	3.0	A	2.2	A	2.5	A			4	325	11	300	31
		WB	240	213	10	463	12.0	B	4.3	A	5.4	A	8.3	A			2	300	101	300	0
	CSAH 46 and US 52 West Ramp	NB	47	10	50	107	13.9	B	11.8	B	7.9	A	10.6	B	6.9	A	25	350	49	350	39
		SB	10	10	30	50	12.9	B	11.3	B	7.5	A	9.1	A			24	275	27	275	33
		EB	20	420	101	541	10.9	B	9.5	A	8.0	A	9.3	A			0	225	15	225	3
		WB	40	314	10	364	3.3	A	1.5	A	1.3	A	1.7	A			0	475	28	0	0
	Akron Ave and Primary Access #2	NB	13	200	0	213	3.5	A	1.6	A	0.0	A	1.7	A	1.5	A	0	200	21	0	0
		SB	0	80	0	80	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		EB	0	0	14	14	0.0	A	0.0	A	2.6	A	2.6	A			67	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.4	A	0	0	0	0	0
		SB	0	0	2	2	0.0	A	0.0	A	2.7	A	2.7	A			24	0	0	0	0
		EB	3	80	0	83	3.0	A	0.3	A	0.0	A	0.4	A			7	0	0	0	0
		WB	0	50	0	50	0.0	A	0.2	A	0.0	A	0.2	A			0	0	0	300	0
PM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	30.9	D	0.0	A	6.4	A	16.2	C	2.8	A	41	0	0	0	0
		SB	30	0	50	80	23.4	C	0.0	A	10.8	B	15.5	C			56	0	0	50	58
		EB	80	574	0	654	7.7	A	1.0	A	0.0	A	1.8	A			0	300	52	300	0
		WB	2	902	80	984	2.7	A	2.3	A	3.0	A	2.4	A			0	300	15	300	7
	CSAH 42 and Biscayne Ave (Signal)	NB	42	20	64	126	23.3	C	11.8	B	5.2	A	12.0	B	14.7	B	62	400	61	0	0
		SB	10	30	110	150	31.2	C	19.6	B	8.7	A	12.0	B			102	290	20	0	0
		EB	170	490	10	670	26.5	C	9.2	A	1.1	A	13.7	B			104	300	139	325	19
		WB	32	732	10	774	26.6	C	15.8	B	11.9	B	16.2	B			208	275	49	0	0
	Biscayne Ave and Boulder Tr	NB	5	120	0	125	2.3	A	0.8	A	0.0	A	0.8	A	1.4	A	8	0	0	0	0
		SB	2	70	5	77	5.7	A	1.6	A	1.0	A	1.7	A			0	0	0	0	0
		EB	10	0	5	15	4.7	A	0.0	A	2.7	A	4.0	A			40	0	0	300	0
		WB	0	0	6	6	0.0	A	0.0	A	3.6	A	3.6	A			41	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	20	10	40	10.0	B	12.6	B	10.0	B	11.3	B	3.5	A	48	0	0	50	39
		SB	40	30	40	110	14.9	B	14.0	B	8.2	A	12.1	B			75	0	0	50	68
		EB	50	433	10	493	2.8	A	1.4	A	0.3	A	1.5	A			0	200	31	0	0
		WB	10	477	20	507	3.1	A	3.1	A	1.4	A	3.0	A			1	200	14	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.6	A	0	0	0	50	0
		SB	9	0	3	12	15.4	C	0.0	A	6.1	A	14.5	B			59	0	0	0	0
		EB	1	482	0	483	0.0	A	1.4	A	0.0	A	1.4	A			0	0	0	0	0
		WB	0	524	3	527	0.0	A	3.4	A	1.4	A	3.4	A			0	200	0	0	0
	CSAH 46 and Akron Ave	NB	10	40	10	60	17.8	C	17.5	C	8.0	A	15.4	C	8.8	A	59	0	0	0	0
		SB	48	50	53	151	31.5	D	9.0	A	19.7	C	15.9	C			222	0	0	0	0
		EB	51	430	10	491	9.3	A	2.5	A	1.5	A	3.1	A			0	200	83	300	0
		WB	10	464	24	498	13.0	B	11.2	B	6.0	A	11.0	B			0	200	20	300	19
	CSAH 46 and US 52 East Ramp	NB	111	40	20	171	17.8	C	11.9	B	8.5	A	15.3	C	4.7	A	43	375	84	375	32
		SB	10	10	40	60	15.6	C	13.3	B	3.3	A	7.4	A			41	150	27	0	0
		EB	50	433	84	567	2.6	A	2.3	A	1.3	A	2.2	A			3	325	28	300	6
		WB	40	182	10	232	6.7	A	1.6	A	4.5	A	2.6	A			0	300	30	225	1
	CSAH 46 and US 52 West Ramp	NB	165	10	210	385	24.5	C	14.6	B	11.9	B	17.2	C	9.9	A	27	350	113	50	78
		SB	20	10	40	70	15.4	C	14.1	B	9.6	A	12.0	B			31	275	34	275	43
		EB	10	337	201	548	9.1	A	9.9	A	8.1	A	9.3	A			0	225	18	225	11
		WB	50	273	10	333	4.3	A	2.0	A	0.8	A	2.3	A			0	200	31	0	0
	Akron Ave and Primary Access #2	NB	5	110	0	115	3.4	A	1.0	A	0.0	A	1.1	A	0.9	A	0	200	13	0	0
		SB	0	140	0	140	0.0	A	0.4	A	0.0	A	0.4	A			0	0	0	0	0
		EB	0	0	11	11	0.0	A	0.0	A	3.2	A	3.2	A			58	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.3	A	0	0	0	0	0
		SB	0	0	1	1	0.0	A	0.0	A	4.3	A	4.3	A			23	0	0	0	0
		EB	1	70	0	71	0.0	A	0.2	A	0.0	A	0.2	A			7	0	0	0	0
		WB	0	70	0	70	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	300	0

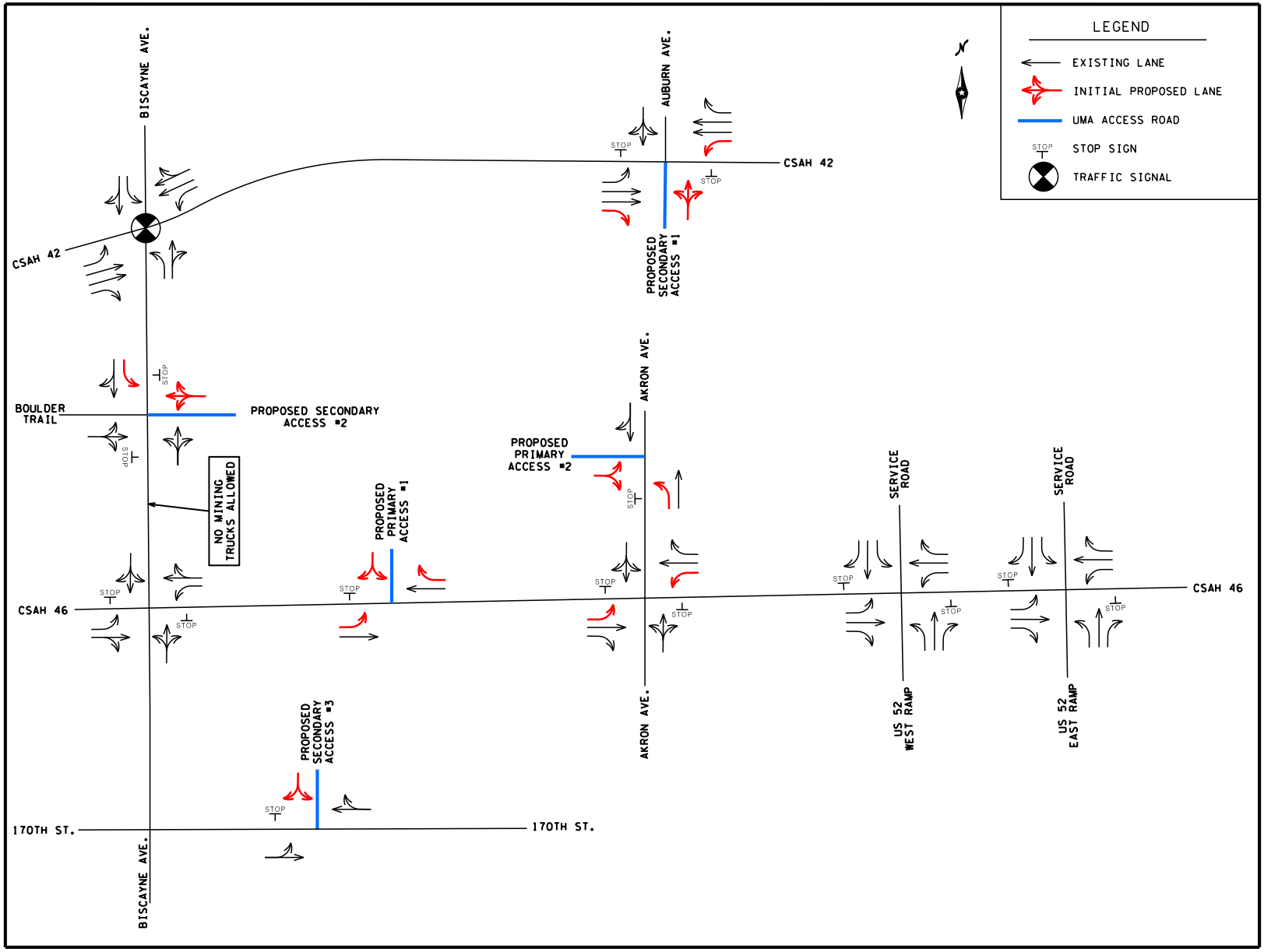

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Figure 46

2011 Build Initial Lane Geometry and Intersection Control

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These safety improvement measures are shown in Figure 46 and were incorporated into the traffic model used for the 2011 Build analysis.

It should be noted that turn lane safety improvements are not being recommended on mainline road approaches that are expected to be unpaved in 2011. These unpaved roads are expected to be 170th Street at Secondary Access #3, Biscayne Avenue south of Boulder Trail, and Akron Avenue north of Primary Access #2. There is expected to be little or no UMA mining traffic on these gravel roads in 2011. The low speed and low volume associated with gravel roads precludes the need for turn lane safety improvements. It is expected that future development in the area will increase traffic on these gravel roadway segments, and, at some point in the future, there will be sufficient traffic on these roads to create the need to pave the roads. When these roadways are paved, turn lane additions on the mainline roads at the UMA access driveways should be considered.

2030 No Build Results

For the 2030 No Build analysis, the 2030 No Build AM and PM peak hour forecast volumes were utilized. The lane geometry and intersection control at the intersections were assumed to be the same as for existing conditions, except at the County Road 42/Biscayne intersection where the intersection control was assumed to be a traffic signal instead of two-way stop control (This is based on the results from the 2011 No Build traffic analysis which indicated this mitigation measure was needed for 2011 No Build conditions.) and at the County Road 42/Auburn Avenue intersection where the intersections was assumed to have been changed from a full access intersection to a ¾ access intersection by 2030. It is also assumed that the existing unpaved segments of Biscayne Avenue and Akron Avenue in the study area will be paved by 2030. Since, under No Build conditions, the UMA access points will not be in place, the traffic analysis investigated operations at only the seven existing study intersections. These intersections are as follows:

- County Road 42/Auburn Avenue intersection
- County Road 42/Biscayne Avenue intersection
- Biscayne Avenue/Boulder Trail intersection
- County road 46/Biscayne Avenue intersection
- County Road 46/Akron Avenue intersection
- County Road 46/US 52 East Ramp intersection
- County Road 46/US 52 West Ramp intersection

The results of the 2030 No Build traffic operations analysis are shown in Table 28. The results of the analysis indicate that five of the seven intersections are expected to have traffic operations problems for the AM and/or PM peak hour.

At the County Road 42/Biscayne Avenue intersection, the eastbound left turn movement is expected to operate at LOS E during the PM peak hour, and the eastbound left turn queue is expected to frequently exceed the storage capacity of this turn lane during the PM peak hour.

Table 28 – 2030 No Build Traffic Operations Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/Veh)						LOS By Approach		LOS By Intersection		Through		Left Turn		Right Turn	
							Left		Thru		Right		Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue	Storage
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS										
AM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.1	A	0	0	0	0	0	0
		SB	0	0	70	70	0.0	A	0.0	A	4.8	A	4.8	A			0	0	0	0	55	0
		EB	20	1790	0	1,810	5.3	A	2.3	A	0.0	A	2.3	A			0	300	23	0	0	0
		WB	0	705	10	715	0.0	A	1.5	A	3.0	A	1.5	A			0	0	0	300	0	0
	CSAH 42 and Biscayne Ave (Signal)	NB	40	90	210	340	27.3	C	25.7	C	16.8	B	20.5	C	20.4	C	139	400	49	0	0	0
		SB	10	90	100	200	25.7	C	28.4	C	13.6	B	20.4	C			149	290	24	0	0	0
		EB	70	1120	40	1,230	38.2	D	22.1	C	5.9	A	22.5	C			332	300	91	325	88	0
		WB	110	490	40	640	45.5	D	12.6	B	8.6	A	17.0	B			155	275	134	0	0	0
	Biscayne Ave and Boulder Tr	NB	10	340	0	350	5.3	A	6.7	A	0.0	A	6.7	A	7.5	A	79	200	25	0	0	0
		SB	0	240	15	255	0.0	A	8.9	A	5.7	A	8.7	A			81	150	0	0	0	0
		EB	10	0	5	15	4.8	A	0.0	A	3.4	A	4.3	A			41	0	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0	0
	CSAH 46 and Biscayne Ave	NB	20	350	170	540	1864.3	F	1856.9	F	1812.3	F	1843.6	F	353.9	F	1059	0	0	50	100	
		SB	60	60	60	180	48.7	E	23.6	C	19.4	C	29.1	D			191	0	0	50	91	
		EB	60	510	10	580	3.8	A	2.8	A	0.6	A	2.9	A			8	200	38	0	0	
		WB	70	390	60	520	6.6	A	5.2	A	2.0	A	5.0	A			11	200	53	225	0	
	CSAH 46 and Akron Ave	NB	40	150	60	250	36.6	E	36.9	E	32.3	D	35.7	E	11.4	B	261	0	0	0	0	
		SB	10	20	60	90	18.4	C	15.7	C	8.5	A	10.8	B			80	0	0	0	0	
		EB	80	560	10	650	3.8	A	2.7	A	1.1	A	2.8	A			0	200	43	0	0	
		WB	30	400	20	450	13.2	B	11.2	B	9.7	A	11.3	B			4	200	40	200	5	
	CSAH 46 and US 52 East Ramp	NB	150	10	10	170	67.1	F	25.5	D	7.2	A	61.5	F	13.4	B	122	375	266	375	21	
		SB	10	10	30	50	23.9	C	32.2	D	8.4	A	16.3	C			56	150	30	0	0	
		EB	20	270	370	660	3.5	A	3.6	A	2.7	A	3.1	A			0	325	23	300	34	
		WB	220	270	10	500	13.0	B	4.4	A	5.3	A	8.2	A			0	300	93	300	0	
	CSAH 46 and US 52 West Ramp	NB	50	10	40	100	19.2	C	12.8	B	8.9	A	14.6	B	7.3	A	25	350	55	350	33	
		SB	10	10	30	50	22.2	C	17.4	C	8.4	A	13.2	B			29	275	28	275	34	
		EB	20	610	150	780	9.9	A	9.6	A	8.2	A	9.3	A			0	225	18	225	10	
		WB	20	420	10	450	4.6	A	1.8	A	0.9	A	1.9	A			0	475	20	225	0	
PM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.5	A	0	0	0	0	0	
		SB	0	0	100	100	0.0	A	0.0	A	15.1	C	15.1	C			0	0	0	0	83	
		EB	100	910	0	1,010	25.2	D	1.5	A	0.0	A	3.8	A			0	300	114	0	0	
		WB	0	1440	120	1,560	0.0	A	4.2	A	5.1	A	4.3	A			0	0	0	300	15	
	CSAH 42 and Biscayne Ave (Signal)	NB	100	80	170	350	33.2	C	25.3	C	18.1	B	24.0	C	31.8	C	179	400	110	0	0	
		SB	10	120	210	340	36.6	D	50.3	D	34.1	C	39.7	D			384	290	52	0	0	
		EB	340	660	30	1,030	65.2	E	19.9	B	3.8	A	34.2	C			420	300	352	325	40	
		WB	80	920	10	1,010	50.4	D	29.3	C	48.5	D	30.3	C			454	275	128	0	0	
	Biscayne Ave and Boulder Tr	NB	5	350	0	355	3.9	A	2.3	A	0.0	A	2.3	A	2.5	A	0	200	6	0	0	
		SB	0	230	10	240	0.0	A	2.4	A	1.9	A	2.4	A			0	0	0	0	0	
		EB	15	0	5	20	7.5	A	0.0	A	4.1	A	6.9	A			40	0	0	300	0	
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0	
	CSAH 46 and Biscayne Ave	NB	10	120	20	150	51.0	F	59.6	F	29.7	D	54.5	F	207.3	F	194	0	0	50	77	
		SB	180	140	40	360	1458.2	F	1314.6	F	1288.7	F	1377.8	F			1273	0	0	50	105	
		EB	60	480	10	550	5.7	A	2.3	A	0.5	A	2.6	A			2	200	43	0	0	
		WB	20	580	110	710	5.6	A	5.9	A	2.6	A	5.4	A			12	200	21	225	0	
	CSAH 46 and Akron Ave	NB	10	50	10	70	16.1	C	16.4	C	7.9	A	15.2	C	8.4	A	62	0	0	50	0	
		SB	50	60	70	180	18.1	C	19.9	C	12.3	B	16.3	C			121	0	0	0	0	
		EB	70	540	10	620	4.3	A	2.3	A	1.0	A	2.5	A			3	200	43	0	0	
		WB	10	580	20	610	12.9	B	11.1	B	10.4	B	11.1	B			0	200	17	200	3	
	CSAH 46 and US 52 East Ramp	NB	150	20	20	190	32.7	D	15.1	C	7.8	A	27.7	D	6.7	A	38	375	137	375	30	
		SB	10	10	50	70	21.5	C	17.1	C	4.8	A	9.0	A			45	150	31	0	0	
		EB	80	580	110	770	3.4	A	2.8	A	1.6	A	2.7	A			0	325	39	300	9	
		WB	30	260	10	300	8.1	A	2.0	A	4.2	A	2.7	A			0	300	30	300	0	
	CSAH 46 and US 52 West Ramp	NB	240	10	190	440	387.6	F	158.7	F	176.7	F	288.8	F	71.2	F	1130	350	470	350	123	
		SB	20	10	50	80	27.3	D	20.6	C	12.3	B	16.7	C			21	275	36	275	44	
		EB	20	560	260	840	12.4	B	10.9	B	9.1	A	10.4	B			0	225	23	225	14	
		WB	40	410	10	460	7.2	A	2.7	A	1.0	A	3.1	A			0	475	41	225	0	

During the AM peak hour at the County Road 46/Biscayne Avenue intersection, the northbound left turn, thru, and right turn movements are expected to operate at LOS F, the southbound left turn movement is expected to operate at LOS E, and the northbound queue is expected to be over 1,000 feet long (the queue is 1,059 feet, which equates to more than 42 vehicles). During the PM peak hour, the northbound left turn and thru movements are expected to operate at LOS F, the southbound left turn, thru, and right turn movements are expected to operate at LOS F, and the southbound queue is expected to be over 1,200 feet long.

At the County Road 46/Akron Avenue intersection, the northbound left turn and thru movements are expected to operate at LOS E during the AM peak hour.

During the AM peak hour at the County Road 46/US 52 East Ramp intersection, the northbound left turn movement is expected to operate at LOS F.

At the County Road 46/US 52 West Ramp intersection, the northbound left turn, thru, and right turn movements are expected to operate at LOS F during the PM peak hour. During the PM peak hour, the northbound left turn queue is expected to frequently exceed the turn lane storage capacity, and the northbound thru 95th percentile queue is expected to be over 1,100 feet.

Potential mitigation measures to address the identified problems were investigated. The following measures would address the identified 2030 No Build condition issues (Figure 45):

County Road 42/Biscayne Avenue Intersection

- Add 300-foot right turn lane to northbound and southbound Biscayne Avenue approaches
- Lengthen eastbound left turn lane to 400 feet (existing length is 300 feet.)

County Road 46/Biscayne Avenue Intersection

- Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)
- Add 300-foot westbound right turn lane
- Add 300-foot left turn lane to northbound and southbound Biscayne Avenue approaches
- Add 300-foot right turn lane to northbound Biscayne Avenue

County Road 46/Akron Avenue Intersection

- Add 300-foot left turn lane to eastbound and westbound County Road 46
- Add 300-foot left turn lane to northbound and southbound Akron Avenue

County Road 46/US 52 East Ramp Intersection

- Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)

County Road 46/US 52 West Ramp Intersection

- Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)

A traffic operations analysis was performed for 2030 No Build conditions incorporating these measures and the results of this analysis are shown in Table 29. As can be seen from Table 29, the identified traffic problems at the intersections are addressed by the measures. The LOS E operation shown for the eastbound left turn movement at the County Road 46/US 52 West Ramp intersection in both the AM and PM peak hour does not represent an actual traffic problem that needs corrective action. A review of the SimTraffic runs for this intersection indicated that all the vehicles attempting to make this left turn were able to get through the intersection in one signal cycle, which is an indication that this is not a real traffic problem. This left turn movement has a small traffic volume (20 vehicles in both peak hours) compared to other movements at the intersection, and, consequently, this left turn movement receives only about seven seconds of green time out of the 90-second cycle time for the intersection. This means that traffic wanting to make this left turn typically has to wait a long time before it gets a green light. However, once the left turn gets the green light, all the traffic wanting to make the left turn are able to do so on one signal cycle.

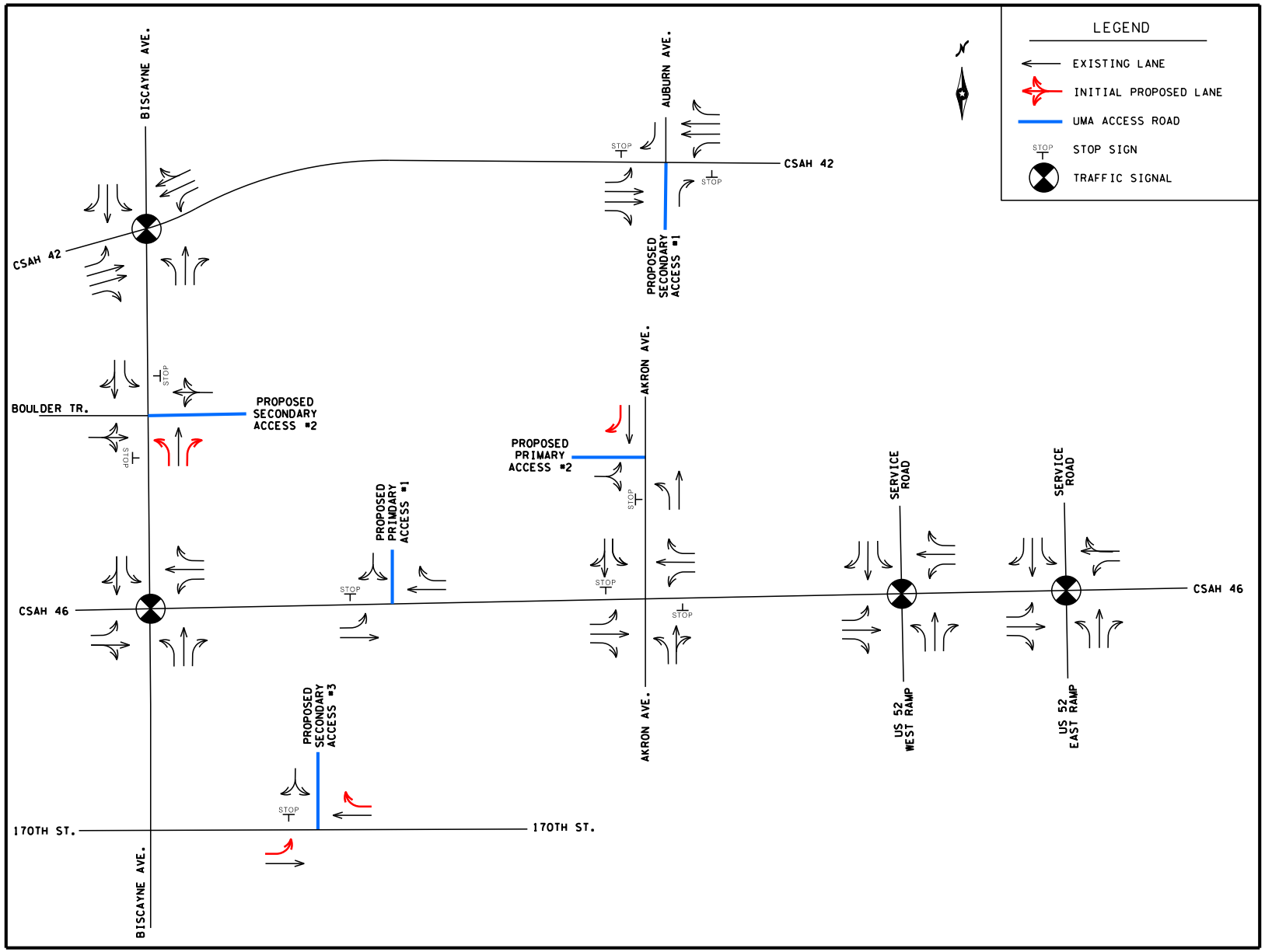
Table 29 – 2030 No Build Mitigated: Traffic Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2	A	0	0	0	0	0
		SB	0	0	70	70	0.0	A	0.0	A	4.7	A	4.7	A			0	0	0	0	53
		EB	20	1790	0	1,810	6.2	A	2.1	A	0.0	A	2.1	A			0	300	24	0	0
		WB	0	705	10	715	0.0	A	1.5	A	2.7	A	1.5	A			0	0	0	300	0
	CSAH 42 and Biscayne Ave (Signal)	NB	40	90	210	340	26.9	C	18.7	B	14.7	B	17.2	B	17.6	B	84	400	61	300	139
		SB	10	90	100	200	28.2	C	19.6	B	7.3	A	13.6	B			80	290	28	300	52
		EB	70	1120	40	1,230	31.9	C	20.0	C	5.6	A	20.2	C			280	400	89	325	74
		WB	110	490	40	640	36.9	D	11.3	B	8.2	A	14.8	B			159	275	130	0	0
	Biscayne Ave and Boulder Tr	NB	10	340	0	350	11.3	B	11.1	B	0.0	A	11.1	B	10.1	B	130	200	35	0	0
		SB	0	240	15	255	0.0	A	8.9	A	6.1	A	8.7	A			87	150	0	0	0
		EB	10	0	5	15	4.8	A	0.0	A	2.9	A	4.4	A			41	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	20	350	170	540	27.5	C	35.1	D	18.1	B	29.5	C	27	C	366	200	65	200	203
		SB	60	60	60	180	27.0	C	12.7	B	10.6	B	15.9	B			100	200	82	0	0
		EB	60	510	10	580	45.1	D	29.7	C	20.6	C	31.1	C			363	200	134	0	0
		WB	70	390	60	520	50.1	D	23.0	C	9.4	A	25.2	C			241	200	125	225	108
	CSAH 46 and Akron Ave	NB	40	150	60	250	21.8	C	26.4	D	19.4	C	24.0	C	9.1	A	167	200	49	0	0
		SB	10	20	60	90	26.0	D	15.6	C	5.7	A	9.5	A			52	200	26	0	0
		EB	80	560	10	650	4.2	A	2.8	A	1.3	A	2.9	A			0	300	48	200	2
		WB	30	400	20	450	13.9	B	10.7	B	8.5	A	10.8	B			3	200	36	300	4
	CSAH 46 and US 52 East Ramp (Signal)	NB	150	10	10	170	41.6	D	20.1	C	7.6	A	38.2	D	22.6	C	28	375	178	375	17
		SB	10	10	30	50	33.3	C	35.1	D	5.5	A	16.2	B			54	150	19	0	0
		EB	20	270	370	660	43.2	D	20.1	C	12.6	B	16.6	B			145	325	56	300	167
		WB	220	270	10	500	42.1	D	13.8	B	6.9	A	25.8	C			133	300	195	300	11
	CSAH 46 and US 52 West Ramp (Signal)	NB	50	10	40	100	36.6	D	29.3	C	12.8	B	26.3	C	17	B	25	350	76	350	38
		SB	10	10	30	50	37.4	D	28.5	C	7.7	A	17.4	B			29	275	27	275	29
		EB	20	610	150	780	65.5	E	20.7	C	12.6	B	20.0	C			282	225	47	225	89
		WB	20	420	10	450	49.6	D	7.7	A	3.2	A	9.5	A			127	475	50	225	10
PM Peak Hour	CSAH 42 and Auburn Ave	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.4	A	0	0	0	0	0
		SB	0	0	100	100	0.0	A	0.0	A	14.6	B	14.6	B			0	0	0	0	83
		EB	100	910	0	1,010	23.3	C	1.3	A	0.0	A	3.4	A			0	300	100	0	0
		WB	0	1440	120	1,560	0.0	A	4.3	A	5.2	A	4.4	A			3	0	0	300	15
	CSAH 42 and Biscayne Ave (Signal)	NB	100	80	170	350	37.0	D	21.9	C	8.6	A	19.7	B	23.1	C	86	400	127	300	89
		SB	10	120	210	340	37.5	D	28.0	C	12.9	B	18.9	B			117	290	27	300	118
		EB	340	680	30	1,030	42.3	D	14.0	B	2.9	A	23.1	C			189	400	328	325	36
		WB	80	920	10	1,010	41.3	D	23.9	C	31.9	C	24.8	C			370	275	146	0	0
	Biscayne Ave and Boulder Tr	NB	5	350	0	355	3.0	A	3.4	A	0.0	A	3.4	A	3.1	A	0	200	4	0	0
		SB	0	230	10	240	0.0	A	2.4	A	2.0	A	2.4	A			0	0	0	0	0
		EB	15	0	5	20	7.1	A	0.0	A	3.4	A	6.2	A			46	0	0	300	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	10	120	20	150	26.0	C	27.5	C	12.1	B	25.3	C	23.8	C	126	200	31	200	41
		SB	180	140	40	360	34.3	C	21.8	C	15.6	B	27.0	C			135	200	161	0	0
		EB	60	480	10	550	37.7	D	15.1	B	8.8	A	17.5	B			237	200	98	0	0
		WB	20	580	110	710	42.6	D	29.1	C	11.3	B	26.8	C			428	200	89	225	161
	CSAH 46 and Akron Ave	NB	10	50	10	70	23.1	C	19.4	C	7.1	A	17.9	C	8.9	A	59	200	26	50	0
		SB	50	60	70	180	25.4	D	20.4	C	11.3	B	18.3	C			89	200	63	0	0
		EB	70	540	10	620	6.1	A	2.5	A	1.2	A	2.9	A			0	300	53	0	0
		WB	10	580	20	610	11.1	B	11.4	B	9.4	A	11.3	B			0	200	12	0	0
	CSAH 46 and US 52 East Ramp (Signal)	NB	150	20	20	190	39.8	D	26.9	C	10.5	B	34.8	C	17.8	B	36	375	152	375	27
		SB	10	10	50	70	33.7	C	38.6	D	4.4	A	13.5	B			55	150	30	0	0
		EB	80	580	110	770	38.6	D	12.5	B	5.3	A	14.3	B			179	325	109	300	38
		WB	30	260	10	300	52.8	D	13.2	B	5.8	A	16.8	B			143	300	57	300	11
	CSAH 46 and US 52 West Ramp (Signal)	NB	240	10	190	440	47.1	D	26.3	C	16.2	B	32.7	C	23.2	C	22	350	231	350	98
		SB	20	10	50	80	34.1	C	28.5	C	10.0	B	17.4	B			27	275	34	275	48
		EB	20	560	260	840	63.3	E	28.0	C	14.4	B	24.5	C			319	225	80	225	154
		WB	40	410	10	460	43.5	D	10.1	B	3.3	A	12.6	B			137	475	72	225	14

2030 Build Results

For the 2030 Build analysis, the 2030 Build AM and PM peak hour forecast volumes were utilized. The lane geometry and intersection control at the intersections were assumed to be that indicated in Figure 47. For 2030 Build conditions, it was assumed that the No Build mitigation measures as shown in Figure 44 were in place and that the turn lane safety improvements assumed for 2011 Build conditions were in place. For 2030, it was also assumed that the existing unpaved segments of 170th Street, Biscayne Avenue, and Akron Avenue were paved. As a result of the gravel roads being paved, it was assumed that the following turn lane safety improvements would be in place:

- At the Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection, add a northbound left turn lane and right turn lane to Biscayne Avenue.
- At the Akron Avenue/Primary Access #2 intersection, add a southbound right turn lane to Akron Avenue.



UMore Park Sand and Gravel Resources

Final Environmental Impact Statement
September 2010

Figure 47

2030 Build Initial Lane Geometry and Intersection Control

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- At the 170th Street/Secondary Access #3 intersection, add an eastbound left turn lane and a westbound right turn lane to 170th Street

The 2030 Build traffic analysis investigated operations at the ten study intersections. These intersections are as follows:

- County Road 42/Auburn Avenue/Secondary Access #1 intersection
- County Road 42/Biscayne Avenue intersection
- Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection
- County Road 46/Biscayne Avenue intersection
- County Road 46/Primary Access #1 intersection
- County Road 46/Akron Avenue intersection
- County Road 46/US 52 East Ramp intersection
- County Road 46/US 52 West Ramp intersection
- Akron Avenue/Primary Access #2 intersection
- 170th Street/Secondary Access #3 intersection

The results of the 2030 Build traffic operations analysis are shown in Table 30. The results of the analysis indicate that all ten intersections are expected to operate at an overall intersection LOS of C or better for both the AM and PM peak hour. However, at two intersections certain individual movements are expected to operate at LOS E or LOS F. At the County Road 46/US 52 West Ramp intersection, the eastbound left turn movement is expected to operate at LOS E in the AM and PM peak hour. At the County Road 46/Akron Avenue intersection during the AM peak hour, the northbound thru and right turn movements are expected to operate at LOS F and the northbound and southbound left turn movements are expected to operate at LOS E. During the PM peak hour at this intersection, the southbound left turn movement is expected to operate at LOS F.

Similar to what was found for the 2030 No Build analysis, the LOS E operation for the eastbound left turn movement at the County Road 46/US 52 West Ramp intersection does not represent a traffic problem that needs mitigation. A review of the SimTraffic runs for this intersection indicated that all the vehicles attempting to make this left turn were able to get through the intersection in one signal cycle, which is an indication that this is not a real traffic problem. No mitigation measures are recommended to address the LOS E operation for this left turn movement at the intersection.

Potential mitigation measures for the problems at the County Road 46/Akron Avenue were explored. Changing the intersection control from the existing two-way stop control to traffic signal control addressed the problems at this intersection. Based on the forecast traffic volumes, it appears that the intersection will meet at least the Peak Hour Signal Warrant, and possibly other signal warrants, from the MnMUTCD. With the MnMUTCD signal warrant being met, this implies that signalizing the County Road 46/Akron Avenue intersection is a reasonable improvement measure.

A traffic operations analysis was performed for 2030 Build mitigated conditions with the County Road 46/Akron Avenue intersection signalized, and the results of this analysis are shown in Table 31. As can be seen from Table 31 the problems at the County Road 46/Akron Avenue intersection were addressed by signalizing the intersection.

Table 30 – 2030 Build Traffic Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	0	0	15	15	0.0	A	0.0	A	24.3	C	24.3	C	2.5	A	0	0	0	0	70
		SB	0	0	70	70	0.0	A	0.0	A	4.5	A	4.5	A			0	0	0	0	51
		EB	20	1798	0	1,818	6.4	A	2.4	A	0.0	A	2.4	A			5	300	26	300	0
		WB	15	713	10	738	26.1	D	1.6	A	1.4	A	2.2	A			0	300	78	300	0
	CSAH 42 and Biscayne Ave (Signal)	NB	45	90	218	353	28.0	C	19.0	B	14.7	B	17.6	B	18	B	91	400	63	300	150
		SB	10	90	100	200	29.1	C	20.7	C	7.5	A	14.3	B			80	290	27	300	51
		EB	70	1120	45	1,235	30.9	C	21.0	C	5.8	A	21.0	C			296	400	86	325	47
		WB	118	490	40	648	34.8	C	11.0	B	9.0	A	14.5	B			148	275	117	0	0
	Biscayne Ave and Boulder Tr	NB	10	340	2	352	6.9	A	4.7	A	5.2	A	4.7	A	4	A	0	200	18	0	0
		SB	13	240	15	268	8.0	A	2.3	A	1.9	A	2.6	A			0	150	47	0	0
		EB	10	0	5	15	8.6	A	0.0	A	3.0	A	6.7	A			42	0	0	0	0
		WB	2	0	13	15	5.9	A	0.0	A	4.6	A	4.7	A			60	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	20	350	170	540	29.4	C	34.9	C	18.4	B	29.6	C	27.5	C	344	200	81	200	181
		SB	60	60	62	182	26.7	C	9.5	A	10.1	B	13.8	B			94	200	66	0	0
		EB	62	524	10	596	47.4	D	30.7	C	22.6	C	32.4	C			422	200	140	0	0
		WB	70	404	60	534	47.8	D	25.3	C	9.8	A	26.4	C			300	200	124	225	138
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	5.1	A	0	0	0	0	0
		SB	18	0	6	24	22.2	C	0.0	A	11.0	B	18.3	C			90	0	0	0	0
		EB	6	658	0	664	9.1	A	5.9	A	0.0	A	5.9	A			0	300	28	0	0
		WB	0	508	18	526	0.0	A	3.4	A	1.7	A	3.4	A			0	0	0	0	0
	CSAH 46 and Akron Ave	NB	40	150	60	250	37.2	E	67.8	F	58.1	F	60.5	F	15	C	353	200	134	0	0
		SB	27	20	66	113	43.3	E	6.1	A	11.4	B	13.7	B			121	200	107	0	0
		EB	86	590	10	676	11.3	B	3.4	A	2.6	A	4.4	A			3	300	108	0	0
		WB	30	420	37	487	13.0	B	10.5	B	5.5	A	10.3	B			4	200	31	300	29
	CSAH 46 and US 52 East Ramp (Signal)	NB	152	10	10	172	37.9	D	32.9	C	7.1	A	35.8	D	23.1	C	33	375	152	375	21
		SB	10	10	30	50	35.7	D	38.5	D	7.0	A	18.0	B			57	150	27	0	0
		EB	20	274	401	695	40.5	D	20.6	C	13.7	B	17.1	B			138	325	47	300	192
		WB	220	274	10	504	45.2	D	14.6	B	6.7	A	27.3	C			151	300	210	300	18
	CSAH 46 and US 52 West Ramp (Signal)	NB	81	10	40	131	39.2	D	28.5	C	12.8	B	29.3	C	18.1	B	28	350	102	350	42
		SB	10	10	30	50	38.0	D	31.2	C	8.6	A	17.2	B			28	275	26	275	38
		EB	20	645	152	817	61.5	E	21.7	C	12.9	B	20.9	C			319	225	71	225	141
		WB	20	426	10	456	47.4	D	8.3	A	3.0	A	9.9	A			142	475	51	225	7
	Akron Ave and Primary Access #2	NB	23	250	0	273	3.6	A	1.6	A	0.0	A	1.7	A	1.5	A	0	200	37	0	0
		SB	0	90	0	90	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		EB	0	0	23	23	0.0	A	0.0	A	2.7	A	2.7	A			74	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.7	A	0	0	0	0	0
		SB	0	0	3	3	0.0	A	0.0	A	3.6	A	3.6	A			23	0	0	0	0
		EB	3	300	0	303	6.1	A	0.7	A	0.0	A	0.7	A			0	200	19	0	0
		WB	0	210	0	210	0.0	A	0.7	A	0.0	A	0.7	A			0	0	0	300	0
PM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	0	0	13	13	0.0	A	0.0	A	7.4	A	7.4	A	4.6	A	0	0	0	0	53
		SB	0	0	100	100	0.0	A	0.0	A	14.7	B	14.7	B			0	0	0	0	85
		EB	100	916	0	1,016	24.2	C	1.4	A	0.0	A	3.8	A			3	300	120	300	0
		WB	5	1443	120	1,568	8.5	A	4.3	A	5.5	A	4.4	A			0	300	29	300	12
	CSAH 42 and Biscayne Ave (Signal)	NB	105	80	176	361	39.7	D	22.1	C	8.2	A	20.9	C	23.8	C	87	400	145	300	88
		SB	10	120	210	340	30.8	C	28.0	C	13.4	B	19.1	B			121	290	26	300	111
		EB	340	660	31	1,031	44.7	D	14.4	B	3.4	A	24.0	C			212	400	349	325	41
		WB	83	920	10	1,013	40.3	D	24.6	C	24.4	C	25.4	C			389	275	128	0	0
	Biscayne Ave and Boulder Tr	NB	5	350	1	356	7.1	A	3.1	A	1.9	A	3.1	A	3	A	0	200	9	0	0
		SB	4	230	10	244	8.3	A	2.3	A	2.4	A	2.4	A			0	200	20	0	0
		EB	15	0	5	20	9.3	A	0.0	A	5.4	A	7.9	A			45	0	0	300	0
		WB	2	0	11	13	9.2	A	0.0	A	4.5	A	4.9	A			57	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	10	120	20	150	26.1	C	28.1	C	11.6	B	25.9	C	23.8	C	122	200	34	200	39
		SB	180	140	42	362	33.3	C	23.4	C	14.5	B	27.3	C			155	200	156	0	0
		EB	61	485	10	556	40.9	D	15.3	B	11.4	B	17.9	B			237	200	111	0	0
		WB	20	591	110	721	38.2	D	28.8	C	10.4	B	26.1	C			421	200	53	225	161
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.3	A	0	0	0	50	0
		SB	14	0	5	19	18.7	C	0.0	A	7.4	A	15.2	C			68	0	0	0	0
		EB	2	623	0	625	6.5	A	4.5	A	0.0	A	4.5	A			0	300	13	0	0
		WB	0	666	7	673	0.0	A	3.9	A	1.3	A	3.9	A			0	200	0	0	0
	CSAH 46 and Akron Ave	NB	10	50	10	70	28.8	D	30.3	D	19.5	C	28.7	D	10.9	B	75	200	30	0	0
		SB	64	60	75	199	59.4	F	8.4	A	18.2	C	21.4	C			243	200	209	0	0
		EB	72	555	10	637	11.0	B	2.9	A	1.6	A	3.7	A			0	300	101	300	0
		WB	10	588	27	625	16.1	C	11.6	B	7.8	A	11.5	B			12	200	22	300	22
	CSAH 46 and US 52 East Ramp (Signal)	NB	151	20	20	191	40.1	D	27.4	C	10.9	B	34.5	C	17.7	B	36	375	160	375	27
		SB	10	10	50	70	31.0	C	30.4	C	5.3	A	12.3	B			67	150	25	0	0
		EB	80	583	134	797	37.5	D	12.8	B	5.9	A	14.3	B			167	325	116	300	44
		WB	30	261	10	301	50.9	D	14.0	B	5.8	A	17.5	B			132	300	60	225	20
	CSAH 46 and US 52 West Ramp (Signal)	NB	253	10	190	453	49.2	D	29.0	C	16.9	B	35.2	D	24.5	C	31	350	252	50	100
		SB	20	10	50	80	31.0	C	30.3	C	9.1	A	16.8	B			22	275	38	275	35
		EB	20	587	262	869	57.9	E	28.5	C	15.6	B	25.4	C			426	225	72	225	211
		WB	40	412	10	462	43.8	D	10.7	B	2.7	A	13.4	B			147	200	80	225	8
	Akron Ave and Primary Access #2	NB	9	140	0	149	3.9	A	1.1	A	0.0	A	1.2	A	1	A	0	200	21	0	0
		SB	0	180	0	180	0.0	A	0.5	A	0.0	A	0.5	A			0	0	0	0	0
		EB	0	0	19	19	0.0	A	0.0	A	3.1	A	3.1	A			62	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.8	A	0	0	0	0	0
		SB	0	0	2	2	0.0	A	0.0	A	3.0	A	3.0	A			21	0	0	0	0
		EB	1	280	0	281	0.0	A	0.7	A	0.0	A	0.7	A			0	0	0	0	0
		WB	0	290	0	290	0.0	A	0.8	A	0.0	A	0.8	A			0	0	0	300	0

Table 31 – 2030 Build Mitigated Traffic Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	0	0	15	15	0.0	A	0.0	A	22.3	C	22.3	C	2.4	A	0	0	0	0	67
		SB	0	0	70	70	0.0	A	0.0	A	4.7	A	4.7	A			0	0	0	0	51
		EB	20	1798	0	1,818	5.7	A	2.3	A	0.0	A	2.3	A			3	300	26	300	0
		WB	15	713	10	738	26.5	D	1.5	A	2.6	A	2.0	A			0	300	68	300	0
	CSAH 42 and Biscayne Ave (Signal)	NB	45	90	218	353	26.2	C	18.5	B	13.8	B	16.5	B	18.4	B	80	400	55	300	143
		SB	10	90	100	200	29.6	C	21.8	C	7.6	A	15.0	B			79	290	26	300	51
		EB	70	1120	45	1,235	30.6	C	21.2	C	5.5	A	21.2	C			301	400	84	325	74
		WB	118	490	40	648	43.0	D	10.8	B	8.5	A	15.7	B			139	275	155	0	0
	Biscayne Ave and Boulder Tr	NB	10	340	2	352	7.7	A	4.3	A	3.5	A	4.4	A	3.8	A	3	200	19	0	0
		SB	13	240	15	268	7.6	A	2.2	A	1.5	A	2.5	A			0	150	42	0	0
		EB	10	0	5	15	7.9	A	0.0	A	3.2	A	5.9	A			37	0	0	0	0
		WB	2	0	13	15	12.7	B	0.0	A	4.4	A	5.2	A			48	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	20	350	170	540	32.5	C	34.5	C	18.8	B	29.4	C	27.6	C	358	200	54	200	186
		SB	60	60	62	182	23.6	C	9.7	A	9.4	A	13.0	B			85	200	65	0	0
		EB	62	524	10	596	46.3	D	31.4	C	25.6	C	32.8	C			453	200	130	0	0
		WB	70	404	60	534	48.0	D	25.3	C	9.5	A	26.5	C			303	200	114	225	131
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	5.9	A	0	0	0	0	0
		SB	18	0	6	24	19.4	C	0.0	A	10.2	B	16.9	C			80	0	0	0	0
		EB	6	658	0	664	9.8	A	5.5	A	0.0	A	5.5	A			0	300	19	0	0
		WB	0	508	18	526	0.0	A	6.0	A	2.5	A	5.9	A			0	0	0	0	0
	CSAH 46 and Akron Ave (Signal)	NB	40	150	60	250	31.7	C	24.7	C	14.8	B	23.2	C	20.1	C	166	200	66	0	0
		SB	27	20	66	113	42.1	D	5.7	A	8.1	A	11.9	B			130	200	108	0	0
		EB	86	580	10	676	42.7	D	14.5	B	5.2	A	17.6	B			275	300	230	200	50
		WB	30	420	37	487	54.1	D	23.7	C	10.8	B	24.4	C			273	200	66	300	94
	CSAH 46 and US 52 East Ramp (Signal)	NB	152	10	10	172	39.5	D	27.5	C	8.0	A	36.8	D	23.7	C	28	375	159	375	24
		SB	10	10	30	50	31.6	C	38.4	D	6.1	A	18.0	B			57	150	29	0	0
		EB	20	274	401	695	44.3	D	19.8	B	13.1	B	16.5	B			130	325	45	300	178
		WB	220	274	10	504	50.2	D	13.5	B	6.6	A	29.4	C			187	300	249	300	12
	CSAH 46 and US 52 West Ramp (Signal)	NB	81	10	40	131	37.7	D	27.2	C	12.9	B	29.1	C	17.9	B	22	350	98	350	37
		SB	10	10	30	50	29.4	C	35.7	D	8.5	A	17.8	B			92	275	26	275	33
		EB	20	645	152	817	53.6	D	21.4	C	12.8	B	20.6	C			315	225	84	225	111
		WB	20	426	10	456	45.5	D	6.3	A	3.5	A	10.0	B			129	475	52	225	11
	Akron Ave and Primary Access #2	NB	23	250	0	273	3.6	A	1.6	A	0.0	A	1.7	A	1.5	A	0	200	33	0	0
		SB	0	90	0	90	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		EB	0	0	23	23	0.0	A	0.0	A	2.6	A	2.6	A			72	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.8	A	0	0	0	0	0
		SB	0	0	3	3	0.0	A	0.0	A	4.7	A	4.7	A			27	0	0	0	0
		EB	3	300	0	303	8.2	A	0.8	A	0.0	A	0.9	A			0	200	16	0	0
		WB	0	210	0	210	0.0	A	0.6	A	0.0	A	0.6	A			0	0	0	300	0
PM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	0	0	13	13	0.0	A	0.0	A	8.6	A	8.6	A	4.6	A	0	0	0	0	58
		SB	0	0	100	100	0.0	A	0.0	A	16.0	C	16.0	C			0	0	0	0	89
		EB	100	916	0	1,016	26.7	D	1.4	A	0.0	A	3.7	A			0	300	105	300	0
		WB	5	1443	120	1,568	6.0	A	4.4	A	4.9	A	4.4	A			4	300	26	300	13
	CSAH 42 and Biscayne Ave (Signal)	NB	105	80	176	361	36.8	D	23.2	C	8.9	A	20.4	C	25.3	C	97	400	125	300	92
		SB	10	120	210	340	36.1	D	29.4	C	13.8	B	19.6	B			115	290	25	300	124
		EB	340	660	31	1,031	44.8	D	14.7	B	2.5	A	24.6	C			213	400	357	325	32
		WB	83	920	10	1,013	42.8	D	27.4	C	37.9	D	28.2	C			428	275	132	0	0
	Biscayne Ave and Boulder Tr	NB	5	350	1	356	6.2	A	3.3	A	1.9	A	3.3	A	3.1	A	0	200	12	0	0
		SB	4	230	10	244	7.3	A	2.4	A	2.3	A	2.5	A			0	200	23	0	0
		EB	15	0	5	20	8.0	A	0.0	A	2.6	A	6.9	A			46	0	0	300	0
		WB	2	0	11	13	6.0	A	0.0	A	4.5	A	4.7	A			58	0	0	300	0
	CSAH 46 and Biscayne Ave (Signal)	NB	10	120	20	150	24.7	C	28.4	C	11.5	B	25.6	C	24	C	124	200	31	200	42
		SB	180	140	42	362	34.7	C	24.2	C	16.0	B	28.2	C			154	200	151	0	0
		EB	61	485	10	556	37.7	D	15.4	B	9.4	A	17.6	B			239	200	96	0	0
		WB	20	591	110	721	41.4	D	28.8	C	12.3	B	28.6	C			428	200	74	225	155
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	5.8	A	0	0	0	50	0
		SB	14	0	5	19	18.1	C	0.0	A	11.7	B	16.3	C			71	0	0	0	0
		EB	2	623	0	625	18.3	C	4.5	A	0.0	A	4.5	A			0	300	18	0	0
		WB	0	666	7	673	0.0	A	6.7	A	2.8	A	6.7	A			0	200	0	0	0
	CSAH 46 and Akron Ave (Signal)	NB	10	50	10	70	32.1	C	22.1	C	10.0	B	21.3	C	18.4	B	78	200	25	0	0
		SB	64	60	75	199	35.9	D	7.9	A	13.8	B	14.9	B			174	200	165	0	0
		EB	72	555	10	637	41.0	D	10.1	B	5.5	A	13.0	B			197	300	177	300	18
		WB	10	588	27	625	53.5	D	25.0	C	12.8	B	24.8	C			315	200	31	300	92
	CSAH 46 and US 52 East Ramp (Signal)	NB	151	20	20	191	39.2	D	30.5	C	10.8	B	35.1	D	17.6	B	41	375	156	375	28
		SB	10	10	50	70	29.8	C	34.9	C	4.8	A	12.2	B			60	150	27	0	0
		EB	80	583	134	797	38.6	D	12.3	B	5.5	A	14.0	B			165	325	126	300	48
		WB	30	261	10	301	51.7	D	13.7	B	6.2	A	17.1	B			138	300	64	225	18
	CSAH 46 and US 52 West Ramp (Signal)	NB	253	10	190	453	47.8	D	25.5	C	17.2	B	33.9	C	23.5	C	25	350	240	50	109
		SB	20	10	50	80	27.0	C	27.6	C	9.3	A	16.1	B			30	275	34	275	35
		EB	20	587	262	869	57.3	E	27.4	C	16.1	B	24.8	C			381	225	70	225	192
		WB	40	412	10	462	39.9	D	9.8	A	3.5	A	12.5	B			125	200	80	225	17
	Akron Ave and Primary Access #2	NB	9	140	0	149	4.0	A	1.1	A	0.0	A	1.2	A	1	A	0	200	21	0	0
		SB	0	180	0	180	0.0	A	0.6	A	0.0	A	0.6	A			0	0	0	0	0
		EB	0	0	19	19	0.0	A	0.0	A	2.9	A	2.9	A			63	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.8	A	0	0	0	0	0
		SB	0	0	2	2	0.0	A	0.0	A	3.3	A	3.3	A			23	0	0	0	0
		EB	1	280	0	281	0.0	A	0.7	A	0.0	A	0.7	A			0	200	7	0	0
		WB	0	290	0	290	0.0	A	0.8	A	0.0	A	0.8	A			0	0	0	300	0

Additional Analysis in Response to Draft EIS Comments

In the agency review of the Draft EIS, comments were raised that resulted in the analysis of two additional scenarios. One comment was that the background traffic growth assumed for the 2011 No Build and Build scenarios was too high considering the recent state of development activity in the area. The other comment was that the signalization of the County Road 42 and Biscayne Avenue intersection, proposed as a mitigation measure for 2011 No Build conditions, may not be constructed by the time UMA mining activities commence. Therefore, an analysis of 2011 Build conditions with the existing two-way stop control at the County Road 42 and Biscayne Avenue intersection should be undertaken.

In response to the first comment, a scenario was developed in which UMA site-generated traffic for 2011 was added to existing (2008) traffic volumes. With the current lack of development activity in the Metro area, it was felt that existing traffic volumes would not change substantially by 2011. The traffic volumes for the AM and PM peak hours for the ten study intersections for this new scenario, called "2008 Existing plus site generated traffic", are shown in Table 32. The results of the analysis indicate all ten study intersections are expected to operate at LOS A and all the individual movements at the intersections are expected to operate at LOS D or better for both the AM and PM peak hour. Since no problems are anticipated, no mitigation measures are proposed for this scenario.

Table 32 – 2008 Existing Plus Site generated Traffic Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	11.4	B	0.0	A	4.4	A	6.4	A	2	A	20	0	0	0	0
		SB	94	0	47	141	11.0	B	0.0	A	8.4	A	10.1	B			70	0	0	50	49
		EB	14	850	2	866	1.8	A	1.1	A	1.0	A	1.1	A			0	300	12	300	0
		WB	5	346	7	358	6.2	A	0.8	A	1.6	A	0.9	A			0	300	15	300	0
	CSAH 42 and Biscayne Ave	NB	4	10	29	43	12.4	B	17.5	C	7.2	A	10.5	B	1.3	A	40	400	17	0	0
		SB	7	10	54	71	11.7	B	16.1	C	4.1	A	6.5	A			53	290	20	0	0
		EB	40	702	4	746	1.5	A	0.4	A	0.2	A	0.5	A			0	300	18	325	0
		WB	18	317	5	340	5.5	A	0.6	A	0.2	A	0.8	A			3	275	17	0	0
	Biscayne Ave and Boulder Tr	NB	5	31	0	36	1.7	A	0.2	A	0.0	A	0.4	A	1.3	A	0	0	0	0	0
		SB	6	16	10	32	2.7	A	1.5	A	1.3	A	1.6	A			0	150	0	0	0
		EB	5	0	5	10	4.4	A	0.0	A	2.5	A	3.2	A			33	0	0	0	0
		WB	0	0	7	7	0.0	A	0.0	A	2.4	A	2.4	A			27	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	4	14	6	24	6.1	A	8.9	A	7.8	A	8.2	A	1.7	A	44	0	0	50	26
		SB	2	1	17	20	9.3	A	2.4	A	3.8	A	4.3	A			19	0	0	50	41
		EB	24	478	0	502	1.2	A	0.8	A	0.0	A	0.8	A			0	200	13	0	0
		WB	3	334	11	348	2.1	A	2.3	A	1.3	A	2.3	A			0	200	5	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	1.9	A	0	0	0	0	0
		SB	10	0	4	14	12.0	B	0.0	A	3.4	A	9.9	A			59	0	0	0	0
		EB	4	482	0	486	1.7	A	1.3	A	0.0	A	1.3	A			0	300	9	0	0
		WB	0	351	10	361	0.0	A	2.4	A	4.0	A	2.4	A			0	0	0	0	0
	CSAH 46 and Akron Ave	NB	4	14	6	24	9.9	A	10.2	B	4.1	A	8.5	A	4.8	A	31	0	0	0	0
		SB	12	1	21	34	7.6	A	1.3	A	3.6	A	3.6	A			36	0	0	0	0
		EB	28	480	0	508	2.9	A	2.0	A	0.0	A	2.0	A			0	200	21	0	0
		WB	3	336	20	359	22.6	C	8.7	A	7.7	A	8.7	A			0	200	6	300	3
	CSAH 46 and US 52 East Ramp	NB	130	12	2	144	23.4	C	13.7	B	6.1	A	22.1	C	7.2	A	34	375	104	375	10
		SB	0	11	14	25	0.0	A	18.6	C	3.3	A	8.6	A			37	0	0	0	0
		EB	14	147	263	424	2.3	A	3.0	A	2.3	A	2.5	A			2	325	9	300	25
		WB	210	186	2	398	10.0	B	3.5	A	5.0	A	7.1	A			0	300	70	300	0
	CSAH 46 and US 52 West Ramp	NB	50	0	30	80	11.0	B	0.0	A	7.3	A	9.4	A	6.8	A	0	350	41	350	39
		SB	2	1	25	28	17.4	C	9.7	A	6.5	A	7.0	A			7	275	8	275	26
		EB	9	392	97	498	8.9	A	10.2	B	8.2	A	9.8	A			0	225	11	0	0
		WB	15	311	4	330	3.0	A	1.3	A	0.5	A	1.4	A			0	475	17	0	0
	Akron Ave and Primary Access #2	NB	13	49	0	62	5.6	A	0.7	A	0.0	A	1.4	A	1.4	A	0	0	0	0	0
		SB	0	20	0	20	0.0	A	0.1	A	0.0	A	0.1	A			0	0	0	0	0
		EB	0	0	14	14	0.0	A	0.0	A	2.8	A	2.8	A			72	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.3	A	0	0	0	0	0
		SB	0	0	2	2	0.0	A	0.0	A	2.5	A	2.5	A			35	0	0	0	0
		EB	3	80	0	83	1.8	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		WB	0	50	0	50	0.0	A	0.2	A	0.0	A	0.2	A			0	0	0	300	0
PM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	22.0	C	0.0	A	8.0	A	12.7	B	2.2	A	20	0	0	0	0
		SB	24	0	41	65	17.7	C	0.0	A	9.6	A	12.2	B			40	0	0	50	45
		EB	67	478	0	545	5.3	A	0.6	A	0.0	A	1.2	A			0	300	44	300	0
		WB	2	792	73	867	7.7	A	1.9	A	2.6	A	2.0	A			0	300	8	300	8
	CSAH 42 and Biscayne Ave	NB	13	6	24	43	23.9	C	11.9	B	4.8	A	11.2	B	2.4	A	35	400	29	0	0
		SB	5	11	106	122	25.7	D	28.7	D	8.3	A	10.7	B			85	290	16	0	0
		EB	142	430	4	576	5.8	A	0.4	A	0.3	A	1.7	A			0	300	60	325	6
		WB	11	634	3	648	3.1	A	1.2	A	0.4	A	1.2	A			3	275	11	0	0
	Biscayne Ave and Boulder Tr	NB	5	32	0	37	2.0	A	0.5	A	0.0	A	0.6	A	1.6	A	0	0	0	0	0
		SB	2	19	5	26	3.4	A	1.3	A	1.2	A	1.4	A			0	0	0	0	0
		EB	10	0	5	15	4.5	A	0.0	A	3.4	A	4.1	A			39	0	0	300	0
		WB	0	0	6	6	0.0	A	0.0	A	2.5	A	2.5	A			26	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	2	3	0	5	8.5	A	7.4	A	0.0	A	7.7	A	2.1	A	20	0	0	0	0
		SB	11	4	23	38	9.1	A	10.8	B	6.9	A	8.0	A			40	0	0	50	46
		EB	23	447	2	472	2.3	A	0.8	A	0.2	A	0.9	A			0	200	18	0	0
		WB	1	455	4	460	1.5	A	2.7	A	1.1	A	2.7	A			0	0	0	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.2	A	0	0	0	50	0
		SB	9	0	3	12	14.6	B	0.0	A	6.5	A	12.6	B			51	0	0	0	0
		EB	1	457	0	458	0.0	A	1.3	A	0.0	A	1.3	A			0	0	0	0	0
		WB	0	477	3	480	0.0	A	2.9	A	2.1	A	2.9	A			0	200	0	0	0
	CSAH 46 and Akron Ave	NB	2	3	0	5	12.0	B	8.8	A	0.0	A	9.3	A	6.2	A	16	0	0	0	0
		SB	19	4	26	49	9.9	A	2.7	A	4.3	A	5.7	A			41	0	0	0	0
		EB	24	454	2	480	3.6	A	1.9	A	1.0	A	2.0	A			0	200	21	300	0
		WB	1	452	8	461	5.4	A	10.6	B	9.7	A	10.6	B			0	200	5	300	0
	CSAH 46 and US 52 East Ramp	NB	134	20	11	165	14.5	B	11.0	B	8.2	A	13.6	B	4	A	34	375	76	375	28
		SB	2	2	40	44	12.4	B	20.1	C	2.9	A	3.7	A			36	150	10	0	0
		EB	57	360	97	514	2.2	A	2.1	A	1.1	A	1.9	A			0	325	24	300	5
		WB	22	156	6	184	5.5	A	1.4	A	4.6	A	2.0	A			0	300	19	225	1
	CSAH 46 and US 52 West Ramp	NB	133	0	177	310	18.9	C	0.0	A	9.6	A	13.6	B	8.8	A	0	350	88	50	63
		SB	15	1	36	52	14.5	B	17.5	C	8.0	A	10.0	B			9	275	28	275	34
		EB	5	328	167	500	10.7	B	10.9	B	8.7	A	10.1	B			0	225	11	225	9
		WB	34	292	5	331	4.1	A	1.8	A	0.7	A	2.0	A			0	200	26	0	0
	Akron Ave and Primary Access #2	NB	5	30	0	35	4.9	A	0.5	A	0.0	A	1.0	A	0.9	A	0	0	0	0	0
		SB	0	38	0	38	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		EB	0	0	11	11	0.0	A	0.0	A	2.6	A	2.6	A			64	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.3	A	0	0	0	0	0
		SB	0	0	1	1	0.0	A	0.0	A	2.7	A	2.7	A			19	0	0	0	0
		EB	1	70	0	71	4.7	A	0.2	A	0.0	A	0.3	A			12	0	0	0	0
		WB	0	70	0	70	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	300	0

Comparing the data in Table 32 to the data in Table 24 (Existing Conditions) shows that adding the UMA site-generated traffic to existing traffic does not substantially change the

traffic operations at any of the existing study intersections. The difference between the scenarios in the average total intersection delay for each intersection varies from – 0.4 seconds to + 0.4 seconds. This indicates that the proposed UMA development has no substantial traffic impact on the area roadway system for anticipated opening year conditions.

The small differences observed in the Table 24/Table 32 comparison are due more to the "margin of error" in the model rather than to the small increase in traffic from the UMA site. The SimTraffic model used for the traffic operations results usually generates a traffic volume for each movement for each SimTraffic run that is slightly different than the input demand volume. For example, if the input demand volume for a particular movement is 100, one SimTraffic run may have 103 for that movement, while the next run may have 98 for that movement. The traffic operations results for this study were created from the average of five SimTraffic runs, in order to minimize the effect of the different volumes from run to run. It should be noted that the UMA site-generated traffic increase for most movements at the study intersections is in the same range as the expected variation in volume for each SimTraffic run. Therefore, it will be difficult to distinguish changes due solely to the addition of the UMA site-generated traffic.

In response to the second comment, a new 2011 Build scenario was developed in which the intersection control at the County Road 42 and Biscayne Avenue intersection was changed from signal control to two-way stop control (stop signs on the Biscayne Avenue approaches and no control on the County Road 42 approaches). The new scenario, called "2011 Build (No Signal at County Road 42/Biscayne)", used the same traffic volumes and intersection geometry as the original 2011 Build scenario, with the exception of the intersection control change at the County Road 42 and Biscayne Avenue intersection. A traffic operations analysis was completed for the 2011 Build (No Signal at County Road 42/Biscayne) scenario, and the results are shown in Table 33.

The results of the analysis indicate that all ten intersections are expected to operate at an overall intersection LOS of A or B for both the AM and PM peak hour. However, two of the intersections are expected to have individual movements operating at LOS E or F during the AM or PM peak hour.

At the County Road 42 and Biscayne Avenue intersection, the northbound thru movement is expected to operate at LOS E in the AM peak hour. In the PM peak hour, the northbound left turn, southbound left turn, and southbound thru movements are expected to operate at LOS F, and the southbound right turn movement is expected to operate at LOS E. At the County Road 46 and US 52 East Ramp intersection, the northbound left turn movement is expected to operate at LOS E in the AM peak hour.

Potential mitigation measures to address the identified problems were investigated. At the County Road 42 and Biscayne Avenue intersection, changing the intersection control from the existing two-way stop control to traffic signal control addressed the problems at this intersection. Based on the forecast traffic volumes, it appears that the intersection will meet at least the Peak Hour Signal Warrant, and likely other signal warrants, from the Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD). With the MnMUTCD signal warrant being met, this implies that signalizing the County Road 42 and Biscayne Avenue intersection is a reasonable improvement measure. At the County Road 46 and US 52 East Ramp intersection, a potential mitigation measure is to change the existing two-way stop control to traffic signal control. However, based on the forecasted traffic volumes, it appears the intersection will not meet any of the MnMUTCD signal warrants. This implies that signalizing the intersection is not a reasonable improvement measure. Therefore, no mitigation measures are recommended for this intersection.

Table 33 – 2011 Build (No Signal At County Road 42 and Biscayne Ave) Operation Results

Time Period	Intersection	Approach	Demand Volumes (Veh/Hour)				Delay (s/veh)						LOS By Approach		LOS By Intersection		Through	Left Turn		Right Turn	
							Left		Thru		Right										
			Left	Thru	Right	Total	Delay	LOS	Delay	LOS	Delay	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	95th % Queue	Storage	95th % Queue	Storage	95th % Queue
AM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	30.4	D	0.0	A	11.2	B	16.7	C	2.9	A	44	0	0	0	0
		SB	110	0	50	160	19.1	C	0.0	A	9.7	A	16.1	C			93	0	0	50	74
		EB	20	1095	2	1,117	3.2	A	1.5	A	2.1	A	1.5	A			2	300	20	300	0
		WB	5	414	10	429	11.1	B	1.0	A	1.0	A	1.1	A			0	300	29	300	0
	CSAH 42 and Biscayne Ave	NB	12	30	75	117	29.8	D	35.1	E	19.8	C	24.7	C	4	A	113	400	31	0	0
		SB	10	30	60	100	17.5	C	30.1	D	11.3	B	17.2	C			91	290	26	0	0
		EB	50	832	32	914	2.1	A	1.0	A	0.3	A	1.0	A			0	300	25	325	3
		WB	44	352	10	406	8.7	A	0.8	A	0.3	A	1.5	A			0	275	31	0	0
	Biscayne Ave and Boulder Tr	NB	5	110	0	115	3.8	A	0.9	A	0.0	A	1.0	A	1.4	A	9	0	0	0	0
		SB	6	100	10	116	7.6	A	1.4	A	1.4	A	1.6	A			0	150	15	0	0
		EB	5	0	5	10	6.0	A	0.0	A	2.5	A	4.1	A			30	0	0	0	0
		WB	0	0	7	7	0.0	A	0.0	A	3.0	A	3.0	A			51	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	70	30	110	12.2	B	13.2	B	10.3	B	12.2	B	3.3	A	75	0	0	50	63
		SB	10	10	40	60	17.2	C	2.0	A	5.3	A	4.7	A			48	0	0	50	58
		EB	60	459	10	529	2.2	A	1.5	A	0.3	A	1.6	A			0	200	33	0	0
		WB	20	350	20	390	3.0	A	2.8	A	1.2	A	2.7	A			0	200	23	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.4	A	0	0	0	0	0
		SB	10	0	4	14	12.6	B	0.0	A	3.1	A	9.9	A			57	0	0	0	0
		EB	4	515	0	519	4.9	A	1.7	A	0.0	A	1.7	A			0	300	20	0	0
		WB	0	396	10	406	0.0	A	2.9	A	1.3	A	2.9	A			0	0	0	0	0
	CSAH 46 and Akron Ave	NB	30	120	50	200	26.8	D	24.8	C	16.1	C	22.9	C	8.9	A	162	0	0	0	0
		SB	20	20	54	94	23.4	C	3.5	A	11.0	B	8.8	A			157	0	0	0	0
		EB	64	451	10	525	8.3	A	2.8	A	1.1	A	3.3	A			0	200	84	0	0
		WB	20	322	29	371	11.2	B	9.6	A	5.6	A	9.4	A			3	200	23	300	18
	CSAH 46 and US 52 East Ramp	NB	131	10	10	151	44.9	E	20.4	C	6.6	A	41.0	E	10.5	B	33	375	175	375	21
		SB	10	10	20	40	25.8	D	28.6	D	6.0	A	15.6	C			52	150	28	0	0
		EB	10	193	277	480	2.9	A	3.3	A	2.5	A	2.8	A			0	325	17	300	38
		WB	240	213	10	463	12.4	B	4.4	A	5.7	A	8.6	A			0	300	97	300	0
	CSAH 46 and US 52 West Ramp	NB	47	10	50	107	17.5	C	12.5	B	8.0	A	12.5	B	7.1	A	22	350	53	350	38
		SB	10	10	30	50	14.3	B	12.1	B	7.8	A	10.0	B			29	275	22	275	30
		EB	20	420	101	541	10.5	B	9.6	A	8.2	A	9.4	A			0	225	21	225	11
		WB	40	314	10	364	3.5	A	1.5	A	1.1	A	1.7	A			0	475	27	0	0
	Akron Ave and Primary Access #2	NB	13	200	0	213	3.0	A	1.7	A	0.0	A	1.8	A	1.5	A	0	200	22	0	0
		SB	0	80	0	80	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		EB	0	0	14	14	0.0	A	0.0	A	2.6	A	2.6	A			68	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.4	A	0	0	0	0	0
		SB	0	0	2	2	0.0	A	0.0	A	3.6	A	3.6	A			29	0	0	0	0
		EB	3	80	0	83	2.5	A	0.3	A	0.0	A	0.4	A			0	0	0	0	0
		WB	0	50	0	50	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	300	0
PM Peak Hour	CSAH 42 and Auburn Ave/Secondary Access #2	NB	2	0	4	6	25.7	D	0.0	A	7.2	A	13.4	B	2.9	A	44	0	0	0	0
		SB	30	0	50	80	25.8	D	0.0	A	11.3	B	15.9	C			54	0	0	50	58
		EB	80	574	0	654	7.9	A	0.9	A	0.0	A	1.8	A			0	300	56	300	0
		WB	2	902	80	984	2.5	A	2.3	A	3.1	A	2.4	A			0	300	12	300	7
	CSAH 42 and Biscayne Ave	NB	42	20	64	126	61.5	F	29.6	D	16.8	C	33.2	D	8.4	A	86	400	84	0	0
		SB	10	30	110	150	52.5	F	81.0	F	48.3	E	55.0	F			245	290	28	0	0
		EB	170	490	10	670	9.4	A	0.9	A	0.2	A	3.2	A			0	300	93	325	0
		WB	32	732	10	774	3.0	A	1.7	A	0.7	A	1.7	A			8	275	26	0	0
	Biscayne Ave and Boulder Tr	NB	5	120	0	125	3.0	A	1.1	A	0.0	A	1.2	A	1.6	A	8	0	0	0	0
		SB	2	70	5	77	3.8	A	1.3	A	1.8	A	1.4	A			0	0	0	0	0
		EB	10	0	5	15	5.3	A	0.0	A	2.9	A	4.4	A			43	0	0	300	0
		WB	0	0	6	6	0.0	A	0.0	A	3.4	A	3.4	A			48	0	0	300	0
	CSAH 46 and Biscayne Ave	NB	10	20	10	40	13.6	B	11.5	B	9.5	A	11.5	B	3.6	A	50	0	0	50	35
		SB	40	30	40	110	15.0	C	13.3	B	8.4	A	12.1	B			75	0	0	50	67
		EB	50	433	10	493	2.8	A	1.4	A	0.2	A	1.5	A			0	200	32	0	0
		WB	10	477	20	507	3.5	A	3.2	A	1.6	A	3.2	A			0	200	13	225	0
	CSAH 46 and Primary Access #1	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	2.5	A	0	0	0	50	0
		SB	9	0	3	12	10.9	B	0.0	A	5.2	A	9.3	A			51	0	0	0	0
		EB	1	482	0	483	0.0	A	1.5	A	0.0	A	1.5	A			0	0	0	0	0
		WB	0	524	3	527	0.0	A	3.3	A	1.0	A	3.3	A			0	200	0	0	0
	CSAH 46 and Akron Ave	NB	10	40	10	60	17.8	C	17.6	C	7.6	A	15.2	C	8.6	A	61	0	0	0	0
		SB	48	50	53	151	26.8	D	8.5	A	17.7	C	14.2	B			206	0	0	0	0
		EB	51	430	10	491	8.4	A	2.5	A	1.2	A	3.0	A			0	200	77	300	3
		WB	10	464	24	498	9.2	A	11.4	B	7.1	A	11.2	B			4	200	16	300	35
	CSAH 46 and US 52 East Ramp	NB	111	40	20	171	18.6	C	12.2	B	8.9	A	16.0	C	4.8	A	47	375	76	375	32
		SB	10	10	40	60	17.8	C	13.9	B	4.2	A	8.6	A			44	150	29	0	0
		EB	50	433	84	567	2.6	A	2.2	A	1.3	A	2.1	A			0	325	28	300	9
		WB	40	182	10	232	6.6	A	1.6	A	4.3	A	2.5	A			2	300	26	225	3
	CSAH 46 and US 52 West Ramp	NB	165	10	210	385	29.7	D	16.2	C	12.3	B	19.9	C	10.7	B	34	350	145	50	79
		SB	20	10	40	70	17.6	C	16.0	C	9.2	A	12.4	B			32	275	35	275	38
		EB	10	337	201	548	11.1	B	9.7	A	7.9	A	9.1	A			0	225	18	225	17
		WB	50	273	10	333	5.0	A	2.1	A	0.8	A	2.4	A			2	200	34	0	0
	Akron Ave and Primary Access #2	NB	5	110	0	115	3.2	A	1.1	A	0.0	A	1.2	A	0.9	A	0	200	18	0	0
		SB	0	140	0	140	0.0	A	0.4	A	0.0	A	0.4	A			0	0	0	0	0
		EB	0	0	11	11	0.0	A	0.0	A	2.9	A	2.9	A			62	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	300	0
	170th Street and Secondary Access #3	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	0.3	A	0	0	0	0	0
		SB	0	0	1	1	0.0	A	0.0	A	2.9	A	2.9	A			20	0	0	0	0
		EB	1	70	0	71	1.9	A	0.3	A	0.0	A	0.3	A			0	0	0	0	0
		WB	0	70	0	70	0.0	A	0.3	A	0.0	A	0.3	A			0	0	0	300	0

The mitigation measure recommended for the 2011 Build (No Signal at County Road 42 and Biscayne) scenario is the same mitigation measure recommended for the 2011 No Build scenario. This indicates that the proposed UMA development has no substantial traffic impact on the area roadway system for anticipated 2011 conditions.

The analysis results for the 2011 No Build scenario are shown in Table 26. Comparing Table 26 to Table 33, it is seen that the results for the 2011 No Build and 2011 Build (No Signal at County Road 42/Biscayne) scenarios are similar to each other. The difference in the average total delay for each intersection varies from – 0.2 seconds to +1.6 seconds. For the County Road 42 and Biscayne Avenue intersection, the average total intersection delay is 0.2 seconds less in the AM peak hour and is 0.5 seconds more in the PM peak hour. It should be noted

that, for the data in Table 33, ten SimTraffic runs were completed and the average of the five "worst" (highest delay) runs were used for reporting results. This was done because, when the initial five SimTraffic runs were averaged, the analysis results for the County Road 42 and Biscayne Avenue intersection came out slightly better than what was shown for the intersection under the 2011 No Build scenario.

Review of (ADT) Volumes and Implications for Roadway Size

The traffic operations analysis for the key intersections along the roadway segments suggest the number of lanes needed for roadway segments between intersections. Another way of estimating the number of lanes (two-lane, three-lane, four-lane, etc.) needed for roadways is based on examining the ADT volumes.

Planning level capacity for a two-lane roadway is an ADT of 12,000, for a three-lane roadway is an ADT of 18,000, for a four-lane undivided roadway is an ADT of 27,000, and for a four-lane divided roadway with turn lanes is an ADT of 40,000. Comparing these planning level capacities to the forecast 2030 ADT volumes shown in Figure 41 provides an indication of the future roadway size needed and suggests how much of the roadway capacity is being used.

The comparison for the study area roadways implies the following:

- *County Road 42* – The existing four-lane divided section of County Road 42 west of US 52 and the existing two-lane section of County Road 42 east of US 52 appear to be adequate for 2030 forecast conditions.
- *County Road 46* -- The existing two-lane section of County Road 46 from Highway 3 to US 52 will be over capacity by 2030. To address this deficiency, this segment of County Road could be upgraded to a four-lane roadway, similar to the existing section of County Road 46 west of Highway 3.
- *170th Avenue* – A two-lane roadway appears to be adequate for 170th Avenue through 2030.
- *Biscayne Avenue* – The existing two-lane section of Biscayne Avenue appears to be adequate for 2030 forecast conditions.
- *Akron Avenue* – The existing two-lane section of Akron Avenue appears to be adequate for 2030 forecast conditions.

Traffic Operations Beyond 2030 in Empire Township

The traffic operations analysis was conducted for 2011 and 2030 conditions. The analysis of conditions for these years is consistent with common accepted traffic analysis practice. For 2011 and 2030, the UMA mining operations are expected to occur mainly north of County Road 46 in the City of Rosemount. However, some UMA mining operations will occur south of County Road 46 between 2030 and 2051 and will affect streets in Empire Township, such as Biscayne Avenue, 170th Street, and Akron Avenue. Though a traffic analysis was performed for one UMA access intersection on the Empire Township streets south of County Road 46, this intersection (170th Street/Secondary Access #3) was for the access to the Clay Mining Zone, and the amount of site-generated traffic from this zone is expected to be much less than the traffic generated from other secondary access points (47 vpd for the Clay Mining zone versus 298 vpd for other mining zones). However, the 2030 Build analysis indicates the likely impact UMA site-generated traffic will have on the streets south of County Road 46.

After 2030, secondary UMA access points may be needed on Biscayne Avenue, 170th Street, and Akron Avenue south of County Road 46. As can be seen from the 2030 analysis, the

typical secondary UMA access points are expected to generate an ADT of approximately 300 vehicles/day and peak hour volumes in the range of 18 to 30 vehicles/hour. The same ADT and peak hour volumes are expected to occur at the secondary UMA access points that may be needed on Biscayne Avenue, 170th Street, and Akron Avenue south of County Road 46 between the years 2030 and 2051. These traffic volumes are relatively small. The impacts at these secondary UMA access locations are expected to be similar to those indicated at the County Road 42/Auburn Avenue/Secondary Access #1 intersection and Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection under the 2030 Build analysis. The UMA site-generated traffic at these intersections did not cause any significant traffic impacts. Similarly, it is not expected UMA site-generated traffic from secondary UMA access locations south of County Road 46 will cause any significant traffic impacts to roadways and intersections in the area.

3.10.3 Mitigation

Based on the traffic forecasts, the traffic analysis, and study findings, the following conclusions and mitigation recommendations are offered:

1. The proposed UMA is estimated to generate an average daily traffic (ADT) of 847 vehicles per day on opening day in 2011. The site-generated ADT is expected to increase to 1,562 vehicles per day by 2031 and stay at that level until 2051. The AM peak hour is expected to be the highest traffic hour for site-generated traffic. The site-generated traffic for the AM peak hour is expected to be 86 vehicles per hour in 2011 and 160 vehicles per hour in 2031. The site-generated traffic for the PM peak hour is expected to be 50 vehicles per hour in 2011 and 95 vehicles per hour in 2031.

2. Background traffic growth is expected to result in the need for improvement measures at several study intersections. For 2011 No Build (proposed UMA not in operation) conditions, the intersection control at the County Road 42/Biscayne Avenue intersection is recommended to be changed from two-way stop control to traffic signal control. The implementation of this proposed improvement will be dependent upon actual traffic volumes. If the actual traffic volumes are less than the forecasted volumes and no MnMUTCD signal warrants are met at the intersection, then a traffic signal will not be installed.

   For 2030 No Build conditions, in addition to the signalization of the County Road 42/Biscayne Avenue intersection, the following improvements would address the identified issues (See Figure 45):

   <u>County Road 42/Biscayne Avenue Intersection</u>

   - Add 300-foot right turn lane to northbound and southbound Biscayne Avenue approaches
   - Lengthen eastbound left turn lane to 400 feet (existing length is 300 feet.)

   <u>County Road 46/Biscayne Avenue Intersection</u>

   - Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)
   - Add 300-foot westbound right turn lane
   - Add 300-foot left turn lane to northbound and southbound Biscayne Avenue approaches
   - Add 300-foot right turn lane to northbound Biscayne Avenue

County Road 46/Akron Avenue Intersection

- Add 300-foot left turn lane to eastbound and westbound County Road 46
- Add 300-foot left turn lane to northbound and southbound Akron Avenue

County Road 46/US 52 East Ramp Intersection

- Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)

County Road 46/US 52 West Ramp Intersection

- Change two-way stop control to traffic signal control (2030 volumes meet Peak Hour Signal Warrant)

Similar to the proposed 2011 signal improvement, the implementation of the proposed traffic signal improvements for 2030 will be dependent upon actual traffic volumes meeting the criteria of the MnMUTCD signal warrants. If no signal warrants are met at an intersection, then signals will not be installed at the intersection.

It is expected that traffic generated by development activity in the area will result in the paving of the existing gravel road segments of 170th Avenue, Biscayne Avenue, and Akron Avenue by 2030.

3. The UMA site-generated traffic is not expected to have a substantial impact on traffic operations at any of the study intersections or on any of the study roadways. However, safety considerations resulted in a recommendation to provide turn lane improvements at the following study intersections for 2011 Build (proposed UMA in place) conditions:

   - At the County Road 42/Auburn Ave/Secondary Access #1 intersection, a left turn lane for westbound and an eastbound right turn lane are added to County Road 42.
   - At the Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection, a southbound left turn lane added to Biscayne Avenue.
   - At the County Road 46/Primary Access #1 intersection, an eastbound left turn lane and a westbound right turn lane added to County Road 46.
   - At the County Road 46/Akron Avenue intersection, an eastbound and westbound left turn lane added to County Road 46.
   - At the Akron Avenue/Primary Access #2 intersection, a northbound left turn lane added to Akron Avenue.

   Implementation of these improvements will be based on roadway jurisdiction and relative contribution of traffic.

   In addition to the turn lane safety improvements listed above, turn lane safety improvements at the following locations are recommended for 2030 Build conditions:

   - At the Biscayne Avenue/Boulder Trail/Secondary Access #2 intersection, add a northbound left turn lane and right turn lane to Biscayne Avenue.
   - At the Akron Avenue/Primary Access #2 intersection, add a southbound right turn lane to Akron Avenue
   - At the 170th Street/Secondary Access #3 intersection, add an eastbound left turn lane and a westbound right turn lane to 170th Street.

Implementation of these improvements will be based on roadway jurisdiction and relative contribution of traffic.

With mining trucks slowing down and possibly stopping on high speed and /or high volume mainline roads, the recommended turn lane safety improvements should help reduce the potential for rear-end and sideswipe crashes.

4. The traffic analysis for 2011 Build conditions, assumed the turn lane safety improvements and the improvements recommended for 2011 No Build were in place, indicated no additional improvement measures were needed to provide adequate traffic operations at the study intersections. The traffic analysis for 2030 Build conditions, which assumed the turn lane safety improvements and the improvements recommended for 2030 No Build conditions were in place, indicated only one additional improvement was needed to provide adequate traffic operations at the study intersections. This one improvement involved changing the two-way stop control at the County Road 46/Akron Avenue intersection to traffic signal control. The implementation of this improvement will be dependent upon actual traffic volumes. If the actual traffic volumes are less than the forecasted volumes and no MnMUTCD signal warrants are met at the intersection, then a traffic signal will not be installed. Furthermore, implementation of this improvement, if required, will be based on roadway jurisdiction and relative contribution of traffic.

5. The UMA is proposed to have two primary access points, one located on County Road 46 and one located on Akron Avenue. The primary accesses will serve the main aggregate processing facilities, the asphalt production facilities, and the concrete production facilities. Up to four secondary access points are proposed for the mining area. The secondary access points will provide direct access to the areas being mined. As the areas being mined change, these secondary access points will change. The actual location of each secondary access will need to be determined prior to a mining area being activated. A driveway permit will need to be obtained from the road authority for each requested secondary access location. Several factors, including mainline traffic volumes, access spacing, intersection sight distance, and nearby development will need to be considered in the final determination of the location of an access point. The location of a secondary access may be at an existing driveway location or a new location, as determined by the permitting agency. Access locations along county roads will have to conform to Dakota County's spacing guidelines. If a requested access is on a road that is not paved, it is expected that the driveway permit for the access will indicate what actions the requestor will need to take in order to utilize the unpaved roadway near the access.

6. Some access locations to the UMA are needed on streets that are currently unpaved (Biscayne Avenue, Akron Avenue, and 170th Street). For 2011, a secondary access is proposed at the Biscayne Avenue/Boulder Trail intersection, and the section of Biscayne Avenue south of Boulder Trail is currently a gravel road. As long as this segment remains unpaved, it is recommended that the City consider signing be put in place to prohibit mining trucks from using this section of Biscayne Avenue.

   A primary access is proposed on Akron Avenue approximately 800 feet north of County Road 46, and Akron Avenue is currently a gravel road. It is proposed that site operator(s) will pave the section of Akron Avenue between the primary access and County Road 46. The timing of this paving project and the opening of this primary access is dependent upon the UMA asphalt plant being in operation. Dakota Aggregates proposes to use asphalt from the UMA plant to pave the road.

For 2011, it is proposed that a secondary access to the Clay Mining Zone be allowed on 170th Street, which is currently a gravel road. Due to the existing low traffic volume on this road and the low amount of UMA site-generated traffic (47 vehicles per day) at this access, it is proposed that this section of 170th Street remain unpaved. However, the section of 170th Street that will be used by UMA site-generated traffic should be upgraded to 10-ton design standards.

It is expected that development in the area will cause the existing unpaved streets to be paved by 2030, which means that any new secondary UMA access locations proposed should be located on paved roads. However, if area development does not proceed as expected and a street is unpaved at the time a secondary UMA access is needed, how to handle the unpaved roadway near the proposed UMA access point will be included in the driveway permit required from the road authority.

3.11 Noise

A detailed Noise Technical Memorandum has been prepared and is available for review at the UMore Park Administrative Offices. The purpose of the study was to provide an analysis of potential noise impacts associated with mining truck traffic and general mining operations in the area surrounding the UMA. The findings of this analysis are provided below.

3.11.1 Affected Environment

For the Noise Impact Study, the analysis area included representative sensitive noise receptors on properties surrounding the UMA. Noise receptors were located where sensitive noise reception exists and where project-related noise impacts might be anticipated. The receptors chosen are adjacent residences located along roadways that will carry traffic related to the mining activities and also those that are closest to the proposed mining operations. Figure 48 shows all sites that were analyzed as a part of the noise study.

Noise Description

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels (dBA) represent the logarithmic increase in sound energy relative to a reference energy level. A sound increase of three dBA is barely perceptible to the human ear, a five dBA increase is clearly noticeable and a ten dBA increase is heard as twice as loud. For example, if the sound energy is doubled (e.g., the amount of traffic doubles), there is a three dBA increase in noise, which is just barely noticeable to most people. On the other hand, if traffic increases to where there is ten times the sound energy level over a reference level, then there is a ten dBA increase and the sound is heard as twice as loud.

For traffic noise, an adjustment, or weighting, of the high- and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sound levels are stated in units of "A-weighted decibels".

In Minnesota, noise impacts are evaluated by measuring and/or modeling the traffic noise levels that are exceeded 10 percent and 50 percent of the time during the hour of the day and/or night that has the heaviest traffic. These numbers are identified as the L_{10} and L_{50} levels. The L_{10} is a weighted average noise level exceeded for 10 percent of the time. In this case that time is one hour during peak traffic. For 10 percent (or 6 minutes) of that hour, the sound or noise has a sound pressure level above the L_{10}. For the rest of that hour (or 54 minutes), the sound or noise has a sound pressure level at or below L_{10}. These higher sound pressure levels that exceed L_{10} are likely due to sporadic or intermittent events, like unmuffled vehicles. The noise modeling software used in this analysis does not have the capabilities to model single, impulse type noise events.

The following list provides a comparison of the noise levels of some common noise sources.

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: "A Guide to Noise Control in Minnesota," Minnesota Pollution Control Agency, http://www.pca.state.mn.us/programs/pubs/noise.pdf and "Highway Traffic Noise," FHWA, http://www.fhwa.dot.gov/environment/htnoise.htm

State of Minnesota Noise Regulations

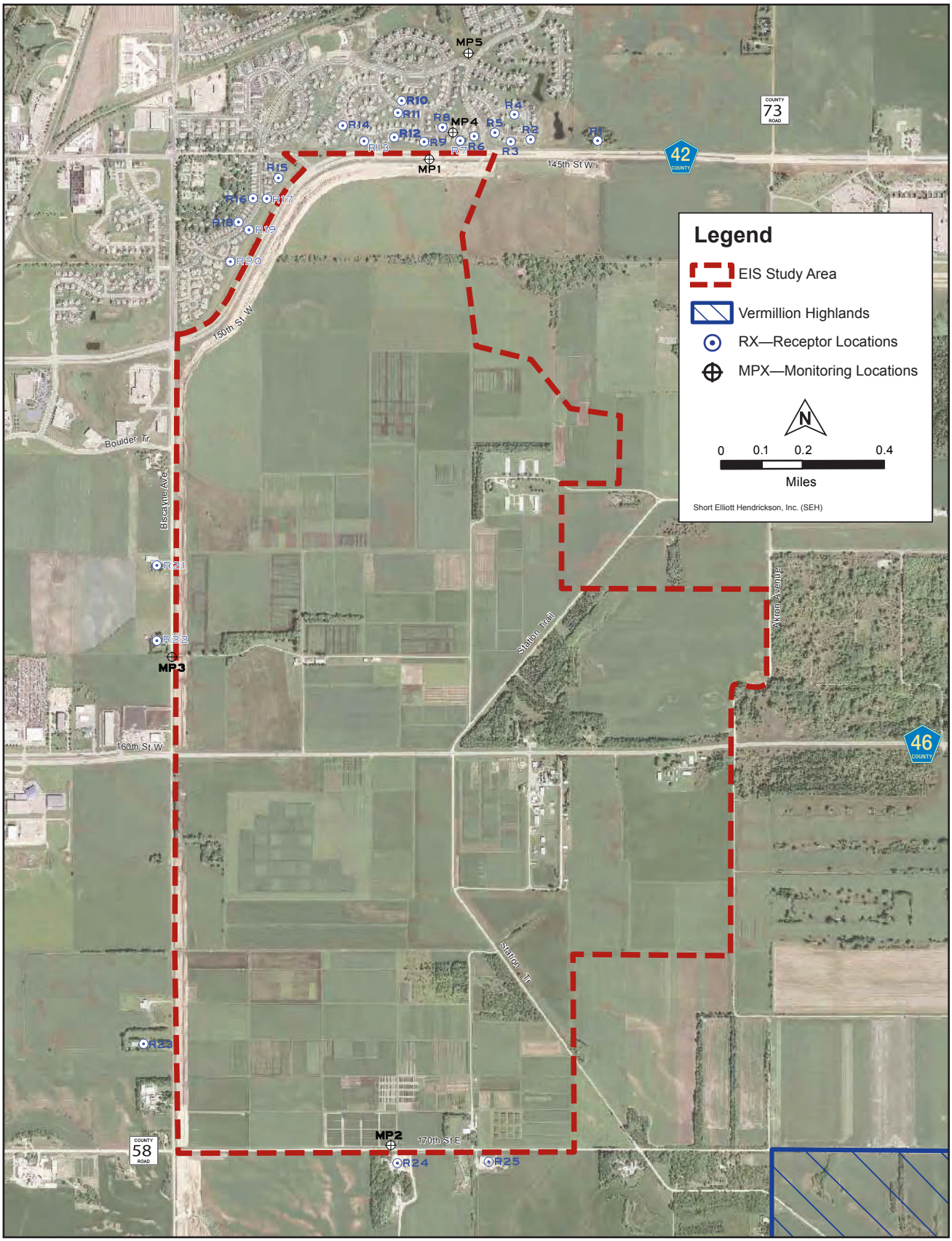
State noise standards are for a one-hour period and apply to outdoor areas. The standards are in terms of the L_{10} and L_{50} noise descriptors. The L_{10} is the sound level exceeded ten percent of the time, or six minutes out of an hour. The L_{50} is the sound level exceeded 50 percent of the time, or 30 minutes out of an hour.

Table 34 provides the Minnesota State Noise Standards for three Noise Area Classifications (NAC), and for daytime, nighttime, L_{10}, and L_{50}. The standards for NAC-1 apply to residential areas and other uses intended for overnight sleeping (hotels, motels, mobile homes, etc.). The NAC-1 standards also apply to schools, churches, medical services, and park areas. The nighttime standards differ from the daytime standards only in areas intended for overnight sleeping. The NAC-1 daytime standards apply during nighttime hours at other NAC-1 land-use areas not intended for overnight sleeping. The NAC-2 standards are applicable to certain NAC-1 land uses if the following criteria are met:

- The building noise attenuation is at least 30 dBA;
- The building has year-round, indoor climate control; and
- The building has no facilities for outdoor activities.

Table 34 – Minnesota State Noise Standards

Noise Area Classification	General Land Use Type	Sound Level (dBA)			
		Daytime (7AM - 10PM)		Nighttime (10PM - 7AM)	
		L_{10}	L_{50}	L_{10}	L_{50}
1	Residential	65	60	55	50
2	Commercial	70	65	70	65
3	Industrial	80	75	80	75



UMore Park Sand and Gravel Resources

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Figure 48
Noise Monitoring and Receptor Locations

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Exemption from State Noise Standards

By state law (MN Statue 116.07, Subd. 2a), standards adopted by any State agency for limiting levels of noise in terms of sound pressure which may occur in the outdoor atmosphere shall apply to an existing or newly constructed segment of a road, street, or highway under the jurisdiction of a road authority of a town, statutory or home rule charter city, or county, except for roadways for which full control of access has been acquired (meaning no at-grade intersections and freeway conditions exist). Because of this exemption for town, city and county roads, exceedances of the state standards by traffic on these roadways do not require noise mitigation. All of the roads near the noise monitoring and receptor locations are town, city, or county roads.

Traffic Noise Analysis Methodology

Existing (2010) and future (2011 and 2030) noise levels were modeled using the Federal Highway Administration (FHWA) noise prediction model STAMINA 2.0, as modified for use by Mn/DOT. Noise projections were based on 2009 traffic counts, 2011 forecasted peak-hour traffic volumes, 2030 forecasted peak hour traffic volumes, time of day, vehicle speeds (posted speed limits), roadway grades, the distance from the roadway center-of-lanes to the receptor (horizontal and vertical), and the mix of vehicle types. The vehicle mix assumptions were 95% autos and 5 percent trucks for the background traffic. The operational truck traffic volumes were then added to the background traffic assumptions. Additional details associated with traffic are included in Section 3.10 of this Final EIS.

As a means to compare noise level changes due to the proposed action, the nighttime peak (6:00 AM - 7:00 AM) and daytime peak hour (4:30 PM - 5:30 PM) L10 and L50 A-weighted noise levels have been predicted. To model a mid-day scenario would not benefit as the lowered “background” level of cars would be less, however the truck traffic volumes would not “stand out” against the lower number of cars. The program does not have the capability to model a single vehicle at a single point in time, producing a predetermined level of noise or during acceleration or deceleration periods.

The noise levels were predicted and compared for the 2011 No-Build and 2011 Build scenarios and for the 2030 No-Build and 2030 Build scenarios as defined in the Traffic Impact Study for the project. The No-Build scenarios reflect the anticipated regional growth and associated increases in background traffic.

The Build scenarios used in this study include all mining operations proposed within the UMA by 2011 and 2030 (phasing as shown in the UMA Draft Mining Plan), with increased truck traffic from the primary and secondary access points for the phasing during the appropriate design year.

Monitoring of Existing Traffic Noise Levels

The area adjacent to the proposed UMA currently receives noise from a variety of sources, with roadway traffic being the primary source.

Noise level monitoring is commonly performed during a noise study to document existing noise levels. Monitored noise levels can be used as a baseline of the possible ambient levels that can occur. It should be noted that the monitoring done in this study was not intended to verify or validate the modeled noise levels. The monitoring was completed without the collection of measured traffic volumes, speeds, vehicle mixes, or lane distribution of traffic. With the traffic volume variations that exist at the monitoring sites, noise modeling likely best describes the possible worst hour scenarios for both existing and future noise levels.

The existing noise levels along County Road 42, Biscayne Avenue, and 170th Street were monitored on November 10 and 11, 2008. Two additional sites were monitored in the residential subdivision north of County Road 42 on April 20, 2010. These locations helped to establish base case conditions and to assist in validating the noise model. These monitoring locations are illustrated on Figure 48. The monitoring results are provided in Table 35.

Table 35 – Monitored Traffic Noise Level

Monitoring Receptor	Monitoring Locations	Monitoring Hours	Monitored Noise Level (dBA)	
			L_{10}	L_{50}
MP1	South shoulder of County Road 42, along the north boundary of the UMore property.	6:30-7:30 PM (Daytime)	75	66
		7:28-8:28 AM (Daytime)	76	67
MP2	North shoulder of 170th Street West, along south boundary of UMore property.	9:04-10:04 AM (Daytime)	56	50
MP3	East shoulder of Biscayne Blvd., along west boundary of UMore property.	5:15-6:15 PM (Daytime)	61	53
MP4	East end of Bayberry Cir., near cul-du-sac.	4:05-5:05 PM (Daytime)	54	50
MP5	Park space along Bloomfield Path between Auburn Avenue and Avalon Path.	5:10-6:10 PM (Daytime)	61	45
	Shaded cells represent noise levels exceeding applicable noise standards.			

The relatively high levels recorded at MP1 during the monitoring are largely a factor of the close proximity of the monitor to the traffic source. As noted previously, noise levels decrease rapidly as the distance from the noise source increases.

3.11.2 Environmental Consequences

Modeled Traffic Noise Levels

Existing traffic noise levels were modeled for 30 receptor locations surrounding the UMA, as shown on Figure 48. The MINNOISE/STAMINA 2.0 noise model applied five scenarios for comparison of noise levels. The scenarios are: a) Existing conditions (2010); b) No-Build (2011); c) Build (2011); d) No-Build (2030); and e) Build (2030). The modeling results of existing traffic noise conditions are provided in Tables 36 and 37.

The noise standard exceedances shown for the peak daytime and nighttime noise levels are a result of existing and forecast traffic volumes along the associated roadways and the proximity of these receptors (residential structures) to the noise source (roadway). The greatest increase in noise levels occur in those locations experiencing the largest growth in background traffic levels. Comparing the 2011 No Build and 2011 Build scenarios as well as the 2030 No Build and 2030 Build scenarios provides a look into the modeled increase in noise levels directly related to the proposed truck traffic associated with the UMore Sand and Gravel Resources Project.

As shown in Table 36 the difference in daytime noise levels for the 2011 No Build and 2011 Build ranges from only 0.0-0.3 dBA with an average difference of 0.03 dBA. The difference in daytime noise levels comparing the 2030 No Build and 2030 Build range from 0.0-0.2 dBA with an average of 0.03 dBA. Table 37 shows the difference in the nighttime noise levels for the 2011 No Build and 2011 Build range from 0.0-0.1 dBA with an average difference on 0.05 dBA and the differences in the 2030 No Build compared to the 2030 Build range from 0.0-0.3 dBA with an average difference on 0.06 dBA.

Table 36 – Peak Daytime Noise Levels (4:30 PM - 5:30 PM)

MINNOISE Receiver	Applicable Standard L_{10} (dBA)	Existing Daytime L_{10} (dBA)	Daytime L_{10} (dBA) 2011 No Build	Daytime L_{10} (dBA) 2011 Build	Daytime L_{10} (dBA) 2030 No Build	Daytime L_{10} (dBA) 2030 Build	Applicable Noise Standard L_{50} (dBA)	Existing Daytime L_{50} (dBA)	Daytime L_{50} (dBA) 2011 No Build	Daytime L_{50} (dBA) 2011 Build	Daytime L_{50} (dBA) 2030 No Build	Daytime L_{50} (dBA) 2030 Build
R1	65	65.3	66	66	67.7	67.8	60	59.8	60.7	60.8	63.2	63.3
R2	65	65.2	65.8	65.9	67.6	67.6	60	59.7	60.6	60.6	63.1	63.2
R3	65	66.2	66.8	66.9	68.6	68.6	60	60.4	61.4	61.4	63.9	64
R4	65	58.8	59.4	59.4	61	61.1	60	54.6	55.5	55.5	57.8	57.8
R5	65	63.1	63.7	63.8	65.4	65.4	60	58.1	59	59	61.4	61.5
R6	65	64.6	65.2	65.2	66.8	66.8	60	59.3	60.2	60.2	62.5	62.6
R7	65	66.5	67.1	67.1	68.7	68.8	60	60.7	61.6	61.7	64	64.1
R8	65	62	62.6	62.6	64.1	64.2	60	57.3	58.1	58.1	60.4	60.4
R9	65	67.2	67.8	67.8	69.5	69.5	60	61.3	62.2	62.2	64.7	64.7
R10	65	56.7	57.3	57.3	58.8	58.9	60	52.8	53.6	53.7	55.8	55.8
R11	65	58.7	59.3	59.3	60.9	60.9	60	54.5	55.4	55.4	57.6	57.6
R12	65	65.5	66.1	66.1	67.8	67.8	60	59.9	60.8	60.9	63.3	63.3
R13	65	66.2	66.8	66.8	68.3	68.3	60	60.2	61.1	61.1	63.3	63.3
R14	65	60	60.5	60.6	62	62	60	55.2	56	56.1	58.1	58.1
R15	65	63.9	64.5	64.5	65.9	65.9	60	58.1	59	59	61	61
R16	65	60.7	61.3	61.3	62.6	62.6	60	55.8	56.6	56.6	58.5	58.5
R17	65	64.7	65.3	65.3	66.7	66.7	60	58.9	59.7	59.8	61.7	61.7
R18	65	60.4	61	61	62.3	62.3	60	55.6	56.4	56.4	58.3	58.3
R19	65	64.3	64.9	64.9	66.2	66.3	60	58.6	59.5	59.5	61.5	61.5
R20	65	63.7	64.2	64.3	65.6	65.6	60	58.1	59	59	61	61
R21	65	53.4	58.3	58.5	63	63.1	60	43.4	49.6	49.9	56.1	56.1
R22	65	54.6	58.7	58.9	63.2	63.2	60	45.2	50.2	50.4	56.3	56.4
R23	65	44.8	50.8	50.5	55.8	55.8	60	35	41.6	42.1	49.2	49.3
R24	65	52.7	56.9	57	63.3	63.3	60	41.9	47.4	47.4	56	56.1
MP1	65	75.5	76.2	76.3	78.1	78.2	60	67.5	68.5	68.5	71.1	71.2
MP2	65	59.9	64.5	64.5	71.4	71.4	60	47.4	53	53.1	62	62
MP3	65	70.2	76.3	76.5	82.3	82.3	60	55.1	62.5	62.7	69.8	69.8
MP4	65	63.4	64	64	65.6	65.6	60	58.4	59.2	59.3	61.5	61.6
MP5	65	51.6	52.2	52.2	53.8	53.8	50	48.5	49.3	49.3	51.4	51.4

Represents those locations exceeding their applicable noise standards.

Table 37 – Peak Nighttime Noise Levels (6:00 AM - 7:00 AM)

MINNOISE Receiver	Applicable Standard L_{10} (dBA)	Existing Nighttime L_{10} (dBA)	Nighttime L_{10} (dBA) 2011 No Build	Nighttime L_{10} (dBA) 2011 Build	Nighttime L_{10} (dBA) 2030 No Build	Nighttime L_{10} (dBA) 2030 Build	Applicable Noise Standard L_{50} (dBA)	Existing Nighttime L_{50} (dBA)	Nighttime L_{50} (dBA) 2011 No Build	Nighttime L_{50} (dBA) 2011 Build	Nighttime L_{50} (dBA) 2030 No Build	Nighttime L_{50} (dBA) 2030 Build
R1	55	63.9	64.5	64.6	66.2	66.2	50	57.7	58.6	58.7	61.1	61
R2	55	63.8	64.4	64.4	66	66.1	50	57.6	58.5	58.6	60.9	60.9
R3	55	64.7	65.4	65.4	67	67.1	50	58.3	59.2	59.3	61.7	61.6
R4	55	57.4	58	58.1	59.5	59.6	50	52.7	53.5	53.6	55.8	55.7
R5	55	61.7	62.3	62.3	63.9	63.9	50	56	56.9	57	59.3	59.2
R6	55	63	63.6	63.7	65.2	65.3	50	57	57.9	58	60.3	60.3
R7	55	64.8	65.4	65.5	67.1	67.2	50	58.4	59.3	59.4	61.8	61.7
R8	55	60.4	61	61.1	62.6	62.6	50	55.1	55.9	56	58.3	58.2
R9	55	65.5	66.1	66.2	67.8	67.9	50	58.9	59.8	59.9	62.3	62.2
R10	55	55.3	55.9	56	57.5	57.5	50	50.9	51.8	51.9	54	54
R11	55	57.3	57.9	58	59.5	59.5	50	52.6	53.4	53.5	55.7	55.7
R12	55	63.9	64.5	64.5	66.1	66.2	50	57.6	58.6	58.6	61	61
R13	55	65	65.7	65.8	67.5	67.5	50	58.5	59.4	59.5	62	61.9
R14	55	59	59.6	59.7	61.2	61.2	50	53.7	54.6	54.7	57	56.9
R15	55	63	63.7	63.7	65.4	65.4	50	56.8	57.8	57.8	60.2	60.2
R16	55	59.8	60.5	60.6	62.1	62.1	50	54.5	55.4	55.5	57.8	57.8
R17	55	63.8	64.5	64.5	66.2	66.2	50	57.5	58.5	58.6	61	61
R18	55	59.5	60.2	60.2	61.8	61.8	50	54.3	55.2	55.3	57.6	57.6
R19	55	63.4	64.1	64.1	65.8	65.8	50	57.3	58.3	58.4	60.8	60.8
R20	55	62.7	63.4	63.5	65.1	65.1	50	56.8	57.8	57.9	60.3	60.3
R21	55	51.5	56.3	56.3	61.4	61.5	50	41	47	47	53.9	53.9
R22	55	52.7	56.8	56.8	61.7	61.7	50	42.6	47.7	47.7	54.3	54.2
R23	55	46.8	50.7	50.7	56.6	56.6	50	37.1	42.2	42.2	50.3	50.2
R24	55	50.3	54.5	54.5	61.2	61.2	50	38.8	44.3	44.3	53	53
R25	55	50.9	55.1	55.1	61.9	61.9	50	39.2	44.7	44.7	53.5	53.5
MP1	55	73.6	74.3	74.4	76.2	76.3	50	64.9	65.9	66	68.6	68.5
MP2	55	57.5	61.9	61.9	69	69	50	44.3	49.9	49.9	58.9	58.9
MP3	55	68.5	74.5	74.5	80.7	80.8	50	53.2	60.4	60.4	68	67.8
MP4	55	61.8	62.4	62.5	64	64.1	50	56.1	57	57.1	59.4	59.3
MP5	55	50.3	50.9	50.9	52.4	52.4	50	46.7	47.5	47.6	49.6	49.6

Represents those locations exceeding their applicable noise standards.

A sound increase of three decibels is barely perceptible to the average human ear. Therefore, the modeled noise level increases resulting from the truck traffic associated with the UMA will be imperceptible.

During the preparation of this Draft EIS, the City of Rosemount raised a concern around heavy trucks using engine brakes, which can result in higher levels of noise. According to the Jacobs Vehicle Systems website (jakebrake.com), "The federal government has required all vehicles manufactured since 1978 to meet noise requirements when delivered to the customer. Today, trucks are required to emit less than 80 dBA of noise when they drive by, as measured at 50 feet. Therefore, trucks have been required to meet noise requirements when they leave the dealership as new vehicles for several years. The real problem arises when engine brakes are modified or a truck has a defective exhaust system. Often times a truck that is causing a noise disturbance is running with straight stacks or gutted mufflers. In other cases the noise disturbance may be the result of a poorly maintained vehicle. In any case, the use of the engine brake is not the problem." More detail regarding vehicle noise levels and compression release engine braking can be found at the following website: http://www.jakebrake.com/about-us/docs/vehicle-noise-and-compression-release-engine-braking-28307b.pdf

Mining Operations Noise

Site related noise will be generated at several locations within the UMA. Noise-generating activities at these facilities include excavation, hauling, stockpiling, crushing and washing of aggregate.

Noise sources that relate directly to the mining operation will include a variety of mobile and stationary equipment.

Mobile equipment will include:

- Bulldozers
- Scrapers
- Backhoe Excavators
- Motor Graders
- Loaders
- Water Truck
- Haul Trucks
- Dredgers

Stationary Equipment will include:

- Conveyors
- Cranes
- Screeners
- Scales
- Scale Houses
- Wash Plants
- Concrete Batch Plants
- Block Plants
- Crushing Plants
- Asphalt Plants
- Concrete Bagging Plants
- Cast Pipe Plants

The distances between mining operations and sensitive receptors will vary substantially as mining operations move within the boundaries of the UMA. Site activities will be placed to maximize efficiency within the site. In addition, topography will vary by mining phase and year of operation within a specific phase. As mining progresses in a particular phase, mining activities will occur at lower elevations and will be shielded by berms or grade, containing much of the site-generated noise.

The aggregate plant and AUF area are proposed north of County Road 46, just west of Akron Avenue. At the northern and northwestern UMA boundaries, a 10-foot high berm feature has been proposed south of County Road 42. This berm will block the direct line of sight from active mining operations to nearby residential areas and will act as an earthen noise wall to mitigate site related noise to the north and northwest.

Whenever feasible, operations will be located as far as possible from sensitive receptors, and will be oriented to direct the loudest equipment away from sensitive receptors. Appropriate placement of site activities will allow noise level dissipation from point source activities, thereby minimizing noise at sensitive receptors. In comparison to state standards, site-generated noise levels will be substantially lower than traffic-related noise levels, particularly traffic noise on County Road 42.

Typical construction equipment generates noise levels ranging from approximately 76 to 88 dBA at a distance of 50 feet from the source, with slightly higher levels of about 88 to 91 dBA for certain types of earthmoving and impact equipment. The rate of attenuation is approximately 6 dBA for every doubling of distance from a point source. Assuming a conservatively high noise level estimate of 90 dBA at 50 feet from the source, noise levels would reach the 65 dBA daytime limit at approximately 900 feet from the source. Brown-Buntin Associates, Inc conducted an analysis of noise impacts associated with the operations of the North Star Gravel Quarry in California. The analysis indicated that the distance to the 50 and 55 dB hourly L_{eq} noise level contours is approximately 900 feet and 500 feet respectively from the center of the excavation area.

Figure 49 illustrates the 900 foot noise contour extending from a representative location at the ancillary use facility as well as a representative location reflecting where gravel mining operations are likely to be closest to the residential land uses along County Road 42. The figure indicates that none of the residential uses are within the 900-foot contour.

Furthermore, it is likely that the background roadway traffic will be a more constant and the dominant noise source over the activities associated with the mining operations.

3.11.3 Mitigation

Traffic-Related Noise Mitigation Options

Noise associated with increased heavy truck traffic over the duration of the project is minimal, based upon peak hour traffic increase calculations for the regional transportation system. This is illustrated in the noise modeling results that indicate there are no additional daytime or nighttime exceedances attributable to the proposed project will occur. Therefore it can be concluded that the truck traffic from UMA operations represents a small fraction of the total traffic noise along each of the analyzed roadways. Furthermore, UMA truck operations will intrude little, if at all, into nighttime hours depending on permitted hours of operation. Last, given that local and county roads are not subject to state standards and subsequent mitigation requirements, no mitigation is required.

Mining-Related Noise Mitigation Options

Mining operations will be setback a minimum of 350 feet from residential properties. The mining operations setback will range from 1,000 to 1,600 feet along the north and northwest portion of the project area. This expanded setback encompasses the majority of the residential land use adjacent to the UMA.

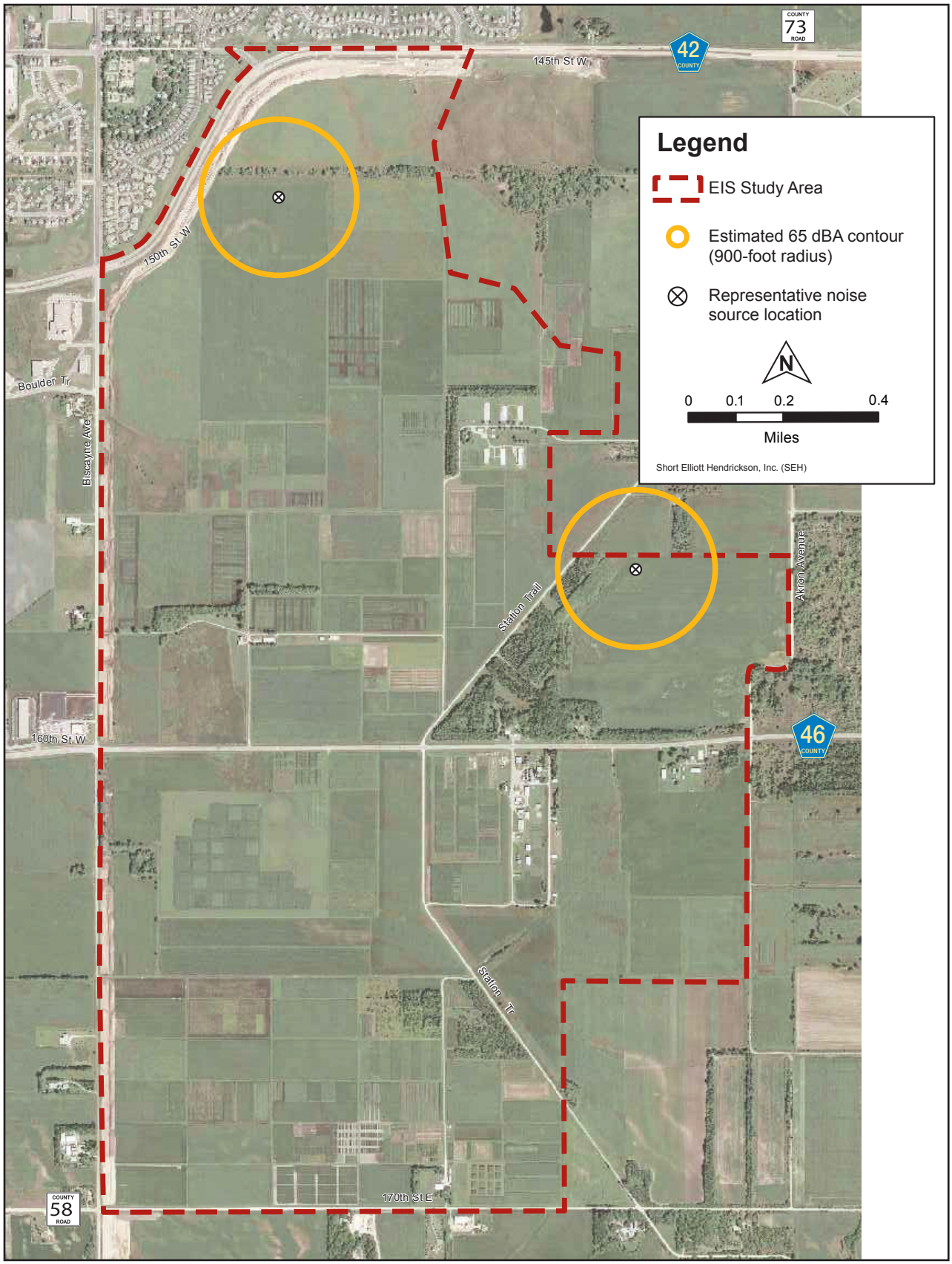

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Figure 49
Mining Operations—Extent of Estimated Noise Impact

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During the duration of the mining operation, equipment, and hauling operations will occur at varying locations and elevations. Most often, with the setback provisions noted above, the distance from these operations to sensitive noise receptors will be sufficient, and substantial mitigation will not be needed. The 10-foot berm which will be constructed along the perimeter of the actively mined areas adjacent to residential land uses will further reduce operational noise levels.

Properly working equipment, including mufflers, shall be maintained on all internal combustion engines. The site layout, including earthen berms, will be such that topography can be used to block noise as much as possible. Specific measures that could be applied to reduce mining related noise may include the following:

- Asphalt facilities should be located on the property and oriented so that the exhaust fan is directed away from sensitive receivers,
- Truck speeds should be kept as low as possible for all on-site roads,
- Use of an earthen berm as indicated in the Draft Mining Plan,
- Road surfaces should be maintained to reduce tire noise and airborne vibration,
- Standard acoustic backup alarms should be replaced with strobe lights at night and with new technology as it becomes available and permitted by the Occupational Safety & Health Administration (OSHA) and the Mining Safety Health Administration (MSHA),
- Squeaks and squeals should be minimized by regular maintenance and lubrication of equipment, and

Any future redevelopment of the UMA should minimize the introduction of new receivers that may result in any noise impacts. This can be accomplished by locating and scheduling redevelopment in locations where operations are complete.

3.11.4 No-Build Alternative

There would be no changes to noise levels from the UMA under the No-Build Alternative.

3.12 Air Quality/Dust

3.12.1 Affected Environment

This air quality impact analysis provides an assessment of potential air quality impacts in the mining area and identifies options for mitigating the potential impacts. The complete analysis process and results are included in the Air Quality Impact Study, available for review at the UMore Park Administration Office.

Applicable Regulations - MPCA Permitting Requirements

The MPCA requires that facilities have air emissions permit(s) based on the type and size of the operations. The MPCA requirements base the permit decision on the ‘potential to emit’ of pollutants. That requires sources of all types to assume that operations occur 24 hours per day, 365 days per year regardless of any local restrictions. Also, for this determination, no controls can be considered. This basis is only for the initial determination of whether or not a permit is needed. Once that decision is made, controls and limits can be considered in permitting documents as appropriate.

MPCA permit requirement thresholds for particulate matter are as follows:

- PM = 100 tons/year
- PM_{10} = 25 tons/year

Based on the assumptions in this analysis and calculations assuming 0 percent control for fugitive dust emissions, the UMA will likely be required to obtain a permit. The applicable permit must be obtained from the MPCA prior to commencing construction or operation at the site. The permit may be a site specific permit or a Non-Metallic Mineral Processing General Permit, depending on eligibility requirements. The permit issued will need to reflect the final agreed upon emission control requirements for the internal haul roads. The general permit includes requirements for either 50 percent or 75 percent control credit for haul roads.

Asphalt operations in the State of Minnesota are primarily covered under the MPCA's Registration Permit system. This is available for facilities having less than 50 and 12.5 tons per year of PM and PM_{10}, respectively. If the facility is not eligible for a Registration Permit, a site specific permit may be issued.

Ready mix operations in Minnesota that produce less than 300,000 tons per year without haul road controls or less than 360,000 tons per year with haul road controls, are exempt from permitting requirements under Minnesota Rules 7008.2200. That rule contains various recordkeeping, reporting and monitoring requirements that a company must comply with in order to be eligible for the permitting exemption.

Applicable State and Federal Requirements For Processing Equipment

The processing equipment (crushers, screens, conveyors) at the proposed mining site will likely be subject to a United State Environmental Protection Agency (US EPA) New Source Performance Standard (NSPS). That standard is 40 CFR Part 60, Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants. The applicability will vary with the particular equipment used. Equipment constructed, reconstructed or modified after August 31, 1983 is subject to the NSPS. The rule sets opacity limits for dust emissions from the equipment. Opacity is the amount of obstruction of light transmittance caused by a plume of dust or gases. Opacity is used as a limit in cases where emissions are not from a well defined stack, which is the case for these types of operations. The addition of water is generally used to control emissions to meet these requirements.

Haul Roads and Storage Piles

Fugitive dust from haul roads and storage piles is controlled by Minnesota Rule 7011.0151. This rule requires that reasonable measures be taken to control fugitive dust.

Power Generators

Power generators, if deemed necessary for operations, will be subject to Minnesota Rule 7011.2300 and may also be subject to future federal rules on engines. The final determination will depend on the type and size of the unit.

Asphalt Operations

Asphalt production is subject to federal NSPS, 40 CFR Part 60, Subpart I, which regulates particulate emissions and opacity.

Asphalt operations are also subject to state requirements in Minnesota Rules 7011.0900 – 7011.0922. These rules address various testing, and monitoring and operational requirements.

Ready Mix

Ready mix operations are subject to state requirement in Minnesota Rules 7011.0850-7011.0859. These rules require controls on cement silo as well as other miscellaneous requirements.

Stationary and Mobile Sources

A stationary source, as defined in Minnesota Rule 7005.0100, means an assemblage of all emission units and emission facilities that belong to the same industrial grouping, are located at one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Emission units or emission facilities must be considered as part of the same industrial grouping if they belong to the same "major group" (that is, which have the same two-digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement (United States Government Printing Office Stock Numbers 4101 to 0066 and 003-005-00176-0, respectively). For there to be a nonmetallic mineral processing stationary source, one or more pieces of processing equipment must be present and operating. Stationary sources may contain portable, mobile and stationary equipment.

Mobile sources, such as haul trucks, are any non-stationary sources of air pollution.

Air Emissions

The regulated emissions associated with mining and subsequent production of construction-related materials from the mined product are particulate matter (PM), particulate matter less than or equal to 10 microns (PM_{10}) as well as other criteria pollutants, such as nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2) and volatile organic compounds (VOCs). These emissions may result from aggregate processing equipment, fuel combustion sources and potentially, from asphalt and concrete operations.

Emission Factors

The emission rates for all sources at the UMA were calculated using published emission factors standard to the mining industry. An “emission factor” is the most accurate and representative emission data available, and can come from several sources as explained in Minnesota Rules 7005.0100 Subpart 10a. The emission factors used for the UMA’s calculations came from the Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources (AP-42), published by US EPA. More information about EPA emission factors is available at www.epa.gov/ttnchie1/ap42/. The MPCA uses AP-42 factors in its permit application forms. The MPCA provides some additional emission factors in its guidance (*MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration Requirements (Version 2.2)*, October 20, 2004 (Reference 1)).

3.12.2 Environmental Consequences

The MPCA requires operators of crushed stone and sand and gravel plants to use dust control measures for their operations. The term "fugitive dust" when referring to emissions from aggregate processing, means the dust does not come from an emission stack, but instead comes from something open to the air such as an unpaved road, wind over a stockpile or material released between conveyors at the transfer points.

The following sections address each type of emission source at the proposed UMA.

Material Processing/Handling and Stockpiles

The processing operations from sand and gravel mining and dredging typically include crushing, screening, size classification, material handling, storage operations, and truck loading/unloading. All of these processes can be sources of particulate matter, or dust, which is of concern to the regulating agencies and surrounding neighbors. If not controlled properly, the dust emitted by these operations can be carried by wind into surrounding neighborhoods.

Emissions from conveyors are considered at each drop or transfer point from one conveyor to the next. Wash plant emissions are considered to be zero after the point that the material enters the wet portion of the wash plant. At that point, the material moisture content is sufficiently high to control particulate emissions. Therefore, wash plant sources of this nature are not considered in this analysis. The emissions from storage piles are a continuous activity, because they are not based on a specific handling activity, but rather atmospheric conditions, such as high winds. Therefore, the emissions will occur 24 hours per day. The estimated emissions associated with material processing and handling in tons per year is summarized in Table 38.

Table 38 – Material Processing/Handling and Stockpile – Estimated Emissions

Pollutant	Material Processing and Handling	Stockpiles	Total
PM (tons/year)	52	16	68
PM_{10} (tons/year)	18	8	26

Internal Haul Roads

It is assumed that no haul roads will be paved throughout the UMA. The haul road emissions will be dependent on the percent control determined between the MPCA and operator. For purposes of this analysis three scenarios were analyzed including no controls, 50 percent control, and 75 percent control. With no controls, the haul road emissions are estimated at 168 tons per year of PM and 43 tons per year PM_{10}. For 50 percent control, the emissions are half of the uncontrolled emissions for PM and PM_{10}, 84 tons per year and 21 tons per year, respectively. Finally, for 75 percent control, the emissions are 25 percent of the uncontrolled emissions for PM and PM_{10}, 42 tons per year and 11 tons per year, respectively. The appropriate emission calculations and permit applications will be completed, as necessary, if and/or when the equipment is deemed necessary for operations. The estimated haul road emissions for each of these scenarios are summarized below:

Table 39 – Internal Haul Roads – Estimated Emissions

Pollutant	No Controls	50 Percent Control	75 Percent Control
PM (tons/year)	168	84	42
PM_{10} (tons/year)	43	21	11

Ready-Mix Operations

Emissions are generated when aggregate is transferred to the concrete plant and when cement is pneumatically transferred to storage silos. The silos are required to have control devices. For this analysis, a baghouse (e.g. fabric filter) is assumed to be used to meet this requirement. In the concrete plant, the aggregate and cement will be metered in a weigh hopper and transferred into either a mixer or directly into trucks where these materials will be mixed with water. Both of these steps, metering in the weigh hopper and transferring to the mixer or truck, will generate PM and PM_{10} emissions.

The air quality assessment is conducted using a concrete plant capacity of 185,000 tons per year. Of this amount, the aggregate throughput will be no more than 154,000 tons per year and the cement throughput will be no more than 31,000 tons per year.

Transferring aggregate to the plant, use of the weigh hopper, and transferring materials to the mixer or truck are considered fugitive emissions. No emission control is assumed when estimating emissions from these activities. Since Minnesota Rules require controls on cement

silos, the emission calculations include use of baghouses. Emissions from these baghouses are not fugitive. Total estimated plant emissions are shown in Table 40.

Table 40 – Concrete Plant – Estimated Emissions

Pollutant	Aggregate Transfer to Hopper	Pneumatic Cement Loading	Weigh Hopper Loading	Truck Loading	Total
PM (ton/yr)	0.5	0.02	0.5	5.3	**6.3**
PM_{10} (ton/yr)	0.3	0.005	0.2	1.5	**2.0**

Asphalt Operations

Hot mix asphalt is a mixture of aggregate (e.g. sand and gravel) and liquid asphalt. In the asphalt manufacturing process, aggregate and asphalt are heated in a dryer. The materials are added in such a manner that the aggregate is dried prior to mixing with the hot asphalt. A baghouse is proposed to be used to control particulate matter emissions from the dryer. The dryer could be fired with either natural gas or fuel oil. Since the fuel for the asphalt plant has not been determined, we use fuel oil in this air quality assessment. Emissions from by-products of combustion with fuel oil will be higher than when using natural gas. The combustion of fuel oil in the dryer will generate CO, NOx, VOCs, and SO_X. Emissions are also generated when the hot asphalt is transferred to storage silos and to loadout vehicles.

The air quality assessment is conducted using an asphalt plant capacity of 400,000 tons per year. Of this amount, the aggregate throughput will be no more than 377,000 tons per year and the asphalt throughput will be no more than 23,000 tons per year.

Emissions are calculated using emission factors and equations published in AP-42 Section 11.1, Hot Mix Asphalt Plants. Emission factors are available for PM, PM_{10}, NO_X, SO_2, CO and VOC from dryers used in continuous drum mix plants. Emissions from the dryer are controlled with a baghouse. AP-42 emission equations are used to determine emissions of CO, VOC and PM from silo filling and plant loadout operations. Total estimated asphalt plant emissions are shown in Table 41.

Table 41 – Asphalt Plant Estimated Emissions

Pollutant	Dryer, Hot Screens, Mixer	Silo Filling	Loadout Operations	Total
PM	6.6	0.12	0.10	**6.8**
PM_{10}	4.6	0.12	0.10	**4.8**
CO	26	0.24	0.27	**27**
NOx	11	-	-	**11**
SOx	2.2	-	-	**2.2**
VOC	6.4	2.4	0.83	**9.7**

Backup Power Generators

At this time, it is believed that no fuel-burning generators will be used at the UMA.

Conclusions

The emission calculations for the proposed project show results typically expected for these types of operations. The pollutant of concern is particulate (PM and PM_{10}) with the largest emission contributor being fugitive dust from internal haul roads.

Haul road fugitive dust is the air quality impact with the highest potential to be experienced by nearby residents. Haul road fugitive dust is typically controlled with water suppression or similar techniques. With adequate dust suppression, operations should not result in substantial negative impacts on nearby residents.

With adequate moisture content in the aggregate, operations should be able to meet the federal applicable requirements for aggregate operations.

The calculations show that the operations (other than any exempt concrete batching operations) will require permitting by the MPCA.

3.12.3 Mitigation

Minnesota Rule 7011.0150 reads, "No person shall cause or permit the handling, use, transporting, or storage of any material in a manner which may allow avoidable amounts of particulate matter to become airborne. No person shall cause or permit a building or its appurtenances or a road, or a driveway, or an open area to be constructed, used, repaired, or demolished without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne. All persons shall take reasonable precautions to prevent the discharge of visible fugitive dust emissions beyond the property line on which the emissions originate." Some federal regulations also limit the visible thickness of dust plumes (a term called opacity) and the amount of time emissions can be seen by the naked eye.

Aggregate Processing and Handling Emissions

Mitigation of dust emissions from aggregate processing and handling operations includes two basic options: reducing the number of processing and/or handling operations and applying dust control. The numbers used in this analysis are a worst case estimate. The analysis assumed maximum production levels and a maximum number of pieces of equipment and further assumed 100 percent of the material passes through every operation.

There are a number of dust control techniques that will be applied within each of the on-site mining facilities, including general operational techniques and specific applications:

- Use of conveyors for transport of a portion of raw material onsite to limit the number of internal truck trips;
- Active reclamation will minimized exposed open areas;
- Use of water to minimize fugitive dust emissions;
- Wet suppression;
- Chemical Stabilization;
- Sequenced mining of smaller subphases.

These dust control techniques will reduce the particulate matter from the proposed mining operations.

Internal Haul Road Emissions

The haul roads contribute to a majority of the total projected emissions. This is typical of such operations. With respect to internal haul roads, there are two basic mitigation options: shorten the length of haul roads, and/or apply dust control. The haul road distances at this

time are estimates, but on average, are believed to be a half mile or less for a round trip. Any reduction in haul road distances will substantially reduce the haul road emissions.

Two control efficiencies, 50 and 75 percent, were provided in the calculations to demonstrate the difference in overall emission totals and available control options. Requirements for achieving 50 and 75 percent control efficiencies can be found in the MPCA Nonmetallic Mineral Processing Air Emissions General Permit and Technical Support Document.

Typical unpaved haul road controls include:

- Wet suppression,
- Chemical Stabilization, and
- Reduction of silt content by gravel surface application

Operations in the UMA will apply wet suppression (water application) to the unpaved haul roads. Water application keeps the road surface wet to control emissions. The control efficiency of unpaved road watering depends on: 1) the amount of water applied per unit area of road surface, 2) the time between reapplications, 3) traffic volume during that period, and 4) prevailing meteorological conditions during the period.

Concrete and Asphalt Plant Emissions

Baghouses (e.g. fabric filters) will be used to control particulate emissions from the asphalt plant and concrete plant operations since they have been proven to provide a high level of emission control for these types of operations. Mitigation approaches related to haul roads and material processing and handling discussed above also apply to handling raw materials and shipment of finished products associated with the asphalt and concrete plant operations.

3.12.4 No-Build Alternative

The No-Build Alternative will not result in any increase in air emissions from the UMA as a result of additional vehicles (haul trucks, equipment, etc.) and/or from stationary sources (aggregate processing equipment).

3.13 Infrastructure and Utilities

3.13.1 Affected Environment

The proposed mining operation will utilize the existing transportation system in the project area. The majority of the existing roadways in the proposed project area are two lane rural type facilities with some turn lanes. County Road 42, located along the northern boundary of the UMA, is a rural four-lane divided roadway with a depressed, grass median. The driving lanes of the existing roadways within and surrounding the UMA are either bituminous pavement or aggregate (gravel) surfacing.

A Mid America pipeline is located to the north of the proposed mining operation. No impacts to this pipeline are anticipated as a result of the proposed action.

There is a Metropolitan Council Environmental Services (MCES) Sanitary sewer line that runs adjacent to the UMA along Biscayne Avenue and County Road 42. The sewer line is located within an easement along Biscayne Avenue and will not be impacted. The sewer line is located along County Road 42 and is north of the UMA.

Several private water supply and monitoring wells exist within the UMA that will be impacted as a result of mining operations. All wells will be abandoned in accordance with state and local requirements.

There is an existing electrical power distribution line located in the right-of-way of County Road 46. This power line may need to be relocated as future mining phases approach County Road 46 from the north.

3.13.2 Environmental Consequences

Transportation/Roadways

See discussion under Section 3.10 – Traffic.

Wells

See discussion under Section 3.9 – Water Use.

Wastewater

The proposed mining operation will result in two types of wastewater being produced: sanitary and industrial. Sanitary (domestic) wastewater will be generated by employees and occupants of offices, plants, processing, and maintenance facilities. Industrial wastewater will be generated by the processing of mined aggregates, in the proposed concrete production plant and possibly the recycled materials operation. These wastewaters will be treated with on-site facilities, which will consist of either portable toilet facilities or by conventional individual sewage treatment systems (ISTS). Portable toilet facilities will be utilized in the phased mining areas, for the processing activities and plant operations in the AUF area of the site, and possibly for the office and maintenance buildings within the AUF area of the site. These portable toilet facilities will be provided, cleaned, and serviced by commercial companies licensed and permitted for such activities. Sanitary wastewater generated from the office building and the maintenance building within the AUF area of the site may be treated by an ISTS. Permits for an ISTS would be obtained from the City of Rosemount. Based on a review of soil conditions in the proposed AUF area, suitable locations for ISTS operation are anticipated.

Industrial wastewaters will result from the processing of mined aggregates, from activities at the concrete production plant and possibly from recycling of materials returned to the site. Wastewater will not be generated by the proposed asphalt plant operation.

Aggregates produced will be treated by dry (screening, separating, and stockpiling) and wet (washing) processing methods. The washing process will result in wash water carrying fine clay, silt and sand particles. The wash water will not contain any chemical additives. This wash water will flow to a system of settling ponds where the fine soil particles will settle out. These settling ponds will be constructed by grading the existing ground surface to create the pond basins. The pond basins will be clay lined. The clarified water from the pond system will be pumped back to the washing plant for reuse. The system of settling ponds will be designed and constructed using the National Stone Association Water Management Guide for Aggregate Operations. The UMA Draft Mining Plan contains other information regarding the design and function of the pond basins.

Wastewater generated during the production of concrete mixtures will include washout water from the production plant and ready mix concrete delivery trucks, including concrete delivery trucks returning to the plant after discharging their loads, washing off water from the exterior of the delivery trucks and water from general cleanup of the production plant. This wastewater is anticipated to contain increased pH levels. This wastewater will be collected and treated in a system of cells constructed of reinforced concrete. The system of cells will be connected by weirs to regulate the flow of water from one cell to the next providing for settlement of solids in the wastewater. The clarified water from the cell system will be reused in the concrete batching process in the plant. The primary treatment of the increased pH level

in the wastewater will be through the reuse of the water in the concrete batching process. If necessary; the increased pH level can also be treated through the use of phytoremediation (an engineered trench to a pond or rain garden), CO2 injection or chemical pH adjustment. An emergency outfall to account for rainfall in the concrete production plant area from storms in excess of the 10-year frequency, 24-hour duration event will be constructed from the last cell in the system (containing the cleanest water). The emergency outfall treatment is usually designed as an engineered trench with phytoremediation potential. Any water leaving the trench will exit from a pipe so that sampling of the water may occur. The pipe would empty into a lined ponding basin to be constructed with no outfall and of sufficient size to retain any discharge to the basin. Any water reaching the ponding basin would evaporate. The ponding basin would be located a sufficient distance from the mine lake. The UMA Draft Mining Plan contains other information regarding the design and function of the pond basins.

Recycling of materials will be predominately dry (screening, separating, crushing and stockpiling) processing methods, but may include some limited washing of recycled products. Any wastewater generated by washing of recycled products will be treated by a separate series of settling ponds. These ponds will be designed and constructed similar to those described above for the aggregate production settling pond system.

No process water will be allowed to discharge overland from the processing or plant area sites. The settling ponds will generate some fine aggregates that will settle out in the pond bottoms. These fine aggregates can be used in general site restoration or could be used to line future water bodies (ponds or lakes) to be constructed in the mining area. This fine aggregate lining could supplement or replace a manufactured liner in the ponds or lakes to ensure that these water bodies can maintain a consistent water level.

Public Utilities

The proposed mining operation should have no impact on public services such as: water distribution, or sanitary sewer facilities. Potential impacts to the surface water management system are discussed in Section 3.7. Sanitary sewer lines operated by MCES border the northern and western portions of the UMA. No impacts to these operating sewer lines or associated easements are anticipated. An existing, abandoned MCES sewer line within an existing easement may need to be removed from the north side of the UMA located south of County Road 42. University officials are currently in discussion with MCES officials regarding this abandoned line. Final plans for the proposed mining operation will be sent to MCES for their review prior to the mining operation being initiated.

Private Utilities

A Mid America pipeline is located to the north of the proposed mining operation. There are no anticipated impacts to this pipeline as a result of the proposed mining operations.

Electrical power for offices, maintenance facility, processing, and plant machinery will be supplied by extension of existing electrical power lines to the proposed AUF area. There is an existing electrical power distribution line located in the right-of-way of County Road 46. There is a private electrical power line located along Station Trail north of County Road 46, which is the site of the proposed AUF area. This private electrical line will be revised and relocated to provide the electrical power needed for the offices, maintenance facility, processing, and plant machinery.

Each private utility owner in the UMA will be contacted to review the location and nature of the utility's facilities that may be affected. An agreement will be reached between the proposed mining operation and the utility provider to address any physical or operational impacts to the utility facilities. This agreement, which may be a simple letter agreement or a

more formal Memorandum of Understanding will address continued operation of utility service, the costs for any relocation or adjustments of the utility's facilities, any modifications to easements that the utility may hold in the affected area and the costs for those modifications.

3.13.3 No-Build Alternative

No changes to the existing infrastructure and utility systems would occur under the No-Build Alternative.

3.14 Farmland

3.14.1 Affected Environment

Much of the UMA is currently under agricultural production and a majority of the underlying soils are identified as "prime" farmland. In fact, according to the Dakota County Soil Survey there are approximately 1,600 acres of land within the UMA is classified as Prime Farmland and approximately 45 acres have soils classified as Statewide Importance.

The presence of prime farmlands over large mineral deposits is common for this geographic area.

3.14.2 Environmental Consequences

Allowing access to and extraction of mineral resources will temporarily or permanently displace prime farmland, depending on the ultimate end use and manner of site rehabilitation. As indicated in the description of the proposed action, the mining operations will require topsoil to be stripped and stockpiled in phases as mining occurs across the entire UMA. This will result in the temporary loss of farmland. However, the proposed end use for the majority of the UMA is agricultural production. Based on the proposed end use condition of the site, the project will result in the loss of approximately 600 acres of farmland classified as Prime and/or Statewide Importance. The majority of the Prime and/or Statewide Important farmland loss is a direct result of the new mine lake that will be created as a result of the mining activities.

3.14.3 Mitigation

Site reclamation will occur as mining phases are completed, and will include grading of slopes and replacement of topsoil to accommodate a return of the land use to agricultural production.

3.14.4 No-Build Alternative

Under the No-Build Alternative the amount of farmland would remain the same and the existing land use for the UMA would continue as an agricultural and institutional/research facility use.

3.15 Social and Community

3.15.1 Affected Environment

The project area has seen human impact to the landscape over the years due to agricultural and institutional uses. The surrounding community in Rosemount has developed to a range of housing, commercial and industrial uses, roadways and supporting community infrastructure. The surrounding community in Empire Township has primarily consisted of agricultural uses and mining activities.

3.15.2 Environmental Consequences

The UMA would change the landscape substantially over the course of the project, which is proposed in a series of phases (see Figure 3 located in Section 2.1.7) and is estimated to occur over a 40 year period. It is estimated that approximately 105 to 110 million tons of aggregate material will be extracted from the site over the lifespan of the operations.

As land is reclaimed, there is the opportunity to preserve greenways, open space, and water bodies. The proposed UMA Draft Mining Plan would leave approximately 370 acres of open water bodies. This added resource to the area would offer habitat for wildlife, native plantings recreational opportunities, and add aesthetic value. Providing amenities, such as open space and water bodies, can positively influence a community's quality of life. Mining activities are anticipated to occur over the next forty years and these end use amenities are a long-term objective.

During the course of the mine's life span, adjacent land uses will be exposed to mining activities. Potential impacts on existing development will be mitigated through berming, landscaping, and through permit controls and technological advances in mining operations that reduce known impacts. Future development that occurs near the UMA will have the benefit of knowing of plans for mining operations and will develop concurrently with mining operations. This is commonly the case in large mining projects where active mining occurs proximate to development.

It is not anticipated that the value of residential properties adjacent to mining operations will experience devaluation in relation to those values of nonadjacent residential properties. This conclusion is supported by a study done by Hosch Appraisal & Consulting, LLC in 2008 for Kelly Aggregate, available for inspection at the UMore Park Administrative Office. This study identified seven gravel mining sites in the Dakota County area, which assessed their potential impact to adjacent residential property values. Comparative appraisals of property values within this area suggest that residences adjacent to mining operations are similar in both value and quality, to nonadjacent residences.

The study also provides comments from buyers, brokers, and developers who have invested in property adjacent to gravel mining sites in Dakota County. Based on their experience they have not witnessed any negative impacts to their property value. In some cases, this was a result of mitigation measures that were implemented to address noise, traffic, and visual impacts.

Mitigation measures described in this Final EIS will be applied to eliminate noise, traffic, and visual impacts to the houses adjacent to the proposed UMA. The mining operation will be setback several hundred feet from existing residential properties and separated by County Road 42. Recent operational changes and equipment adjustments made by the mining industry have been successful in reducing the impacts associated with mining including extra quiet generators and/or the use of electricity. Dredging operations are relatively quiet and will not disturb the residential uses. The AUF is located in the east central portion of the UMA, which is located nearly 1-mile away from existing residential neighborhoods.

Implementation of these mitigation measures will help ensure there are no negative impacts to adjacent land values. However, unforeseen market conditions may change overtime and influence property values. These conditions will be market driven and likely will not be associated with mining operations.

3.15.3 Mitigation

Mitigation measures that address visual quality, land use impacts, noise and air pollution and traffic will serve to mitigate any potential impacts related to social and community impacts.

3.15.4 No-Build Alternative

Under the No-Build Alternative, the land would remain as agricultural and as an institutional/research facility, resulting in current social or community impacts, if any.

3.16 Economics

3.16.1 Affected Environment

The UMA Draft Mining Plan indicates that approximately 105 to 110 million tons of aggregate material will be extracted from the UMA over the life time of the mining operations. Empire Township currently has several active mining sites that are within its Overlay Mining District. Approximately 200 million tons of sand and gravel reserves are anticipated to be extracted from this district in the next 30 to 40 years as noted in the Township's Sand and Gravel Mining and Accessory Uses Final EIS dated June 2005. Sand and gravel resources from the UMA would increase the overall aggregate supply for the region by an estimated 105 to 110 million tons.

The 2002 "Aggregate Resources Inventory of the Seven-County Metropolitan Area, Minnesota" prepared by the Metropolitan Council, MNDNR, and University of Minnesota has found that forecasting future demand for aggregate is a task filled with uncertainties. The seven-county metropolitan area has little data that accurately displays the amount of aggregate resources being exported from the region. The study finds that aggregate resources are diminishing rapidly while long-term demand from urbanization must be met. Therefore, areas such as the UMA must be preserved and utilized for their aggregate resources.

3.16.2 Environmental Consequences

The University acknowledges that adding additional aggregate resources to today's existing supply may have environmental (economic) consequences. However, the "Aggregate Resources Inventory of the Seven-County Metropolitan Area, Minnesota" has shown evidence that additional aggregate resources are needed to meet future demand, and that preserving and utilizing these resources is essential. The UMA is an appropriately located aggregate supply source for the Twin Cities Metropolitan Area. The University also acknowledges that the demand for aggregate resources was much higher before the economic downturn, but anticipates the market to recover in the future.

This economic downturn proves that the overall demand for aggregate resources is solely market driven. It is difficult to assess whether or to what extent the operations of the UMA would influence the future supply and demand balance of aggregate resources and the economic impact on other mining operations in the region. Urbanization in the seven-county metropolitan area will continue to occur well into the future providing a long-term demand for aggregate resources.

The presence of additional mining operations in the area can support uses such as truck repair shops, commercial contracting and concrete/masonry industries. There are industrial and business park sites available for development west of the UMA that could benefit by new business start ups, serving to enhance the local tax base and job creation.

Gravel mining operations will provide an alternative productive use of the land resources that otherwise would continue to be used for agricultural purposes until such time as urban development becomes feasible.

Minnesota State Statutes Section 298.75 is the Aggregate Material Removal; Production Tax. This provision of state law generates revenues for county and local governments to be expended for maintenance, construction and reconstruction of roads, highways and bridges. The tax is distributed to the communities in which it is extracted or collected. Assuming demand for materials remains unchanged (which it will not), a shift in production site will result in an equal shift in distribution of the aggregate tax revenues. Payment of the tax and distribution of the tax will be consistent with state law.

The UMore Park Sand and Gravel Resource Project estimates approximately 105 to 110 million tons of aggregate material will be sold over approximately 40 years with annual sales ranging from 700,000 to 3,000,000 tons per year depending on market demand.

Extraction of materials is projected to occur in phases (see Figure 3 located in Section 2.1.7). The presence of other aggregate resources in the region will result in increased competition within the free market. Potential economic impacts to the Town of Empire may result from a loss in annual tonnage taxes that would have otherwise been collected from sites within their jurisdiction through the provisions of Minnesota State Statute Section 298.75. The potential delay in collecting a percentage of the aggregate tax is expected to primarily occur, if at all, in the first 20-plus years of operating the UMore Sand and Gravel Resource Project because the early mining phases on the UMA are proposed to occur in the portion of the project area located within the City of Rosemount. As a result, introduction of the UMore Park Sand and Gravel Resource Project to the region might initially reduce the Empire Township aggregate tax revenues. However, the later phases of the UMA are proposed to occur within Empire Township, which may increase their aggregate tax revenues and will likely extend the number of years these taxes can be assessed since there will be an overall increase in supply of available aggregate resources within the Township.

3.16.3 No-Build Alternative

The No-Build Alternative would result in approximately 105 to 110 million tons of aggregate material taken out of production as well as the loss of associated revenues.

3.17 Compatibility with Local Plans and Land Use Regulations

Historically, based on its constitutional autonomy and status as a state entity, the UMA and other property of the University of Minnesota throughout the state have not been subject to local land use controls or permitting requirements. Without waiving its autonomy or unique constitutional status, as a matter of comity and respect for the local jurisdictions in which the UMA is situated, and in order to assure that this EIS is complete and adequate, the University sets forth below a discussion of the relevant local plans, ordinances, permits, and approvals otherwise applicable to the proposal as if it were being carried out by a private entity on private land.

3.17.1 Affected Environment

City of Rosemount's 2030 Comprehensive Plan Update

The City's 2030 Comprehensive Plan Update currently identifies the UMA as "Agricultural Research (AGR)". The AGR land use designation applies to the entire UMore Park property. The Plan text acknowledges the planning efforts being undertaken for the UMore Park property and recognizes that the property will eventually urbanize over time.

The City of Rosemount anticipates a major Comprehensive Plan amendment to occur as part of the UMore Park planning efforts. In the meantime, the site of the UMA will maintain an "AGR" designation.

The Comprehensive Plan supports the interim use of gravel mining. The Land Use Element Goals and Policies ensure that interim uses allow for productive use of the land before development occurs, but does not prevent or inhibit the orderly development of land. Aggregate mining operations are required to have an approved reclamation plan that allows development to occur in a manner consistent with applicable elements of the Comprehensive Plan. The reclamation plan for mining is part of the Mineral Extraction Permit process administered through the City of Rosemount Community Development Department.

Empire Township's 2030 Comprehensive Plan Update

The Township's 2030 Comprehensive Plan Update designates this area as "University of Minnesota (UMore)" and to be part of the "Mining Overlay Area". The mining overlay land use designation has been in place since the adoption of the 1997 Comprehensive Plan. The Mining Overlay defines areas of concentrated high quality aggregate resources where mineral extractions may occur. The Land Use Plan has designated 6,000 acres of land to be included in the overlay district. The plan update incorporates the UMA into the Comprehensive Plan's Mining Overlay Area and recognizes the importance of aggregate resource production.

Rosemount/Empire/UMore Area Transportation System Study (June 2010)

The Rosemount/Empire/UMore Area Transportation System Study was conducted in collaboration with Dakota County, Rosemount, Empire Township, University of Minnesota and the Minnesota Department of Natural Resources. The study was conducted to address transportation issues in the growing areas of southern Dakota County.

The study is intended to be used as a planning tool for local agencies as they begin prioritizing future transportation improvements, regional trail alignments and greenway alignments. The study's recommendations include a series of improvements to the regional arterial roadway network that are adjacent or within the UMA project area including upgrades to CSAH 42 and CSAH 46 and a new corridor connecting Akron Avenue to Biscayne Avenue. The new north/south corridor is a long-range roadway extension that would occur in response to urban development in the region. This recommended transportation system plan will be used by study partners, including the University of Minnesota as land use and transportation plans are implemented in the future.

Dakota County 2030 Comprehensive Plan Update

The Dakota County 2030 Comprehensive Plan Update acknowledges the planning efforts that are being done for the UMA. The County's plan indicates that it will reflect the land use changes once the relevant information is available and Rosemount has updated its land use plan.

The Dakota County 2030 Comprehensive Plan also identifies parks, trails, open spaces and greenway corridors. This system includes a regional greenway that would pass through the UMA site connecting Lebanon Hills Regional Park and the Vermillion Highlands Regional Park. The plan has identified this project as a ten-year (2008 – 2018) priority. The proposed alignment has been refined as a result of Dakota County's Rosemount/Empire/UMore Area Transportation Study.

Aggregate mining of the existing regional resource within the UMA is consistent with both regional policies and the University's mission.

Land Use/Zoning Regulations

City of Rosemount

Under current zoning regulations, the UMA is zoned for "Agriculture (AG)." Gravel mining operations are generally permitted through the issuance of a Mineral Extraction Permit under this zoning classification. Rosemount City Code (11-10-4) states that "mineral extraction shall not be allowed in that portion of Rosemount located west of Akron Avenue, so as not to interfere with the orderly growth and expansion of public utilities". Within the UMA, in order to mine the resources and conduct certain ancillary operations consistent with Rosemount zoning, the areas west of Akron Avenue, south of County Road 42 will require an amendment to certain provisions of the City Code.

Empire Township

The UMA is located adjacent to the "Mineral Extraction Overlay (ME)" zoning district as defined in the Empire Township Zoning Code. The district was established to provide a planning and regulatory base for landowners and mining operators looking to expand aggregate mining areas within Empire Township.

Under the current zoning regulations, the UMA is zoned for "Agricultural Preservation District (AG)". However, the Agricultural Preservation District does not permit the use of mining operations. The "Mineral Extraction District (ME)" is the appropriate zoning district to allow for mining operations. The Township's 2030 Land Use Plan has guided the UMA to be included in the Mining Overlay Area. The Township's procedure is to zone land to ME – Mineral Extraction concurrent with issuance of a mineral extraction permit. Such a permit will be sought for the UMA.

3.17.2 Environmental Consequences

The UMA is acknowledged in all three jurisdiction's land use plans. The Dakota County, Rosemount, and Empire Township Comprehensive Plans are compatible with mining in the UMA. Zoning amendments are required for the City of Rosemount and Empire Township.

The UMA is acknowledged in the Rosemount/Empire/UMore Area Transportation Study. The University of Minnesota will continue to work with the study partners and surrounding communities as the need for future improvements become more apparent as dictated by the phasing and pace of future development.

The proposed regional greenway will need to be planned accordingly to ensure it is not in conflict with the UMA phased mining plan. The University of Minnesota will continue to work with Dakota County as future greenway alignments are refined and scheduled for implementation.

3.17.3 No-Build Alternative

The No-Build Alternative would be inconsistent with the Dakota County and Empire Township Comprehensive Plans. However, the City of Rosemount's Comprehensive Plan would be considered compatible under the No-Build Alternative.

3.18 Visual Quality

3.18.1 Affected Environmental

Visual Resources

Natural Environment

The area within and surrounding the UMA consists of a varied natural environment. Within the UMA the landscape is primarily rural in nature with farmlands dominating the land use.

Open space and sparse woodlands also speckle the area. To the north, there are higher density residential, commercial and institutional developments. The Dakota County Regional Park and Vermillion Highlands RR&WMA are located some distance southeast of the UMA These public recreational areas have ground elevations above the 950-foot elevation at the southern mine site on the UMA.

Cultural Environment

Cultural resources (i.e., historic buildings) are primarily limited to structures associated with the former GOW located on the UMore Park property (see Section 3.19).

Viewers

Travelers

Travelers are people who use the area network of roads and highways. Most travelers along County Road 42 and County Road 46 are commuters who regularly use these roads to get to home, work, or market; commercial haulers also use these roads to move goods and services. Local roads like Biscayne Avenue and 170th Street are primarily used for property access. Different types of travelers focus their attention on different types of visual resources. Commuters and haulers are interested in maintaining existing landmarks that guide them to their destination.

Neighbors

Neighbors are people who reside, work, or recreate on property near the UMA. In this area, neighbors are in residential, commercial, and institutional developments as well as users of recreational property.

3.18.2 Environmental Consequences

The creation of the proposed mining area and operation of mining activities within the UMA will have an effect on the existing visual scene and resources for both travelers and neighbors. Visual impacts will occur in various forms ranging from changing land cover type, berms, earth moving equipment, increased truck traffic, lighting, stockpiling of aggregate resources, emission plumes, and dust. The mining operations in the UMA will be conducted in a manner similar to current mining practices in the immediate area with the exception of the floating dredge mining that will occur in the created mine lake.

The level of visual impacts will vary in degree among adjacent land uses surrounding, and created topography, and the viewer's line of sight. Since the mining operations are proposed to occur in phases, the location, amount (land area), and length of time that temporary impacts occur will change as new areas are mined and spent areas are reclaimed. Long-term visual impacts are anticipated to be minimal since the land use on the UMA is proposed to be returned to agricultural. Mining and reclamation are proposed to occur in phases throughout the life of the project.

3.18.3 Mitigation

Mining operations will be setback a minimum of 350 feet from residential properties. The mining operations setback will range from 1,000 to 1,600 feet along the north and northwest portion of the project area. This expanded setback encompasses the majority of the residential land use adjacent to the UMA. As topsoil is stripped for each phase of the mining area, it will be stockpiled in a series of earthen berms that will serve as visual barriers. The berming is proposed to be constructed approximately 10 feet high with a five-foot top and 3:1 side slopes. The berms will be seeded and maintained as needed. Other vegetative plantings (trees, shrubs, etc.) around the site will be determined with each phase of the mining activities.

Potential visibility impacts will be substantially mitigated through the construction of the earthen berms and vegetative plantings around the site. Furthermore, most of the mining activities will take place at a reduced elevation below the line of site from the viewers (travelers and neighbors). The buildings and operations associated with the AUF will be partially screened from travelers along County Road 46 through the preservation of existing trees along the north side of the roadway.

3.18.4 No-Build Alternative

There would be no changes to the visual environment under the No-Build Alternative.

3.19 Archaeological, Historical, or Architectural Resources

3.19.1 Affected Environment

There is no federal involvement associated with the proposed mining operations (e.g., federal permitting and/or funding) and, therefore, the proposed project needs to comply solely with applicable State mandates governing cultural resources, including the Minnesota Historic Sites Act, the Minnesota Field Archaeology Act, and the Minnesota Private Cemeteries Act.

To assist in compliance with these State mandates, a literature review and Phase IA archaeological survey was completed. The Minnesota Historic Sites Act (MS 138.661-138.669) requires state agencies and departments to take into account the effects of the projects they fund or permit on historic properties, which are those listed on the National Register of Historic Places (NRHP) or State Register of Historic Places. The results of the literature review indicated that no architectural history properties listed on the NRHP or State Register are located within the UMA. Therefore, no further work concerning architectural history properties is required.

The objective of the Phase IA archaeological survey was to identify any archaeological properties within the project area that may require further investigation in order to determine their potential eligibility for listing on the NRHP, and to assess the potential for unknown archaeological resources located within the project area that may require additional survey. The study area for the archaeological survey included all areas of proposed construction activities or other potential ground-disturbing activities associated with future development. The Phase IA archaeological survey encompassed the UMA study area.

3.19.2 Environmental Consequences

The Phase IA archaeological survey included a systematic walk-over of the entire project area that was safely accessible at the time of the survey in order to assess the potential for archaeological resources. No archaeological sites were recorded during this survey, nor did the area appear to have potential for containing intact archaeological resources. The areas that were avoided due to safety concerns are suspected dump locations or other agricultural related activities that may have created a past release. These areas were observed from adjacent property and do not appear to be likely locations for significant intact archaeological sites. No further archaeological investigations are recommended prior to development. A letter correspondence from the State Historic Preservation Office was received in August 2010 that concurred with these findings.

Twenty-nine properties were identified within the UMA that were over 45 years old. No analysis or recommendations were made regarding these properties during this survey; however, should the project receive federal funding and/or permitting in the future, additional survey may be required to evaluate the potential eligibility of the properties for listing on the NRHP. Three properties characterized by some as "*de facto landmarks*" within the current

project area are not eligible for listing on the NRHP, and current state mandates do not require these landmarks to be preserved or integrated into future development.

3.19.3 No-Build Alternative

There would be no changes to archeological, historical, or architectural resources under the No-Build Alternative.

3.20 Cumulative Potential Effects

3.20.1 Background

This section describes the potential for cumulative potential effects, both direct and indirect, from the UMore Park Sand and Gravel Resource 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).

3.20.2 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 social, economic, and environmental resources that may result from operation of the UMore Park Sand and Gravel Resources 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 UMore Park Sand and Gravel Resources EIS, as well as information available for the other projects identified in the SEAW (dated January 2009) and the Scoping Decision Document (dated April 2009).

The proposed UMore Park Sand and Gravel Resources 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. 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 traffic impacts, surface water impacts, ground water impacts, and economic impacts associated with adjacent gravel mining operations.

<u>Traffic</u>
Traffic from past, present, and reasonably foreseeable future development occurring outside of the UMA has been included in traffic modeling completed for the project as the background condition. Traffic modeling was conducted using the Met Council's Twin Cities Regional Model, which includes 2030 socio-economic data that was updated in 2009. The EIS identifies important development projects that fall within study area traffic analysis zones (TAZs). Figure 47 depicts the study area for potential cumulative traffic impacts.

<u>Surface Water Runoff</u>
Development projects with cumulative potential effects for surface water impacts are those projects that are upstream and downstream from the project. Cumulative potential effects associated with storm water involve the collective changes in quantity and quality and their

effect on the Vermillion River and Mississippi River. In general, under current conditions, storm water runoff is conveyed directly to the Mississippi River or Vermillion River with no treatment. Given that the entire area is currently agricultural, the project included in this analysis will not substantially alter the quantity of storm water runoff generated in the area, while improving the quality of storm water runoff.

Groundwater Resources

The University has constructed a groundwater flow model that incorporates effects on groundwater at the UMA and in the surrounding area. The model, as described in Barr (2009a), 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 run to simulate current conditions including explicit representation of pumping wells and surface water bodies as well as implicit land use assumptions (incorporated via the Soil Water Balance model). The model was found to calibrate well to existing conditions and effectively includes virtually all of the significant effects that are anticipated within the current flow system as per step 1 above.

As discussed in Section 3.8, groundwater use for the mine site was evaluated and optimized to minimize impacts at the UMore boundary. This analysis showed that the aggregate of pumping activity at the UMA in the context of other effects in the model amounts to no significant impact, therefore the cumulative potential effects of the mining along with the other effects represented by the flow model are not significant.

Economic Impacts (related to adjacent gravel mining operations)

Existing and future sand and gravel mining activities in Empire Township will have a cumulative potential economic effect when added to the resources planned for extraction from the UMore Park Sand and Gravel Resources Project. The cumulative potential effect will be an increased supply of materials available to the market, possibly influencing the amount and distribution of the tax authorized by Minn. Stat. 298.75.

Step 2 – Establish the geographic scope for the analysis

The following method was used in determining an environmentally relevant area (the Cumulative Potential Effects Study Area, "CPESA") to identify projects that might reasonably be expected to affect the same environmental resources as the UMore Park Sand and Gravel Resource Project:

for traffic impacts—Major projects within the travel shed were studied for traffic forecasts including TAZs 169, 221, 222, 223, 224, 225, 226 and 227.

for all other impacts—Major projects that generally fall within an area one-mile from the edge of the UMA. Projects that are within the mile area but also extend beyond it are included to their full extent (see Figure 50).

Step 3 – Establish the time frame for the analysis

The year 2020 was defined as the time frame for the cumulative potential effects analysis. The year 2020 reflects the maximum time horizon for reasonably foreseeable projects and is based on the premise that Comprehensive Plans will be updated within the next 10-year time horizon. It should be noted, however, that several of the impact-specific analyses earlier in this Draft EIS use different time parameters for reasons explained in those analyses.

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

Past, present, and reasonably foreseeable projects were identified based on conversations with Empire Township, City of Rosemount, and Dakota County planning and community

development staff; on existing Capital Improvement Plans; on current comprehensive plans and area master plans; and on the University's knowledge of the local jurisdictions. 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 (2009) or are under construction. This is evident by a final plat approval or issuance of a building permit for major commercial developments.
    a. Waterford Commons: This development project is a three story mixed use development with 108 residential units and roughly 13,000 square feet of commercial space. It is located near the intersection of County Road 42 and State Highway 3.
    b. Fairview Clinic: 19,600 square feet of office development located near the intersection of County Road 42 and State Highway 3.
2. Present projects have had a formal application for entitlements submitted to a local governmental unit (i.e. a rezoning, preliminary or final plat, site plan, conditional use, Planned Unit Development, etc.) Present projects include the following:
    a. Glendalough Residential Development: 155 platted lots.
    b. Harmony Mixed Use Development: 519 residential units.
    c. Rosewood Villas: 154 platted lots.
    d. There are two active gravel mining operations within Empire Township located south of the project area within one-mile of the UMA boundary. Two additional gravel mining operations are located south and west of the UMA, but fall outside of the one-mile cumulative effects study area.
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 population change, job creation, and/or increases in traffic. Identified reasonably foreseeable future project include the following:
    a. County Road 42/Akron Avenue AUAR: Development of approximately 1,500 acres of land located generally north of County Road 42 (145th Street) along Akron Avenue was evaluated through completion in 2006 of an AUAR. The study projected a range of housing development from 5,000 to 8,500 new units and a range of 844,000 to 1.2 million square feet of new commercial development. Development was anticipated to occur within 10 years depending on market conditions.
    b. UMore Park Phase One West: The University of Minnesota completed the UMore Park Master Plan in 2008. This plan establishes a long term vision for the entire UMore Park property. Phase One West includes urban development of an area that lies east of the UMA. This area includes approximately 140 acres of land area and approximately 750 housing units, supporting commercial services of 3,400 square feet, institutional and educational facilities and a significant amount of park and open space area.
    c. Empire Township has a Gravel Mining Overlay District representing nearly 3,600 acres with the potential of mining over 200 million tons of sand and gravel over the next 30 to 40 years including mining areas in current operation. (Source: Empire Township Sand and Gravel Mining and Accessory Uses Final EIS- 2005).

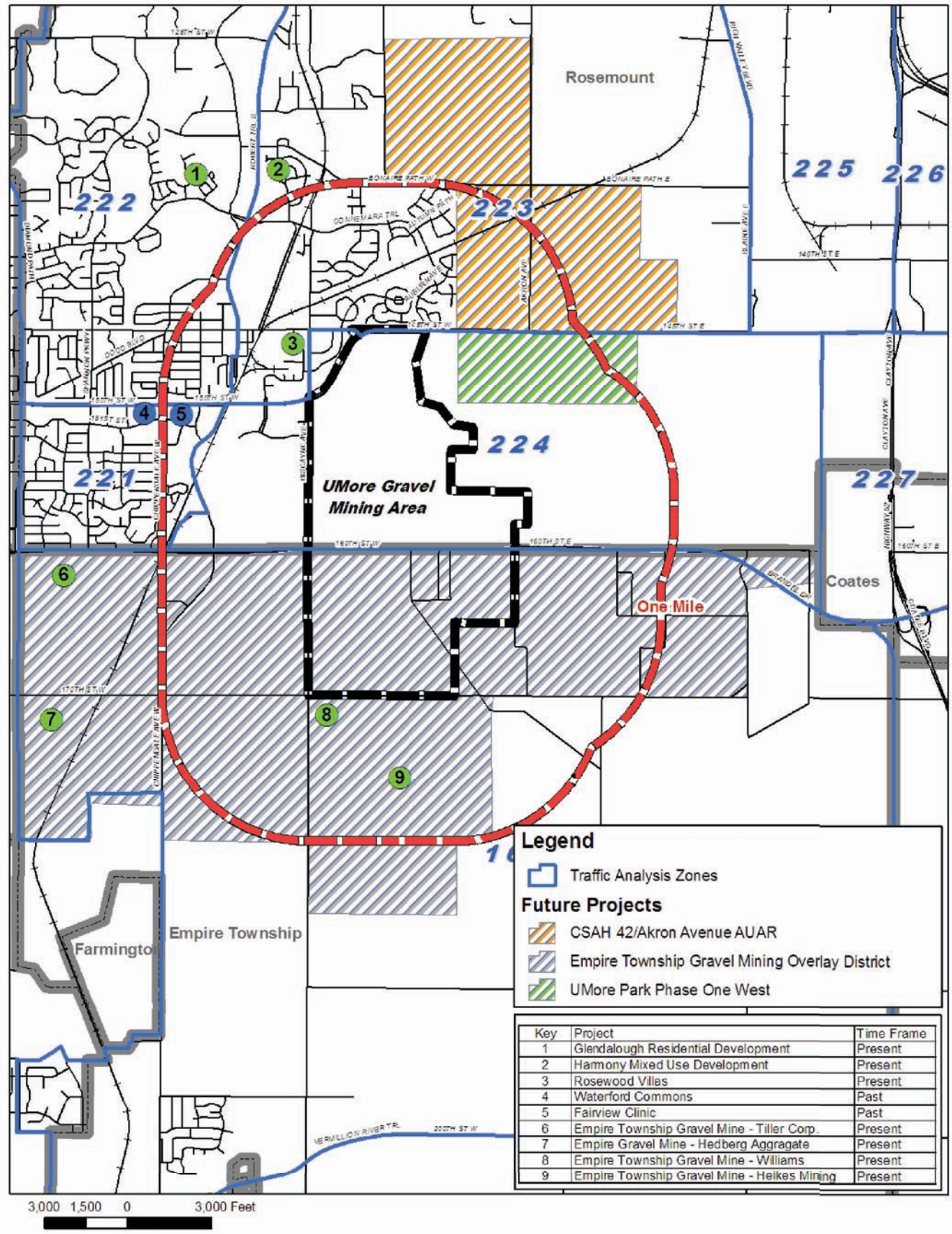

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Figure 50

Cumulative Effects Analysis—Projects

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Projects that have multiple phases stretched across past and present categories were included in their respective category if enough detail is provided for each phase. Otherwise, the entire project was considered as a past project.

3.20.3 Affected Environment

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

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

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

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

The CPESA is a developing area consisting of existing urban development, vacant (development ready) lands, gravel mining, open space and agricultural uses. The majority of the CPESA is pervious surface. No substantial change to the amount of impervious surface is anticipated with the proposed project; therefore, no significant adverse storm water cumulative effects are anticipated as a result of the project. See Section 3.7 for the UMA Surface Water Drainage analysis.

An important *ecosystem* is the Vermillion Highlands Area, which falls partially within the one-mile CPESA. Urbanization of portions of Rosemount will have the potential to add to the impacts generated by the UMore Park Sand and Gravel Resource Project. Urban development will have a greater potential, if not properly mitigated, to place stresses on the Vermillion Highlands, particularly through changing surface and ground water patterns. Gravel mining operations in the region are planned to occur on parcels comprising over 5,200 acres resulting in the potential extraction of over 300 million tons of sand and gravel resources. Effects on water resources were analyzed on a cumulative basis and are described in Sections 3.7 and 3.8. Effects on wildlife, habitat and natural resources are described in Section 3.4, 3.5, and 3.6.

The existing roadway system and planned roadway improvements contemplate growth in the region. Development projects within the region have been considered as part of the background conditions in regional traffic modeling. The cumulative effects of development in the region and the traffic generated by the UMA as well as baseline traffic conditions are described in Section 3.10.

Population growth is expected within Empire Township, the City of Rosemount, and surrounding municipalities. This growth will undoubtedly require access to sand and gravel resources for construction needs related to municipal infrastructure and residential and commercial purposes. Access to a large local supply of sand and gravel will help keep costs of materials affordable. The UMore Sand and Gravel Resources Project will not result in any direct increase in the number of households or population growth.

Within the CPESA, 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 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.

Baseline conditions have been established by groundwater monitoring that indicate groundwater flow within the UMA is northeast toward the Mississippi River. Therefore, there are no apparent issues with regard to groundwater supply or impact to the Vermillion River under current or proposed mining activities. See Sections 3.8 and 3.9 for the UMA Groundwater and Water Use analyses.

There are a number of current mining operations within Empire Township that extract sand and aggregate resources. These operations also provide a source of jobs related to the mining activities. If demand for aggregate holds steady, the cumulative effect of the gravel mining operations may be a shift between local communities in jobs or in revenues received through the aggregate tax (see Minnesota State Statutes Section 298.75) rather than a cumulative impact. If demand for aggregate materials increase, then the project will provide additional indirect jobs stimulating the local and regional economies.

3.20.4 Environmental Consequences

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

Step 9 – Determine the magnitude and significance of cumulative effects

Traffic

Projects within the CPESA generally result in the intensification of land uses and are customary in growing metropolitan areas. The incremental cumulative potential effect of these projects when considered in conjunction with the anticipated UMA impacts (and the Empire Township mining potential) are reflected in the detailed traffic analysis located in Section 3.10 of this document.

Surface Water

Urban development within the CPESA will cause collective changes in the quantity and quality of storm water runoff that ultimately makes its way to the Vermillion and Mississippi Rivers. Given that the CPESA is mostly agricultural, the projects included in this analysis will not substantially alter the quantity of storm water runoff generated in the area, and will improve the quality of storm water runoff by providing a collection and treatment systems.

It is reasonable to conclude that the cumulative runoff conditions associated with implementation of the project considered in this assessment will represent more favorable conditions than those that currently exist. This conclusion is based on the understanding that the area affected by the project is currently agricultural with no storm water treatment provisions. In contrast, the conditions following the proposed action will improve storm water runoff quality while not substantially impacting runoff quantity as compared to existing conditions. See Section 3.7 for the UMA Surface Water Drainage analysis.

Groundwater

Groundwater modeling indicates that neither the current nor proposed water supply demands for the project are likely to impact the identified resources. No additional pumping from other large projects requiring groundwater use are anticipated within 1 mile of the UMore Mining Area within the next 10 years.

Economics (related to adjacent gravel mining operations)

Direct job growth from the mining operations in Empire Township and the UMA Project are anticipated to be minimal as a result of continued development and technological advances in the mining industry. Accurate projections of secondary jobs (trucking, service industry and accessory aggregate related industries) that are a result of a growing mining presence are

difficult to predict. However, it is safe to assume that a growth in mining activities will stimulate aggregate related industries and service providers.

The presence of another supply source of high quality aggregate resources in the region will result in additional competition within the market. Generally, there is a limit to what the market will demand for aggregate resources, and existing mining operations located in Empire Township may be affected due to competitive pricing and the demand for these resources being spread out over multiple sources.

Potential economic impacts to the Town of Empire may result from a loss in aggregate taxes that would have otherwise been collected from gravel operations within their jurisdiction. The potential delay in collecting a percentage of these taxes is expected to primarily occur in the first 20-plus years of operating the UMore Sand and Gravel Resource Project because the early mining phases on the UMA are proposed to occur in the portion of the project area located within the City of Rosemount. As a result, introduction of the UMore Park Sand and Gravel Resource Project to the region could initially reduce the Empire Township revenues from the aggregate tax. However, the later phases of the UMA are proposed to occur within Empire Township, which may increase their aggregate taxes and will likely extend the number of years these taxes will be assessed since there will be an overall increase supply of available aggregate resources within Empire Township. Therefore, the economic impacts from the UMore Sand and Gravel Resources Project are thought to temporary, but will occur over a number of years.

Step 10 – Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects

The assessment concludes no significant adverse cumulative potential effects are anticipated. This conclusion is based on the assumption that the identified mitigation measures are implemented. As a result, no additional or modified alternatives and mitigation measures will be considered.

Step 11 – Monitor the cumulative effects of the selected alternative and adopt management policies as necessary

This step requires the monitoring of ongoing activities that may be implemented as part of the permitting process for gravel mining operations.

3.20.5 Conclusions

Cumulative potential effects to resources resulting from the proposed UMore Park Sand and Gravel Resources Project and the contribution of incremental effects from other past, present, and reasonably foreseeable future actions within the environmentally relevant area are not anticipated to be substantial. The UMA's contribution to cumulative potential effects can be considerably reduced by the mitigation efforts that will be incorporated into the daily operations of the UMA. Governmental agencies responsible for regulating effects on social, economic, and natural resources through permitting and approvals, in conjunction with planning and zoning processes at the local government level will assist in the protection and minimization of impacts on these resources. Specific BMPs to avoid and/or minimize cumulative potential effects will be identified during the permitting and approval processes for each of the projects, as applicable.

In the context of the existing regulatory framework and the mitigation activities for the proposed project impacts, the overall cumulative potential effects to social, economic, and environmental resources are expected to be minimal. Furthermore, all future major

developments within the cumulative potential effects study area will be subject to local, state, and federal environmental reviews where potential impacts to the natural and built environments will be evaluated.

3.20.6 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 Mitigative Measures

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

4.1 Land Use

As discussed in Section 3.1, mining operations will be setback a minimum of 350 feet from residential properties. The mining operations setback will range from 1,000 to 1,600 feet along the north and northwest portion of the project area. This expanded setback encompasses the majority of the residential land use adjacent to the UMA. In addition, berming will be constructed 10 feet high with a 5-foot wide top and 3:1 side slopes as indicated on the Mining Plan, which is available for review at the UMore Park Administrative Office. The berm will be seeded and maintained as needed by the operator. As mineral extraction transitions to lower elevations of depth, the equipment and the extraction area will not be visible to the adjacent residential properties on the north side of County Road 42.

Other activities that will ensure the operation complies with local planning initiatives include:

- The University will file a zoning amendment with Empire Township, and
- The University will file a zoning amendment with the City of Rosemount.

4.2 Environmental Hazards

Mercury Soil Interim Corrective Action

During the SSIRI, mercury was detected at concentrations above health risk-based standards for industrial settings in soils at the base of the drainage ditch located in the northwestern corner of the Central Services Station (SOC 5; Figure 8). The magnitude and extent of the mercury impacted soils was determined with additional soil sampling analysis conducted and are reported in the SSIRI Report (Barr, 2010a). The University provided notice to the MPCA of the mercury release identified in SOC 5 and the work plan for the interim corrective action.

The mercury impacted soils were removed and disposed at a permitted solid waste disposal facility. Confirmation soil samples were collected from the excavation base and sidewalls and analyzed to verify that the remaining soils (adjacent to the excavation) did not contain mercury at concentrations above health risk-based standards for residential/unrestricted use. Approximately 47 cubic yards of soil were removed and disposed of off-site.

Clean up Criteria and Environmental Contingency Plan Contents

In order to be protective of human health and the environment, the University has assumed that the MPCA's most restrictive health risk-based soil screening criteria referred to as Tier 1 Soil Reference Values (SRVs) will apply to soils excavated in the UMA. This assumption is also intended to provide maximum operational flexibility so that once mining extraction begins; the soil and gravel derived from the UMA can be managed without restrictions, consistent with typical mining operations.

The investigation results do not indicate any areas of wide-spread impacts from hazardous substances or petroleum constituents above the Tier 1 SRVs within the UMA. Based on the results of the investigations, the majority of the soil within the UMA is below the Tier 1 SRVs and is free of soil impacts that might interfere with mining operations.

Soil stripping and gravel excavation in these areas will be guided by an MPCA-approved ECP that will be used throughout mining operations. The ECP will address unforeseen

circumstances, or releases of petroleum products and hazardous substances that will be addressed prior to, or during mining.

Circumstances addressed in the ECP include buried debris, underground storage tanks, old wells, and previously unknown release areas. Where evidence of a release is discovered during mining operations, appropriate actions will be taken to control the extent of the potential release and to remove or remediate the impacted media in ways that protect human health and the environment. The ECP will also include operator awareness training, routine inspection of stripped areas and active mine face areas, and University oversight of specific areas such as the SOCs, abandoned farmsteads, and previously closed petroleum and pesticide release areas.

Summary of Presumed Response Actions

The investigation results indicated that a few isolated areas of the UMA exhibit evidence of a release of petroleum products or hazardous substances. These areas may require additional investigation and specific MPCA-approved RAPs where targeted soil clean up is needed. The actions are described below.

SOCs 1-3 and 6-8

No additional investigation or remediation is required in these areas. Future mining operations in these areas will be performed in accordance with an ECP. The slightly elevated PAH concentrations found in the former rail bed portion of SOC 1 suggest that management of soil during mining operations that intersect the former rail bed may be necessary. The northwestern arm of the rail line transects Phases 2 and 3 of the mining operation. This area will likely require a RAP to ensure the proper management of overburden soils.

The portion of the former rail bed that extends toward along the eastern edge of the UMA is located within tilled areas where the soil has been well mixed with topsoil over the years and therefore is not likely to be impacted or pose an exposure risk. These areas will likely not require additional Response Action Plans.

SOC 4

Additional investigation will be needed to document the extent of the debris and characterize the debris material for off-site disposal at a permitted solid waste disposal facility prior to the start of mining operations. The debris is not considered a significant threat to groundwater.

SOC 5

Additional soil and groundwater sampling within SOC 5 will be conducted prior to mining. Each of the areas within SOC 5 where soil sample results were above a Tier 1 SRV will be subjected to additional soil sampling so that appropriate response actions can be planned. The response actions in these areas will be addressed in a specific RAP for each area and approved by the MPCA. Mercury in soils at SOC 5 have been addressed by the Interim Corrective Action as described above. Future sampling and soil excavation will be conducted as needed to remove affected areas.

4.3 Cover Types

Mitigation for changes in cover types will be addressed in greater detail as part of the reclamation plan. In refining the reclamation plan, the University will work with the City of Rosemount including their tree preservation ordinance. Based on the Draft Mining Plan, non-native grassland eliminated by mining will be replaced at twice the original acreage. Additionally, native grassland will also be planted; no native grassland currently exists on the site. Mitigation will be completed to replace the lost wetland acres, as described in Section 3.6.

4.4 Fish, Wildlife, and Ecologically Sensitive Resources

The mitigation commitments identified under Sections 4.3, 4.5, and 4.6 will minimize potential impacts to fish, wildlife, and ecologically sensitive resources that may be impacts as a result of the proposed action.

4.5 Threatened and Endangered Species

No mitigation is required for Blanding's turtle, mesic prairie, or the Vermillion River trout stream. No mitigation is necessary to offset direct impacts to loggerhead shrike on the UMA, however, implementation of the site reclamation plan (i.e. planting grasslands on 3:1 slopes, along some of the site's perimeter, and around the lake) could benefit loggerhead shrike. If the project requires tree replacement, appropriate trees will be selected and properly sited in order to benefit loggerhead shrike habitat.

4.6 Wetlands

All wetland impacts will be mitigated following Minnesota Wetland Conservation Act (WCA) and MPCA replacement requirements. Note that MPCA rules require compensatory mitigation for unavoidable impacts to all wetlands, regardless of their jurisdictional status. Wetland mitigation will consist of on-site replacement, off-site replacement, or purchase of wetland bank credits.

4.7 Surface Water Drainage

The analysis indicates the proposed UMore Sand and Gravel Resources Project will perform well in terms of controlling surface runoff rate and volume. The proposed mine lake will reduce offsite nutrient and sediment loadings compared to existing conditions. Pre- and post-project monitoring should be performed to measure (rather than estimate) discharge rates and pollutant loadings coming from the site under existing and proposed action conditions. In addition, the nutrient concentrations in the mine lake should be monitored following the completion of the proposed mining project.

Unavoidable Adverse Impacts

This evaluation revealed no unavoidable significant adverse impacts from the UMore Sand and Gravel Resources Project. The proposed action would reduce storm water runoff rate and volume, and reduce nutrient and sediment loads leaving the UMA. Additionally onsite receiving water impacts would meet existing MPCA criteria for deep lakes

4.8 Groundwater Flow Modeling

The predicted effect of a spill will be confined to the area immediately down gradient of the UMA within the UMore property boundary. Ancillary operations will be located in area underlain by a relatively thick unsaturated zone (relative to the active aggregate extraction areas) and the low permeability clay till. Potential for releases of hazardous substances or petroleum products will also be managed in accordance with appropriate spill prevention, control, and containment measures.

Detailed plans for environmental protection and/or monitoring will be addressed during the mine permitting stage. Consideration for future monitoring should include the geology and groundwater flow directions in the UMA relative to drinking water supply wells in order to evaluate appropriate locations for monitoring wells for the monitoring network.

The hypothetical release simulation indicates that the constituents of concern would exhibit concentrations that would be below detection limits within less than 600 feet of the release

area. The simulation suggests that field or other indicator parameters may be more effective monitoring parameters than the source constituents themselves. This is because these indicator parameters reflect changes in general aquifer chemistry (e.g. reduction in dissolved oxygen) that often extend beyond the limits of the plume of primary constituents and/or precede the plume and that may serve as an early warning of a release. If an increase in the indicator parameters is observed, then additional parameters can be added in subsequent monitoring events to determine if a release has occurred.

4.9 Water Use

Mitigation has been incorporated into the proposed mining operations to limit the use of groundwater. The potential effects of groundwater withdrawal will be mitigated primarily by use of a clay-lined wash basin, seepage from the basin to groundwater, and the intermittent pumping of the concrete production well. Increasing the thickness of the liner would theoretically decrease the demand for makeup water, depending on the concentration of fine sediment in circulation, but would come at the cost of increased energy and infrastructure to construct the liner. The increased cost would not significantly reduce the effect on the resource at the UMA boundary and therefore was concluded that a thicker liner would not enhance the sustainability of the operation.

The mine lake itself would result in a net increase in water level elevation relative to current conditions. Although this effect may be significant, it is likely a positive effect and therefore is unlikely to result in environmental impact to other users or habitats that rely on groundwater.

4.10 Traffic

Several of the roads serving the UMA site are currently gravel roads. There is a concern about having a UMA access driveway on these gravel roads and mining trucks using these gravel roads. If a UMA access point is desired on a gravel road, how to handle the unpaved roadway near the proposed UMA access point will be included in the driveway permit required from the road authority. If UMA truck traffic is expected to be substantial, mitigation measures may include paving the section of the gravel road to be used by UMA site-generated traffic and prohibiting UMA truck traffic on certain sections of gravel roads.

Though traffic operations are not driving the need for improvements at most study intersections, safety concerns resulted in recommendations for turn lane safety improvements at access points to the UMA site. With mining trucks slowing down and possibly stopping on high speed and/or high volume mainline roads, left turn lane and right turn lane additions are recommended on paved mainline roads at the UMA access driveways.

The UMA site-generated traffic is not expected to have a substantial impact on traffic operations at most of the study intersections or on any of the study roadways. The traffic analysis for 2030 Build conditions, which assumed the turn lane safety improvements and the improvements recommended for 2030 No Build conditions were in place, indicated only one additional improvement was needed to provide adequate traffic operations at the study intersections. This one improvement involved changing the two-way stop control at the County Road 46/Akron Avenue intersection to traffic signal control. The implementation of this improvement will be dependent upon actual traffic volumes. If the actual traffic volumes are less than the forecasted volumes and no MnMUTCD signal warrants are met at the intersection, then a traffic signal will not be installed. Furthermore, implementation of this improvement, if required, will be based on roadway jurisdiction and relative contribution of traffic.

4.11 Noise

Traffic-Related Noise Mitigation Options

Noise associated with increased heavy truck traffic from the mining activities over the duration of the project is minimal, based upon peak hour traffic increase calculations for the regional transportation system. This is illustrated in the noise modeling results that indicate there are no additional daytime or nighttime exceedances attributable to the proposed project. Therefore it can be concluded that the truck traffic from UMA operations is not likely to be extensive during nighttime hours and represents a small fraction of the total traffic noise along each of the analyzed roadways. Furthermore, given that local and county roads are not subject to state standards and subsequent mitigation requirements, no mitigation is required.

Mining-Related Noise Mitigation Options

Mining operations will be setback a minimum of 350 feet from residential properties. The mining operations setback will range from 1,000 to 1,600 feet along the north and northwest portion of the project area. This expanded setback encompasses the majority of the residential land use adjacent to the UMA.

During the duration of the mining operation, equipment, and hauling operations will occur at varying locations and elevations. Most often, with the setback provisions noted above, the distance from these operations to sensitive noise receptors will be sufficient, and substantial mitigation will not be needed. The 10-foot berm which will be constructed along the perimeter of the actively mined areas adjacent to residential land uses will further reduce operational noise levels.

Properly working equipment, including mufflers, shall be maintained on all internal combustion engines. The site layout, including earthen berms, will be such that topography can be used to block noise as much as possible. Specific measures that could be applied to reduce mining related noise may include the following:

- Asphalt facilities should be located on the property and oriented so that the exhaust fan is directed away from sensitive receivers,
- Truck speeds should be kept as low as possible for all on-site roads,
- Use of an earthen berm as indicated in the Draft Mining Plan,
- Road surfaces should be maintained to reduce tire noise and airborne vibration,
- Standard acoustic backup alarms should be replaced with strobe lights at night and with new technology as it becomes available and permitted by the Occupational Safety & Health Administration (OSHA) and the Mining Safety Health Administration (MSHA),
- Squeaks and squeals should be minimized by regular maintenance and lubrication of equipment, and

Any future redevelopment of the UMA should minimize the introduction of new receivers that may result in any noise impacts. This can be accomplished by locating and scheduling redevelopment in locations where operations are complete.

4.12 Air Quality

Minnesota Rule 7011.0150 reads, “No person shall cause or permit the handling, use, transporting, or storage of any material in a manner which may allow avoidable amounts of particulate matter to become airborne. No person shall cause or permit a building or its appurtenances or a road, or a driveway, or an open area to be constructed, used, repaired, or demolished without applying all such reasonable measures as may be required to prevent

particulate matter from becoming airborne. All persons shall take reasonable precautions to prevent the discharge of visible fugitive dust emissions beyond the property line on which the emissions originate." Some federal regulations also limit the visible thickness of dust plumes (a term called opacity) and the amount of time emissions can be seen by the naked eye.

Aggregate Processing and Handling Emissions

Mitigation of dust emissions from aggregate processing and handling operations includes two basic options: reducing the number of processing and/or handling operations and applying dust control. The numbers used in this analysis are a worst case estimate. The analysis assumed maximum production levels and a maximum number of pieces of equipment and further assumed 100 percent of the material passes through every operation.

There are a number of dust control techniques that will be applied within each of the on-site mining facilities, including general operational techniques and specific applications:

- Use of conveyors for transport of a portion of raw material onsite to limit the number of internal truck trips;
- Active reclamation will minimized exposed open areas;
- Use of water to minimize fugitive dust emissions;
- Wet suppression;
- Chemical Stabilization;
- Sequenced mining of smaller subphases.

These dust control techniques will reduce the particulate matter from the proposed mining operations.

Internal Haul Road Emissions

The haul roads contribute to a majority of the total projected emissions. This is typical of such operations. With respect to internal haul roads, there are two basic mitigation options: shorten the length of haul roads, and/or apply dust control. The haul road distances at this time are estimates, but on average, are believed to be a half mile or less for a round trip. Any reduction in haul road distances will significantly reduce the haul road emissions.

Two control efficiencies, 50 and 75 percent, were provided in the calculations to demonstrate the difference in overall emission totals and available control options. Requirements for achieving 50 and 75 percent control efficiencies can be found in the MPCA Nonmetallic Mineral Processing Air Emissions General Permit and Technical Support Document (Reference 2).

Typical unpaved haul road controls include:

- Wet suppression,
- Chemical Stabilization, and
- Reduction of silt content by gravel surface application

Operations in the UMA will apply wet suppression (water application) to the unpaved haul roads. Water application keeps the road surface wet to control emissions. The control efficiency of unpaved road watering depends on: 1) the amount of water applied per unit area of road surface, 2) the time between reapplications, 3) traffic volume during that period, and 4) prevailing meteorological conditions during the period.

Concrete and Asphalt Plant Emissions

Baghouses (e.g. fabric filters) will be used to control particulate emissions from the asphalt plant and concrete plant operations since they have been proven to provide a high level of emission control for these types of operations. Mitigation approaches related to haul roads and material processing and handling discussed above also apply to handling raw materials and shipment of finished products associated with the asphalt and concrete plant operations.

4.13 Farmland

Site reclamation will occur as mining phases are completed and will include grading of slopes and replacement of topsoil to accommodate a return of the land use to agricultural production.

4.14 Social and Community

Mitigation measures that address visual quality, land use impacts, noise and air pollution and traffic will serve to mitigate any potential impacts related to social and community impacts.

4.15 Visual Quality

Mining operations will be setback a minimum of 350 feet from residential properties. The mining operations setback will range from 1,000 to 1,600 feet along the north and northwest portion of the project area. This expanded setback encompasses the majority of the residential land use adjacent to the UMA. As topsoil is stripped for each phase of the mining area, it will be stockpiled in a series of earthen berms that will serve as visual barriers along the property boundaries. The berming is proposed to be constructed approximately 10 feet high with a five-foot top and 3:1 side slopes. The berms will be seeded with a 340 native mix and maintained as needed. Other vegetative plantings (trees, shrubs, etc.) around the perimeter of the site will be determined with each phase of the mining activities.

Potential visibility impacts will be substantially mitigated through the construction of these earthen berms and vegetative plantings around the site. Furthermore, most of the mining activities will take place at a reduced elevation below the line of site from the viewers (travelers and neighbors). The buildings and operations associated with the AUF will be partially screened from travelers along County Road 46 through the preservation of existing trees along the north side of the roadway.

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5.0 Public Involvement

The University of Minnesota is committed to public involvement/outreach at all levels in the project development process. The University will continue to engage area property owners, business owners, residents, and agencies representatives. The public involvement/outreach efforts have included the following:

- Public Meetings
- Draft EIS Public Hearing
- Technical Advisory Committee (TAC)
- Agency and Jurisdictional Coordination
- Project Web Site
- Media

5.1 Public Meetings

The University of Minnesota hosted two public meetings leading up to the preparation and publication of the Draft EIS. A preliminary scoping meeting was conducted on November 6, 2008 prior to the start of the scoping period to receive suggestions for the SEAW. The second public meeting was the February 5, 2009 Public Scoping Meeting. The scoping meeting focused on presenting the results of and receiving feedback on the Scoping EAW and SDD. 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 EIS.

Since publication of the Draft EIS, two neighborhood meetings were held on August 25th and August 26th, 2010 with neighborhood associations located north of County Road 42. The purpose of these meetings was to share information regarding the proposed mining operations and to receive feedback from area property owners.

5.2 Draft EIS Public Hearing

The Draft EIS was published on June 28, 2010, which also marked the beginning of the official public comment period. A public hearing was held on July 22, 2010 at the Rosemount Community Center. This meeting afforded an opportunity for stakeholders to provide comments on the Draft EIS. A presentation was given that outlined the findings of the Draft EIS. An open house was conducted in conjunction with the public hearing where attendees were allowed to review study materials and ask questions to staff. Attendees were able to submit comments for the official hearing record through oral testimony to a court reporter or through submitting a written comment card.

Comments received during the official comment period on the Draft EIS and at the Public Meeting/Hearing have been used to prepare this Final EIS.

5.3 Technical Advisory Committee (TAC)

The TAC was organized and convened by the University of Minnesota to meet periodically during the planning and design phases of the project. The group is comprised of state, county, and local agency representatives. The TAC advises the University staff on issues related to potential impacts on or opportunities for communities adjacent to UMore Park and potential impacts on natural resources as a result of the Sand and Gravel Resources Project. The responsibilities of the members have included appointing a representative and providing timely and relevant comments on review documents. The responsibilities of the University have been to convene the group, arrange for meeting space, provide relevant and timely information, and consider the representatives' comments in decisions related to the UMore

Sand and Gravel Resources Project. Throughout the planning process, the University has been and will continue to coordinate with various agencies and jurisdictions to ensure the proper processes are followed and approvals requested. More importantly, the ongoing coordination and communication with these representatives provides valuable input and guidance through the project development process. Some of the organizations that have played important roles include:

- City of Rosemount
- Empire Township
- Dakota County
- Minnesota Pollution Control Agency
- Minnesota Department of Natural Resources
- Metropolitan Council
- Dakota County Technical College

5.4 Project Web Site

An information project web site has been established on the World Wide Web at www.umorepark.umn.edu/Gravel_Resources_and_Assessment.html. The site provides a means for distributing available information and gathering input with an e-mail reply feature. The site is periodically updated to reflect project developments and to address new issues.

5.5 Media

The University recognizes the importance of the media in conveying project information to the public. University staff is in regular contact with the various local media outlets (newspaper, television, radio) and the media has attended the previously mentioned public meetings.

6.0 Approvals, Permits, or Consultation

Historically, based on its constitutional autonomy and status as a state entity, the proposed UMA and other property of the University of Minnesota throughout the state have not been subject to local land use controls or permitting requirements. Without waiving its autonomy or unique constitutional status, as a matter of comity and respect for the local jurisdictions in which the proposed action is situated, the University has identified the relevant local ordinances, permits and approvals otherwise applicable to the proposed action if it were being carried out by a private entity on privately owned land. 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 Rosemount, Empire Township, Dakota County, and other appropriate jurisdictions has and will continue to occur.

Table 42 – Potential Permits and Approvals

Government Agency	Potential Approval, Permit, or Consultation
State Minnesota Pollution Control Agency	State Disposal System Construction Sand and Gravel, Rock Quarrying and Hot Mix Asphalt Production Facilities NPDES Permit (Including Storm Water Pollution Prevention Plan) Air Emissions (For Plant Operations/ Equipment) Spill Prevention Plan Response Action Plans (RAPs) Environmental Contingency Plan (ECP)
Minnesota Department of Natural Resources	Water Appropriations Permit
State Historic Preservation Officer	Coordination/Consultation
Local City of Rosemount	Ordinance Amendment Groundwater Monitoring Plan Interim Use Permit Wetland Replacement Plan ISTS permit(s) Road Access Approvals
Empire Township	Interim Use Permit, Ordinance Amendment Road Access Approvals
Vermillion River Watershed Joint Powers Organization	Plan Review/Consultation
Dakota County	County Road Access Approvals; Well Construction and Sealing Permits

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7.0 Response to Comments on the Draft EIS

7.1 Opportunities for Public Comment and Guidelines for Responding to Comments

The Draft EIS for the UMore Sand and Gravel Resources Project was distributed in June 2010 to agencies and organizations on the official EQB distribution list, as well as additional agencies/organizations that had either requested a copy of the document and/or that could be affected by the proposed project. The comment period for the Draft EIS officially closed on August 5, 2010.

A public hearing to receive comments on the proposed project and Draft EIS was held as follows:

Thursday, July 22, 2010, 6:00 p.m. to 8:00 p.m.
Rosemount Community Center
13885 South Robert Trail
Rosemount, Minnesota

At the public hearing and meeting, an informational presentation was held to provide a Project update and a summary of the key issues and impacts addressed in the Draft EIS. Furthermore, an informational handout describing the proposed Project and the issues and impacts were made available to each attendee. All attendees were invited to provide comments through one of two ways: oral statements to a court reporter and/or through written comments.

- Written Statements: Attendees were invited to submit written comments on cards provided at the open house or in letter form. Comments could also be submitted via e-mail.
- Oral Statements: Statements were recorded by a certified court reporter during the public hearing.

A total of 23 written comments (letters, comment cards, e-mails) and 3 oral comments were received from private citizens, business representatives, agencies, and other government entities during the comment period. All written and oral comments were incorporated into the Public Hearing Record for the Draft EIS.

Consistent with state environmental review rules, substantive comments are responded to in this Final EIS. Written responses have been provided for comments pertaining to analysis conducted for and documented in the Draft EIS. Additionally, responses have been prepared for statements noting incorrect or unclear information or content requirements.

A response was not provided for comments agreeing/opposing with the project information, general opinions, statements of fact, or statements of preference. Section 7.2 presents a compilation of responses to those issue areas receiving the most comments. Finally, Section 7.3 presents copies of all government, agency, and organized interest group letters along with responses to the substantive comments provided in each.

Responses to comments provided by individual citizens are included within Section 7.2.

7.2 Responses to Frequent Comments

In reviewing the comments received several topic areas of common concern and feedback were evident. To facilitate a more clear and organized response, several categories encompassing common topic areas were defined and responses were drafted to address each. The topics are listed below and detailed in the remainder of Section 7.2.

- UMore Mining Area Boundary
- Hours of Operation
- Dust, Noise, and Aesthetic Concerns
- Traffic
- Social and Economic Concerns
- Site Contamination
- Land Use Compatibility
- Public Involvement
- Other Environmental Concerns

7.2.1 UMore Mining Area Boundary

Several comments were received requesting the UMore Mining Area (UMA) boundary be adjusted to allow for additional buffer space between the mining areas and existing residential developments.

Response: The UMA boundary as depicted in the Draft EIS will remain unchanged. However, in working with the adjacent neighborhood and City of Rosemount, the University and Dakota Aggregates have altered the extent of the mining phases along the north boundary. This change has resulted in a substantial greater buffer area (greater than 1000') from the northern extent of mining to the nearest residential dwelling.

7.2.2 Hours of Operation

Several comments made reference to the proposal in the Draft EIS Section 2.1.7 to allow extended hours of operation, including material hauling, dredging, and processing.

Response: The hours of operation presented in the Draft EIS were proposed to allow competitiveness in today's market conditions and not limit delivery opportunities. As stated in the Draft EIS, both public and private entities commonly require delivery of aggregate materials and related activities occur at non-peak hours (night or early morning) for safety and efficiency purposes. Furthermore, the relatively short peak construction season in Minnesota combined with tight project schedules often required extend operations. The University and Dakota Aggregates are committed to working with the City of Rosemount and Empire Township and acknowledge that hours of operation need to comply with local restrictions.

7.2.3 Dust, Noise, and Aesthetic Concerns

Several comments made reference to the potential for dust, noise and aesthetic impacts on surrounding properties. These concerns are further discussion below.

Dust

Several comments expressed concern regarding on-site dust generation and potential impacts on surrounding properties.

Response: Section 3.12 of the Draft and Final EIS present various operational practices used to minimize dust emissions. The approach anticipated for UMore mining operations is similar to the best management practices used at other sand and gravel mining operations and includes wet suppression on unpaved haul roads. It should also be noted that other operation techniques such as using conveyors to transport raw materials onsite will be used to control dust emissions.

Noise

Several comments expressed concern regarding the proximity of mining operations and the associated noise that will be heard in residential neighborhoods north of County Road 42.

Response: The University has held two neighborhood group meetings to provide advice and feedback on the impacts and opportunities associated with the operations at the proposed UMA. As a result of these meetings the University has proposed an expanded buffer along the north edge of the UMA in order to increase the distance between mining activities and residential neighborhoods located on the north side of County Road 42.

Aesthetics

Several comments were received that expressed concern for changes in the aesthetic character of the area resulting form the mining operation. The changes noted in the comments included loss of rural landscape (agricultural fields) and introduction of lights associated with the mining operations.

Response: As noted in Section 3.18 of the Draft and Final EIS, visual changes will occur in various forms including changes in land cover type and lighting. The Draft EIS also notes that since the mining operations are proposed to occur in phases any impacts at any given location will be temporary. Furthermore, any visual impacts (e.g. lighting) will be mitigated given the majority of operations will occur during daylight hours, will drop below existing grade as mining progresses in each phase, and will be minimized through the construction of a 10-foot berm along County Road 42.

7.2.4 Social and Economic Concerns

One comment questioned the need for another mining operation in the area and the affects this will have on other privately owned mines.

Response: As stated in Section 3.16 of the Draft and Final EIS, a 2002 "Aggregate Resources Inventory of the Seven-County Metropolitan Area, Minnesota" prepared by the Metropolitan Council, Minnesota Department of Natural Resources, and University of Minnesota found that aggregate resources are diminishing rapidly while long-term demand from urbanization must be met. Furthermore, the presence of other aggregate resources in the region will result in increase competition within the free market and may result in a reduction of potential tonnage being removed from other sites. However, the potential loss would extend the number of years these other sites are in operation.

A comment expressed concern regarding their perception that property values for surrounding residential developments will decrease as a result of the proximity to the UMA.

Response: As stated in Section 3.15.2 of the Draft and Final EIS, a 2008 study of seven gravel mining sites throughout Dakota County concluded that comparative property value

appraisals are similar for residences adjacent to mining operations to non-adjacent residences.

7.2.5 Site Contamination

Several comments were received related to past land uses associated with the Gopher Works Ordinance (GOW) and the known contaminants on the UMore property.

Response: Historic records of the GOW were used in scoping the location and extent of the investigations. The historical records are believed to be generally accurate, but are not complete due to either a lack of documentation initially or subsequent loss of the information over the years. This is typical of older facilities and is why the scope of the Peer Phase I ESA update and Phase II investigations employed multiple lines of evidence to identify and evaluate the potential for soil and/or groundwater impacts at the UMA. A Geological Assessment (prepared by ProSource consultants on behalf of the University) was intended to study the economic potential of the gravel deposits at the UMA and was not intended or equipped with appropriate tools to investigate the extent of potential soil impacts. Therefore, the University contracted another consultant (Barr Engineering) to conduct a formal investigation of potentially impacted areas within the UMA, which is fully described in the Section 3.2 of the EIS. That investigation utilized all available information from the Geological Assessment and used it along with information collected during the Groundwater Assessment to construct a conceptual geological model of the UMA. No relevant information from any previous reports was excluded in scoping the UMA investigations. The sources of information reviewed to assess the SOCs are described in the Phase II and SSI/RI work plans and appendices. The following list from the Phase II work plan includes many (but not all) of these sources.

- *An updated GIS database of possible environmentally impacted areas from Dakota County (Dakota Co. 2008).*
- *Updated database search of government records (EDR, 2008) consistent with ASTM E 1527-05 and EPA's All Appropriate Inquiry Rule.*
- *Review of historical city directories, Sanborn insurance maps, and historical aerial photographs.*
- *Review of University records and reports regarding general setting information and past releases. This information included a 1949 topographic survey, limited facility diagrams, a directory of University buildings compiled in the early 1990s with oblique aerial photographs, reports on past leaking underground storage tank investigations and agricultural chemical spills that were cleaned up and administratively closed.*
- *Review of the Peer Phase I (described above) and evaluation of the historical recognized environmental conditions (RECs) that were identified in that report.*
- *Site reconnaissance of buildings and areas identified in the above resources that have or may potentially be associated with releases of hazardous substances or petroleum products. The site reconnaissance included discussions with University staff familiar with past operations within the UMA.*
- *An evaluation of the identified sites of potential concern from available sources of information to determine which of these sites should be carried forward as a "Site of Concern" or SOC.*

7.2.6 Land Use Compatibility

A comment was received question how the proposed mining plan and operations relates to the overall future land use planning of Rosemount.

Response: Local land use planning efforts have taken into consideration the UMA site. The UMA is recognized in the City of Rosemount's 2030 Comprehensive Plan Update, Empire Township Comprehensive Plan and the Dakota County Comprehensive Plan. These documents were reviewed as part of the Draft and Final EIS and were discussed in Section 3.17: Compatibility with Local Plans and Land Use Regulations of the Draft EIS.

A comment questioned how currently plan for regional trails connecting area parks and recreational areas would be affected by the mining operation.

Response: Future trail connections will need to be phased and designed accordingly to ensure they are cognizant of mining sites and activities. The Final EIS recognizes future greenway corridors and discusses how these facilities could be developed in the future.

A comment was received expressing concern that the proposed mine would split Rosemount in two, with a central node developing on each side.

Response: The University does not foresee the UMA site and activities splitting Rosemount into two. Mining operations will occur over a period of time and through a series of phases until resources have been sufficiently extracted. Utilizing resources in this manner is consistent with regional policy for the sustainable use of available aggregate resources. Future master planning and development will be conducted on the site to establish a land use and development pattern that ensures future connectivity. Rosemount's Comprehensive Plan recognizes the importance of aggregate resources and has mechanisms in place to ensure that such uses consider future urban development potential. Rosemount's Comprehensive Plan also recognizes the importance of the long term concept planning conducted by the University to understand how the UMA site and its uses fit within the community and region.

7.2.7 Public Involvement

A comment was received expressing concern regarding the amount of public involvement offered for area landowners.

Response: From the onset of the project, the University has been committed to public involvement/outreach at all levels in decision-making. The University has engaged community organizations, area property owners, residents, and local, regional, and state agencies in the development of the project. The Final EIS Section 5.0 provides a description of public involvement activities and opportunities that took place during the development of the project.

7.2.8 Other Environmental Concerns

A few comments were received expressing concern regarding potential impacts to wildlife on the UMA site.

Response: Wildlife use the site, but environmental reviews typically focus on rare wildlife and other rare natural features because their regional populations are at risk of decline due to human activity. Common wildlife, such as deer and turkey, may be displaced from an area, but their populations tend not to decline regionally. In September 2008, the MNDNR was contacted regarding rare natural features on and near the UMore Mining Area sit. Information from the Natural Heritage Information System (NHIS) database was obtained along with a response from the MNDNR. The information did not indicate records of rare wildlife on the UMA site. However, rare wildlife (e.g., loggerhead shrike and bald eagle) are known to utilize the site and/or surrounding areas. Risks and impacts to rare wildlife are addressed in Section 3.5.1 of the Final EIS.

One comment stated that the EIS is inconsistent with effects on the Vermillion River because while the documentation states there will be no impact on the river it also acknowledges that surface water flows will be reduced.

Response: Surface flow to the Vermillion River will be reduced slightly as summarized in Table 17 of the EIS. This surface water condition would not include recharge from "cool fresh groundwater" from the UMA. As stated in the DEIS, groundwater flow is toward the Mississippi River located northeast of the UMA. The separate directional flow of surface water and groundwater is sometimes confusing but not unusual. Run off occurs once the ground surface becomes saturated which can occur during relatively infrequent heavy rainfall events. As shown on Figure 22 of the DEIS, most of the rainfall at the UMA infiltrates to groundwater. A reduction in volume of surface water runoff is in compliance with the stormwater management section of the VRWJPO rules. Finally, surface water runoff that reaches the Vermillion River and tributaries typically has a higher temperature than the streams and is not conducive to trout habitat. Minimizing the surface runoff that reaches the tributaries and Vermillion River will in fact result in cooler temperature streams and may enhance the existing trout habitat.

A comment requested an assessment of water quality effects near the corner of County Road 46 and Blaine Avenue.

Response: The corner of County Road 46 (160th Street) and Blaine Avenue is located approximately 1.5 miles east of the extents of the proposed action. Overall, the total phosphorus and total suspended solids leaving the site towards the County Road 46 and Blaine Avenue intersection would be substantially reduced following the proposed action, as discussed in Section 3.7.2 Impacts of Strom water on Downstream Areas of the EIS.

A comment questioned the potential for cumulative impacts on the area and whether other mine sites had been included in the Draft EIS assessment.

Response: The EIS did include an assessment of cumulative potential effects and included all known past, present, and foreseeable future projects, including four other mining sites. The findings of the Cumulative Potential Effects analysis can be found in Section 3.20 of the Draft and Final EIS.

7.3 Agency and Organizations Comments and Responses

Comment letters were received from the following governmental agencies:

- Minnesota Historical Society
- Minnesota Pollution Control Agency
- Minnesota Department of Natural Resources
- Minnesota Department of Transportation
- Twin Cities Metropolitan Council
- Dakota County
- Vermillion River Watershed District
- City of Rosemount
- Empire Township

Comment Letter A: Minnesota Historical Society

Minnesota
Historical Society

State Historic Preservation Office

August 13, 2010

Mr. Steven Lott
University of Minnesota
UMore Park
1605 West 160th Street
Rosemount, MN 55068

Re: Draft Environmental Impact Statement
University of Minnesota UMore Park Sand and Gravel Resources
Rosemount, Dakota County
SHPO Number: 2009-0803

Dear Mr. Lott:

Thank you for sending us the Phase IA Archaeological Survey report and associated materials prepared for this project. These materials have been reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

We have reviewed the results of the survey for the project area. Based on the results of this survey, we concur that the probability of any unreported properties being located in the area of potential effect is low, and that no historic properties will be affected by the proposed project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36CFR800, procedures of the Advisory Council on Historic Preservation for the protection of historic properties. If this project is considered for federal assistance, it should be submitted to our office with reference to the assisting federal agency.

Please contact us at 651-259-3456 with any questions relative to our review of this project.

Sincerely,

Mary Ann Heidemann, Manager
Government Programs and Compliance

Minnesota Historical Society, 345 Kellogg Boulevard West, Saint Paul, Minnesota 55102
651-259-3000 • 888-727-8386 • www.mnhs.org

Comment Letter B: Minnesota Pollution Control Agency

Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, MN 55155-4194 | 651-296-6300 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

August 5, 2010

Mr. Steven Lott
UMore Park Project Manager
University of Minnesota
1605 West 160th Street
Rosemount, MN 55068

Re: UMore Park Sand and Gravel Resources Project Draft Environmental Impact Statement

Dear Mr. Lott:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the UMore Park Sand and Gravel Resources Project (Project) in both the city of Rosemount and Empire Township, Minnesota. The Project consists of 1,722 acres of new aggregate mining and ancillary operations. Minnesota Pollution Control Agency (MPCA) staff have reviewed the DEIS and have no comments at this time other than those sent separately via electronic correspondence by Gary Krueger on August 5, 2010.

Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this DEIS, please contact me at 651-757-2508.

Sincerely,

Karen Kromar

Karen Kromar
Planner Principal
Environmental Review and Feedlot Section
Regional Division

KK:bt

cc: Craig Affeldt, MPCA, St. Paul

Comment Letter B: Minnesota Pollution Control Agency

Steven Lott <lottx020@umn.edu>

RE: Gopher Ordnance Works/UMore Park & mining area draft EIS (June 2010)

4 messages

Krueger, Gary (MPCA) <Gary.Krueger@state.mn.us> **Wed, Aug 11, 2010 at 8:47 PM**
To: "Kubler, Rick E." <Rick.Kubler@gpmlaw.com>
Cc: "girtz001@umn.edu" <girtz001@umn.edu>, Janet Dalgleish <dalgl006@umn.edu>, "lottx020@umn.edu" <lottx020@umn.edu>, "Wetzstein, Doug (MPCA)" <Doug.Wetzstein@state.mn.us>

Rick, to follow-up on our conversation on August 9, 2010, these are the primary comment points for the UMA draft EIS from MPCA Superfund.

- All future investigations/response actions plans prepared by the U of M regarding the UMA area shall be done in compliance with MPCA Superfund program requirements, and requirements set forth under MERLA – State Statute 115B.(including any updated Phase I environmental assessments and/or contaminant source identifications deemed necessary by MPCA Superfund staff)
- The University should consider conducting any future investigations/response actions in the UMA area, that may be associated with Gopher Ordnance Works activities, consistent with CERCLA and/or FUDS Program guidance.

1

- The University needs to acknowledge the potential that asbestos/hazardous debris/structures may be encountered during future UMA activities and there does exist a stipulation agreement between the MPCA and U of M for recent asbestos related violations. As the MPCA has repeatedly stated, the remaining asbestos/hazardous structures/debris remaining throughout UMORE Park is of concern to the Superfund staff, and the University should develop some type of contingency plan for dealing with such structures/debris.

2

Gary

1 All investigations and response action activities conducted to date by the University in the UMA as part of the EIS process have been compliant with the Minnesota Environmental Response and Liability Act (MERLA), Minn. Stat. § 115B.01 et seq., and, where applicable, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq., and ER 200-3-1, the regulation promulgated by the United States Army Corps of Engineers (Army Corps) for the Formerly Used Defense Sites (FUDS) Program. MPCA Superfund Program staff reviewed and approved the work plan for the Phase II Investigation (Phase II) for Sites of Concern (SOCs) 1-3 and 6-8 and the work plan and Quality Assurance Project Plan/Sampling Analysis Plan (QAPP/SAP) for the

Supplemental Site Inspection/Remedial Investigation (SSI/RI), which studied two Areas of Concern (SOCs 4 and 5) associated with the former GOW. MPCA's review and approval of investigation work plans and the QAPP/SAP was completed consistent with MERLA and CERCLA. The University will continue to seek approval from MPCA of all future investigation and response action work plans and related project plans developed to address releases or threatened releases of hazardous substances present within the UMA under MERLA, and as appropriate with respect to GOW, under CERCLA and/or FUDS regulations.

The MPCA's reference to MERLA, CERCLA and Army Corps' regulation regarding future investigation and response actions within the UMA is helpful in confirming the appropriate regulatory requirements. Because the work completed to date within the UMA as part of the EIS has been reviewed and approved by MPCA Superfund staff, this comment is not directed at the adequacy of the EIS and/or supporting investigations, which have determined that the existing conditions do not represent a potential for significant environmental effects under MN Rules 4410.1700 Subpart 7.

2 The University will prepare a UMA site-wide Environmental Contingency Plan (ECP) that is consistent with the stipulation agreement between the MPCA and the University, and will otherwise comply with all applicable laws. As described in the DEIS, the ECP will include procedures for managing debris, asbestos and hazardous substances discovered during preparation of an area for mining or as part of the mining process. The ECP will be submitted to the MPCA for review and approval prior to start of mining.

Comment Letter C: Minnesota Department of Natural Resources

Minnesota Department of Natural Resources

Central Region Headquarters
1200 Warner Road
St. Paul, MN 55106
651-259-5738

August 2nd, 2010

TRANSMITTED VIA E-MAIL

Steven Lott
University of Minnesota, UMore Park
1605 West 160th Street
Rosemount, Minnesota 55068
Lottx020.umn.edu

RE: UMore Park Sand and Gravel Resources Project – Draft Environmental Impact Statement (EIS)

Dear Mr. Lott:

The Department of Natural Resources (DNR) Central Region has reviewed the Draft EIS for the UMore Park Sand and Gravel Resources project, located in City of Rosemount and Empire Township, Dakota County. We offer the following comments for your consideration.

Section 3.2 Environmental Hazards, Subsection 3.2.2 Environmental Consequences, discusses concerns relative to potential environmental releases for the project, specifically to surface and groundwater. The DNR is aware that the validity of one of the reports referenced in the Draft EIS, the *Final Expanded Site Inspection Report* dated December 2009 prepared by the U.S. Army Corps of Engineers (Corps), is under question by the Minnesota Pollution Control Agency (MPCA). Groundwater modeling (Figure 26) depicts groundwater flow to be to the northeast to the Mississippi River. The Draft EIS has also identified tributaries of the Vermillion River, a designated trout stream, which will be impacted by the proposed project. As it appears that some data used in the impact analysis may be incomplete, the DNR has concern that the potential impact to these resources by past activities may not be fully addressed in the Draft EIS. **1**

Section 3.4 Fish, Wildlife and Ecologically Sensitive Resources, Subsection 3.4.3 Mitigation, of the Draft EIS comments that a 50 meter-wide strip (approximately 57 acres) adjacent to the open water lake will be left to allow for the development of wetland vegetation. As the site surrounding this new open lake will be recently disturbed, there is a high likelihood that vegetation that will establish will be invasive species such as reed-canary grass (*Phalaris arundinacea*). The DNR encourages that this 50 **2**

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1 The potential environmental effects of the project on groundwater and surface water have been fully addressed in the EIS process. The evaluation included detailed groundwater monitoring, groundwater modeling, a series of environmental soil and groundwater investigations, and surface water analyses. The conclusion reached through those analyses is that there are no likely significant effects from the proposed project on groundwater or surface water. The data show infiltration is to groundwater and groundwater flow is toward the northeast and away from the Vermillion River. Although surface topography slopes to the south, there is no evidence that runoff from any of the identified impacts within the UMA

extend outside of the Sites of Concern (SOCs). The University is unaware of any concern by the MPCA that these results are in question.

The DNR refers in this comment to the Final Expanded Site Inspection Report (ESI) (Army Corps, 2009). The DNR is correct that the MPCA has expressed concerns to the Army Corps regarding the conclusions reached in the ESI Report. However, none of the testing completed by the Army Corps as part of the ESI was in the UMA. Rather, the ESI was directed exclusively at former GOW production and operational areas located in the eastern portion of UMore Park or in Vermillion Highlands to the south. Therefore, the conclusions reached in the Draft EIS were not based upon the Army Corp's sampling data provided in the ESI report.

The Army Corps also completed a Focused Site Inspection (FSI) (Bay West, 2007). Unlike the ESI, the FSI included soil and groundwater sampling in SOCs 4 and 5 of the UMA, and it is possible that the DNR intended in this comment to refer to FSI. In the FSI report, the Army Corps found that releases of hazardous substances associated with GOW operations were present in SOC 5 (but not SOC 4). The MPCA and University questioned the conclusions reached in the FSI because they believed among other things, that the number of samples collected by the Army Corps was inadequate. The University's environmental consultant designed and implemented the SSI/RI in SOCs 4 and 5 for the specific purpose of characterizing the scope and extent of the releases identified by the Army Corps in the FSI (as well as any other releases from pre- or post-GOW operations that may have been present within SOCs 4 and 5). The MPCA reviewed and approved the work plan for the SSI/RI, as well as the QAPP/SAP under which the testing was conducted. (See response to MPCA comment #1, above). Additional soil testing and remediation will be completed in SOC 5 at the time the DNT storage bunkers are demolished, and before commencement of mining activities. MPCA concurs with that approach and will review and approve all associated work plans. Therefore, the concerns expressed by the MPCA and the University with respect to the findings of the FSI have now been fully addressed through the SSI/RI completed as part of the EIS process.

2 When mining activities are completed along a given section of shoreline, a grassland seed mixture will be installed around the perimeter of the lake. This will provide soil stabilization, native cover, and discourage invasive plant establishment.

Comment Letter C: Minnesota Department of Natural Resources

meter strip be included in the reclamation/management plan and that native wetland vegetation be actively established along this strip as well as into the lake's shallow littoral zone. Native vegetation establishment significantly increases the value of the habitat for Species of Greatest Conservation Need (SGCN) as well as to other wildlife that are anticipated to utilize the resulting habitat. **2** *cont'd*

Section 3.5 Threatened and Endangered Species of the Draft EIS discusses loggerhead shrike use of the project area. Please note that the Natural Heritage Information System letter referenced in the report is not representative of the most current information on resources in the project area. In addition to the loggerhead shrike observations included in the Draft EIS, there are three additional sitings that need to be taken into consideration. More recent sitings, two in 2008 and one 2009, have relevance to the project as they are located on or in close vicinity to the eastern boundary of the proposed project area. Mitigation measures discussed in the Draft EIS include leaving a strip of open grassland and crop fields along the western edge of the site. The DNR encourages the proposer to consider additional sites within the project area that could be included in reclamation activities that would provide suitable habitat for this species. **3**

As referred to above, the DNR Natural Heritage letter referenced in the Draft EIS is dated 8 October 2008. The Natural Heritage Information System is continually updated as new information becomes available. An updated request for review should be requested as it has been more than one year from the date of the original response letter. A request for an update can be made directly to Lisa Joyal, Natural Heritage Review Coordinator, at lisa.joyal@state.mn.us. Please include the original contact number (ERDB 20090153) when submitting the request.

Thank you for the opportunity to provide comments on the Draft EIS and for your consideration of these comments. We look forward to reviewing the Final EIS when it becomes available. If you have any questions about these comments, please call Melissa Doperalski, Regional Environmental Assessment Ecologist, at 651-259-5738, or by e-mail at melissa.doperalski@state.mn.us . **4**

Sincerely,

Joseph M. Kurcinka
Regional Director

CC: Steve Colvin, Lisa Joyal, Diana Regenscheid, Liz Harper, Robert Fashingbauer, Paul Purman, Gerald Johnson, Janell Miersch, Melissa Doperalski, Jan Wolff, REAT (DNR)
Nick Rowse (USFWS)
Jon Larsen (EQB)

DAK10 UMore Sand and Gravel DEIS.doc
ERDB 20090153-0005

3 Section 3.4.3. Loggerhead shrike habitat will be created through implementation of the reclamation plan, namely through establishment of non-native grasslands and native grasslands. Loggerhead shrike habitat will also be enhanced on the site if tree replacement plantings are conducted (see response to Rosemount comment, Section 3.3.3).

On August 12, 2010, an updated request was made to the MNDNR's Natural Heritage Information System (NHIS) regarding rare natural features on and in the vicinity of the site. These data will be reviewed and assessed upon receipt of the MNDNR's response

letter. Any substantial changes will be accounted for in the final record. However, review of March 2010 NHIS data did not suggest any increased risk or impact associated with loggerhead shrike or any other rare natural feature. Based on reviewed NHIS data, loggerhead shrike was adjacent to and within one-mile of the UMA. In the 1990s and early 2000s, shrikes were observed along Biscayne Avenue (the western boundary of the UMA) in lightly grazed pastures, residential yards, and cropland with scattered shrubs and shelter belts, but have not been observed since. These shrikes were also observed utilizing nearby cropland in the UMA for foraging. Several occurrences of adult shrikes with young were also reported to the east and southeast of the UMA in the 1960s, 1980s, 1990s and as recently as 2008 and 2009. Locations of these shrike sightings change from year to year. Several of the late 2000 sightings were of shrikes in short-stature cropland interspersed with scattered grasslands or pastures with cedar trees and fencerows east of US Highway 52. While loggerhead shrike may nest at the same site in successive years, return rates are typically low. Males are more likely to return to their territory than females.

4 The comment is noted, the University will continue to coordinate with the MNDNR throughout the project development process and as mining activities commence.

COMMENT LETTER D – MINNESOTA DEPARTMENT OF TRANSPORTATION

Minnesota Department of Transportation

Metropolitan District
Waters Edge
1500 West County Road B-2
Roseville, MN 55113-3174

July 29, 2010

Steven Lott
University of Minnesota
UMore Park
1605 West 160th Street
Rosemount, MN 55068

Subject: **UMORE Park Sand & Gravel Resources**, Mn/DOT Review #EIS10-001
Empire Township/Dakota County
Mn/DOT Control Section - 1921

Dear Mr. Lott:

The Minnesota Department of Transportation (Mn/DOT) has reviewed the UMore Park Sand & Gravel Resources Environmental Impact Statement (EIS) and has the following comments:

Traffic:
The EIS notes that to generate the number of AM and PM peak volumes, counts were taken at existing mining operations. It is not clear whether these mines are similar in operations *(aggregate, asphalt, concrete, employee)*, these mines operate at similar level of mining intensity, and the trip generation from the existing mine operations represent the "worst case scenario" for traffic impacts. Additionally, it is not clear how many mines were evaluated to determine the range for AM and PM peak hour traffic. **1**

The draft EIS states that "If the proposed mining site-generated traffic for at least one movement at an intersection was equal to 10 percent or more of the existing traffic volume for the corresponding movement at that intersection, then that intersection was included in the detailed traffic operations analysis." This is not adequate reasoning to exclude an operational analysis for TH 52 at County Road 42. Mn/DOT would like to request the Synchro files for additional review and comment. **2**

To discuss these questions and issues, please contact David Sheen, Mn/DOT Traffic Section, at (651) 234-7824.

As a reminder, please address all initial future correspondence for development activity such as plats and site plans to:

Development Reviews
Mn/DOT - Metro Division
Waters Edge
1500 West County Road B-2
Roseville, Minnesota 55113

An equal opportunity employer

1 Peak hour site-generated traffic estimates for the proposed UMA site were estimated based on information from, "Traffic Impact Study – Sand & Gravel Mining and Accessory Uses, Empire Township, Dakota County, MN", December 2004, prepared by URS. As part of its traffic impact study, URS conducted traffic counts at five existing mining operations located west and south of the UMA site. Additional detail about the counts can be found in the cited reference. These existing mining operations are similar in operations and mining intensity to the proposed UMA site. Based on these counts, URS found that, for the studied mining operations, the AM peak hour traffic ranged from 5.65% to 9.78% of the ADT and the PM peak hour traffic ranged from 3.35% to 6.07% of the ADT. For the UMA, the AM peak hour

traffic was assumed to be 10% of the ADT, and the PM peak hour traffic was assumed to be 6% of the ADT. These AM and PM peak hour percentages should represent a "worst case scenario" since they will result in a higher site-generated traffic for the respective peak hours.

2 The methodology to determine when to perform detailed traffic operations analysis for study intersections was developed in conjunction with Dakota County staff and is reasonable. The following table, based on information in the draft EIS, shows 2030 peak hour traffic information for the CR 42/US 52 East Ramp intersection and CR 42/US 52 West Ramp intersection.

Intersection	Peak Hour	2030 No Build Total Entering Traffic	2030 UMA Site-Gen. Entering Traffic	Percent Site-Gen. vs Total
CR 42/US 52 East Ramp	AM	1600	27	1.6%
CR 42/US 52 East Ramp	PM	1370	20	1.5%
CR 42/US 52 West Ramp	AM	1950	46	2.4%
CR 42/US 52 West Ramp	PM	2140	27	1.3%

As can be seen from the information in the above table, when the UMA site-generated traffic is added to the intersections for the "Build" condition, the increase in traffic at the intersections is very small (1.3% to 2.4% increase). This small increase in traffic will not result in any significant impact to traffic operations at the intersections.

It should also be noted that the Synchro files for the traffic analysis were sent to Mn/DOT.

COMMENT LETTER E –METROPOLITAN COUNCIL

August 4, 2010

Mr. Steven Lott
University of Minnesota
UMore Park
1605 160th Street West
Rosemount, MN 55068

RE: Draft Environmental Impact Statement
University of Minnesota UMore Park Sand and Gravel Resources Project
Metropolitan Council District 16
Metropolitan Council Review File No. 20481-3

Dear Mr. Lott:

The Metropolitan Council received the Draft Environmental Impact Statement (DEIS) for the proposed aggregate mining project on June 29, 2010. The geologic conditions which make this a prime location for aggregate mining also render the drinking water supplies and groundwater-dependent surface water resources in the area particularly vulnerable to chemical and thermal contamination. The planned construction of a new large surface water body in direct connection with the water table aquifer at the conclusion of mining will exacerbate groundwater vulnerability in the area. Council staff review finds the DEIS complete with respect to the potential for regional impacts, but offer the following technical comments to clarify issues addressed in the DEIS that need to be clarified in the Final EIS document.

3.1.1 – Affected Environment – Empire Township
A portion of the planned Empire Wetlands Regional Park is located within 0.5 mile of the proposed UMore Gravel Mining Area. The description of the Empire Township Planned Land Use (Section 3.1.1, page 26) indicates that all land located within 0.5 mile of the proposed UMore Gravel Mining Area is guided as "Mineral Extraction Overlay Area." The Empire Township 2030 Comprehensive Plan designates a "Mining Overlay Area"; however, the regional park site is guided as "Public Park, Recreation and Open Space" and is not within the overlay area. The description of the Empire Township Planned Land Use (page 26), Figure 5 (page 23), and Table 6 (page 26) should be updated to include this information as part of the Final EIS. **1**

3.13.2 – Infrastructure and Utilities – Environmental Consequences – Public Utilities
The document accurately indicates that a MCES sanitary sewer line runs adjacent to the UMore Mining Area. The MCES sewer line – Interceptor 9208, is located within the right-of-way for Biscayne Avenue. The document indicates that no impacts to the MCES interceptor are anticipated. Final plans should be sent to Scott Dentz, MCES Interceptor Engineering Manager, at 3565 Kennebec Drive, Eagan, MN 55122-1058, (651-602-4503), to assess the potential impacts to the regional interceptor system, prior to initiating this project.

3.7.1 – Surface Water Drainage – Post-Mining Condition
The DEIS states that upon completion of reclamation, the end use of the UMore Mining Area property will be suitable for agricultural use. Council staff recommends that no fertilizers, pesticides, or herbicides should be utilized within the mine footprint in association with ensuing agricultural uses after reclamation, due to the significantly reduced ability of the shallow layer of replacement topsoil that will **2**

1 Section 3.1.1 in the Final EIS reflects the Empire Township's Land Use Plan as depicted in their 2030 Comprehensive Plan Update.

- The University of Minnesota will note the Council's recommendation and may consider organic farming within the mine pit following completion of the mining activity. In addition as discussed in Section 3.7.3, following completion of mining activity water quality monitoring of nutrient concentrations in the mine-pit lake will be considered. Such monitoring could also include testing for insecticides and herbicides.

COMMENT LETTER E –METROPOLITAN COUNCIL

Mr. Steven Lott
August 4, 2010
Page 2

be spread over remaining sand and gravel materials to properly attenuate such chemicals before entering the groundwater table. Typical stormwater runoff BMPs will have little if any effect in sequestration or removal of any applied agricultural chemicals. Any chemical proposed for use within the mine footprint should be added to the long-term groundwater quality monitoring regimen for the site, to be tracked for off-site movement. **2** *cont'd*

Council staff strongly encourages the University staff to work together with Dakota County Watershed and Soil and Water Conservation staffs to instead consider the potentially significant long-term wetland banking opportunities that this site has the capacity to provide. With adequate advance planning, many of the water features proposed to be incorporated into the final end use drainage plan could be designed to consist of a number of large wetland complexes whose cumulative value would be significant, both from an environmental and financial standpoint. Additionally, the proximity of the proposed mine lake to the park and wildlife management areas directly to the southeast of the site will encourage movement of wildlife between them and the mine lake area. **3**

3.8.1 – Groundwater Flow Modeling – Future Mine Lake Simulation
Local modeling was modified as per our SEAW review comments to predict the impacts to groundwater flow direction and quantity of the proposed mine lake and increased municipal demand, however Council staff requests additional clarification with regard to our request for assessment of recharge water quality impacts.

Modeling indicates that the mine lake is expected to contribute a significant amount of water to the groundwater flow system, offsetting minor predicted aquifer declines due to increased municipal demand. This highlights the importance of maintaining the quality of surface water runoff into this lake – future land use within the mine lake watershed should be designed with this goal in mind, and surface water management plans and permits should employ BMPs capable of treating runoff to levels acceptable for aquifer recharge.

Section 3.8.4 (No Build Alternative), page 122, states that groundwater flow patterns will likely be similar under either the preferred alternative or the no build alternative. This section should be amended to point out that, although flow directions do not change much, recharge source areas and rates *do* change between the two scenarios.

This concludes the Council's review of the DEIS. The Council will take no formal action on the document. If you have any questions or need further information, please contact Jim Larsen, PE, principal reviewer, at 651-602-1159. **4**

Sincerely,

Phyllis Hanson, Manager
Local Planning Assistance

cc: Wendy Wulff, Metropolitan Council District 16
Patrick Boylan, Sector Representative
Judy Sventek, Watershed Coordinator
Cheryl Olsen, Reviews Coordinator

3 The EIS team has discussed with University staff and other project partners the potential for wetland banking within the UMore Mining Area. This option will continue to be explored as the project proceeds, but a decision has not been reached regarding the specific wetland mitigation approach and if wetland banking will be conducted on the site. Coordination will continue with regulators on these issues, and the project will comply with all wetland mitigation requirements.

4 Comment noted. The reference to recharge source areas will be added to the text. Further management plans including best management practices for storm water will be performed in accordance with applicable regulations and permit requirements. The plans and permits will be subject to future rigorous analyses and regulatory requirements.

COMMENT LETTER F – DAKOTA COUNTY

Dakota
COUNTY

Physical Development Division
Lynn Thompson, Director

Dakota County
Western Service Center
14955 Galaxie Avenue
Apple Valley, MN 55124-8579
952.891.7000
Fax 952.891.7031
www.dakotacounty.us

Environmental Mgmt. Department
Office of GIS
Parks and Open Space Department
Surveyor's Office
Transit Office
Transportation Department
Water Resources Department

August 4, 2010

Steven Lott
University of Minnesota
UMore Park
1605 West 160th Street
Rosemount, MN 55068

RE: UMore Sand and Gravel Resources Environmental Impact Statement

Dear Mr. Lott:

Thank you for the opportunity to review the UMore sand and gravel mining EIS. Dakota County staff comments are summarized in the enclosed document.

Specifically, we urge you to consider carefully our comments regarding mining in the vicinity of County Road 46, and our continuing concerns about contaminated sites within the proposed gravel mining area. We strongly recommend additional soil and water testing, as we have throughout our involvement in this process. We appreciate the opportunities we already have had to provide information during recent testing and will be happy to continue this cooperation.

We also look forward to additional discussion of fiscal issues and governance with the University and other stakeholders as UMore Park is mined and then further developed.

Please contact Kurt Chatfield in our Office of Planning and Analysis (kurt.chatfield@co.dakota.mn.us or 952.891.7022) if you have any questions or if we can supply more information as you address our comments.

Sincerely,

Lynn Thompson

Lynn Thompson, Director
Physical Development Division

Enclosure

cc: Dakota County Board of Commissioners
Brandt Richardson, County Administrator

COMMENT LETTER F – DAKOTA COUNTY

Dakota COUNTY

Staff Comments: University of Minnesota UMore Park Sand and Gravel Resources Draft Environmental Impact Statement
July 30, 2010

The University of Minnesota and consultants have prepared a draft environmental impact statement for an aggregate mining project on 1,722 acres of the UMore Park in Rosemount and Empire Township within Dakota County.

Dakota County staff have provided comments on the University of Minnesota's draft EIS for the proposed mining at UMore Park. They are organized by subject area.

If there are comments or concerns, please contact Kurt Chatfield, Dakota County Planning Supervisor, at kurt.chatfield@co.dakota.mn.us or 952-891-7022.

Transportation

Over the past two years, the University, County , the Department of Natural Resources, the Department of Transportation, the City of Rosemount, and Empire Township developed a long-term vision for arterial corridors through the Rosemount/Empire/UMore Area Transportation System Study. The study recommendations were adopted by the County Board in March 2010. This study should provide a framework for transportation issues related to mining in the area.

Dakota County's primary transportation-related concern about the draft EIS pertains to County Highway 46, an important east-west arterial route constructed within the past 10 years that bisects the area proposed for gravel mining. This roadway currently provides for 9,000-10,000 trips per day, and is projected to support 25,000 trips by 2030. The Study referenced above recommends that County Highway 46 remain in its current alignment.

The draft EIS does not address either temporary rerouting or final alignment of County Highway 46; the draft EIS shows the final land use in the vicinity as a lake without accommodating the roadway. We prefer that the mining not disturb the roadway or the underlying aggregate. An option would be for the University to fund a temporary diversion of County Highway 46 and at-grade replacement after the area is mined. We do not endorse the construction of a bridge or permanent diversion of County Highway 46. If bridge options are evaluated, maintenance implications and responsibilities would need to be resolved. These construction and maintenance costs should also be compared to the value of aggregate under the roadway and included in the EIS. **1**

UMore Park Sand and Gravel Resources Draft EIS: Dakota County Staff Comments 1

1 The draft EIS assumes no change to the existing alignment of CR 46 and that CR 46 will be in place to serve the UMA site. It is recognized that CR 46 is an important east-west arterial and the County may need to upgrade this roadway to a 4-lane facility as development occurs in the area. The upgrading of CR 46 will be development driven and is not currently in the County's capital improvement program. When the County is ready to move forward with this project, the University and Dakota Aggregates will work with the County, through the normal project development process.

The Rosemount/Empire/UMore Area Transportation System Study is at:
http://www.co.dakota.mn.us/EnvironmentRoads/Reports/Road/RosemountEmpireUMoreTransportationSystemStudy.htm **1** *cont'd*

Traffic Operations

The 2011 No Build analysis for the intersection of CSAH 42 and Biscayne and 2030 Build analysis for the intersection of CSAH 46 and Akron suggest that signalization is a reasonable measure due to the level of service (LOS) on Biscayne. This mitigation measure determination does not follow the County's practice for determining the need for intersection control change. When evaluating an intersection, the County considers demonstrated safety issues, overall intersection delay and operations, and meeting of a major signal warrant. The 2011 No Build analysis for CSAH 42 and Biscayne shows the intersection's overall LOS is A and that it may meet the peak hour signal warrant. The 2030 Build analysis for CSAH 46 and Akron shows the intersection's overall LOS is C in the AM peak hour and B in the PM peak hour and that it may meet the peak hour signal warrant. Based on these analyses alone, the County's practice would not result in the recommendation of signal installation at these intersections for the analyzed scenarios. Review of actual conditions including traffic volumes, overall intersection operations, and safety data would take place by the County to determine the need and timeline of a traffic control change at these and all intersections under the County's jurisdiction analyzed in the study. Other mitigation measures that could have been analyzed for intersection operations include a change in side road lane geometrics before a change in traffic control. **2**

The 2011 Build, 2030 No Build, and 2030 Build analyses take into consideration the suggested 2011 No Build mitigation measure of a signal installation at CSAH 42 and Biscayne. Based on the County's practice, the scenarios of this intersection without signalization should also be analyzed in the 2011 Build, 2030 No Build, and 2030 Build for operations and mitigation measures. **3**

The draft EIS recommends the construction of turn lanes at five of the intersections; though traffic congestion does not indicate the need for these measures. For locations proposed on County highways, the University would need to submit a request to the County Transportation Department through its permitting process. We would take into consideration the work done in the development of the EIS. All related costs and implementation for design, permits, and construction would be the responsibility of the permit requester. **4**

The 2011 Build and 2030 Build analyses considers turn lane installation under the assumption they are approved by the County for construction by the University. These scenarios should be analyzed in the EIS using existing geometrics without the turn lanes to determine intersection operations and mitigation measures. **5**

UMore Park Sand and Gravel Resources Draft EIS: Dakota County Staff Comments 2

2 The 2011 No Build traffic analysis for the CR 42/Biscayne Avenue intersection indicated that certain traffic movements were expected to operate at LOS E or LOS F. Typical practice for an EIS is that some type of mitigation needs to be recommended for these poor operating conditions. For this intersection, the proposed signalization improvement will provide the necessary mitigation. Changes in side road lane geometrics will not ameliorate the poor operating conditions.

The 2030 Build traffic analysis for the CR 46/Akron Avenue intersection indicated that certain traffic movements were expected to operate at LOS E or LOS F. Typical practice for

an EIS is that some type of mitigation needs to be recommended for these poor operating conditions. For this intersection, the proposed signalization improvement will provide the necessary mitigation. It should be noted that turn lane improvements were recommended as 2030 No Build mitigation measures at this intersection. The 2030 Build analysis assumed these turn lane improvements were in place, but these improvements were insufficient to provide adequate operation at the intersection for 2030 Build traffic conditions; therefore signalization is recommended at the appropriate time.

The mitigation measures in the draft EIS are being proposed for forecast future conditions. It is understood that these forecast conditions may not materialize or may occur at a different time than predicted. Any mitigation measures will need to go through the County's normal project development process to determine their appropriateness and timing.

3 The inclusion of the signal improvement at the CR 42/Biscayne Avenue intersection in the 2011 Build, 2030 No Build, and 2030 Build analysis facilitates the identification of any additional problems and mitigation measures for these scenarios. The same problems shown in the 2011 No Build analysis for the CR 42/Biscayne Avenue intersection will occur in the 2011 Build, 2030 No Build, and 2030 Build analysis if the signal improvement is not included in these scenarios. The exclusion of the signal improvement from these three scenarios will not change the recommended mitigation measures proposed for the intersection.

4 The comment has been noted.

5 In developing the draft EIS, meetings with County Transportation Department staff were held and the County staff indicated that the County would require right and left turn lane improvements at any access points allowed for the UMA site. Since these turn lane improvements will be required by the County (as well as Rosemount and Empire) as part of its driveway permit process, we see no purpose in analyzing the access point intersections without the turn lane improvements in place.

COMMENT LETTER F – DAKOTA COUNTY

Parks and Open Space

The proximity of the aggregate study area to the new Dakota County regional park raises concerns about noise and site impacts from the later phases of operation (Phases 7 and 8, and perhaps 6 and 9 as well). Public use of the regional park will grow in the future. Mining should occur in a fashion that mitigates noise, dust, and visual impacts to the park and park visitors. Berms, buffers natural screening and other strategies should be used to further reduce impacts.

Park visitors and mining trucks would share many of the same roads. Mining access points and mining truck road use should be planned to minimize conflicts with regional park visitors. **6**

The watershed of the 25-acre lake at the center of the new regional park includes portions of the proposed mining area. It is very important that mining operations do not diminish the quality or the quantity of surface water that flows to the park lake. The post-mining condition described on page 75 of the Draft EIS states that a majority of the mining area would be "landlocked" as a result of mining excavation and that surface flow volumes to the Vermillion River watershed (including flows through Tributary 5, a primary source of lake water) would be a fraction of current flows post-mining. We are concerned that mining operations could alter surface water hydrology and would have short-term and long-term impacts on the size and water quality of the downstream lake within the regional park. This EIS should evaluate the proposed mining's impacts to this lake as well as to the Vermillion River and the Mississippi River. **7**

The Dakota County Park System Plan identifies a regional greenway alignment through the proposed mining area. The regional greenway alignment was further refined as part of the Rosemount/Empire/UMore Area Transportation System Study. We recommend that the draft EIS identify the regional greenway as part of the end land use condition following mining operations. **8**

Water Resources, Groundwater Protection, Brownfields, and Contaminated Sites

Given the history and nature of activities on the UMore Park site since the 1940s, it is likely that gravel mining would unearth evidence of some sort of contamination on the 1,700 acres. County staff have identified significant information gaps in the draft EIS regarding what sites are of concern, the analysis of identified SOCs and the assumption that potential contamination will be identified as mining progresses. Our concerns are outlined in the following pages and supplemented with relevant information where available.

Foremost, when unforeseen contamination is encountered, County ordinances must be followed that support the County's responsibility to protect public health and the environment. County staff must be notified so pre-cleanup inspections can be completed and County staff can be consulted before any mitigation starts or contaminated areas are removed. **9**

The areas identified as the UMORE Mining Area (UMA) and the Ancillary Use Facility are both part of the former Gopher Ordnance Works (GOW). This past land use is significant because, as of July 2010, the environmental legacies of GOW operations and post-GOW activities have not been fully investigated and remediated in accordance with State law or County ordinance. In May 2010, the Minnesota Pollution Control Agency (MPCA) stated to the U.S. Army Corps of Engineers (Corps) that the MPCA

UMore Park Sand and Gravel Resources Draft EIS: Dakota County Staff Comments 3

6 Comments are noted. The new Dakota County Regional Park is over a ¼ mile in distance from the nearest active mining area. The Final EIS includes a number of mitigation measures to reduce noise, dust and visual impacts to adjacent uses and such mitigation measures will mitigate potential effects on the new Dakota County Regional Park. These measures are addressed in each relevant section throughout the document and summarized in Section 4.0 (Summary of Mitigation Measures.) The Noise analysis (Section 3.11) indicates that the mining operations should have minimal impacts on lands beyond 900 feet from the mining operations.

The University of Minnesota recognizes that truck traffic will share the road with other users, including park visitors. Areas of concern have been addressed in the mitigation measures to reduce potential traffic conflicts (see Sections 3.10.2 and 3.10.3 of the Final EIS.

As detailed access plans and uses are defined through the master planning and eventual site planning for the new Dakota County Regional Park, traffic patterns should be evaluated relative to identified mitigation actions.

7 The UMA is located in the uppermost portion of the drainage area tributary to the wetland complex known as Butler Pond. Streams and ditches in the area appear to only convey surface runoff flow following a rainfall and snowmelt events with no baseflow from groundwater. During small rainfall events virtually all of the precipitation falling in the UMA infiltrates through the sand and gravel soil that is present on site, and very little runoff leaves the UMA or contributes to flows in tributaries to the Vermillion River. In fact, the modeling analysis completed for this EIS shows that the proposed action will not impact flows or volume in Tributary 5 for a range of precipitation events including the 1-, 10-, and 100-year 24-hour events as well as the 100-year 4-day event. Additionally, the groundwater analyses performed for the EIS reveals the groundwater beneath the UMA currently does not flow to Butler Pond and it will not flow to Butler Pond in the future as discussed in Section 3.8.

The 100-year 4-day modeling summarized in Table 17 and Figure 19 of the EIS indicates that peak flow rates and volume in Tributary 5 just upstream of the Vermillion River would not change from existing conditions following the proposed action. In addition model results summarized in Table 17 and Figures 19-21 reveal that the peak flow rate at the Vermillion River would not change in any of the three tributaries and the total runoff volume reaching the Vermillion River would be reduced by only 3.4 percent. The small reduction in volume is in compliance with the existing VRWJPO volume control standards (as summarized in Section 3.7.2 of the EIS) which indicate that following a land disturbance activity the runoff volume to the Vermillion River must prevent an increase in runoff volume.

The modeling analysis completed also demonstrates that for smaller precipitation events (1-, 10-, and 100-year 24-hour events), the proposed action will not impact the peak flows and volumes conveyed to Tributary 5 from the UMA. The existing peak flow rates and runoff volume from subwatersheds ExtN-6 and ExtN-4 shown in Figure 14 are essentially equal to the peak flow rates and runoff volumes following the proposed action from subwatersheds PropN-38 and PropN-40 (see Figure 15). The nearly identical results are because the subwatershed area tributary to Tributary 5 following the proposed action is nearly identical to the existing area tributary to Tributary 5.

8 Sections 3.1.1, 3.17.1, and 3.17.2 in the Final EIS recognize the proposed regional greenway alignment. In addition, has been modified to show the general alignment of a Greenway Corridor through the UMA as depicted within the Final Report for Rosemount/Empire/Umore Area Transportation System Study: June 2010.

holds the Corps, as owner and operator of the GOW, responsible for investigating and remediating the complete GOW site in accordance with Minnesota Superfund guidelines and with the Corps' own Formerly Used Defense Sites guidance manual. At this time, the Corps has not responded or complied.

In addition to the requirements of State law and the Minnesota Pollution Control Agency, property located in Dakota County is subject to all Dakota County Ordinances, including Ordinances 110 and 111, which regulate the disposal of solid and hazardous wastes. Under Ordinance 110, it is the owner of a nonconforming site, which is property on which the unlicensed disposal of solid or hazardous wastes has taken place, who is responsible for bringing the site into conformance, which may include environmental investigation and remediation subject to County approval.

Because of its historical land use, the UMA contains far more environmental uncertainties than would an aggregate mine on land that had been simply been farmed since it was settled. Section 3.2.2, p. 28, of the EIS states:

> "There are two primary concerns relative to potential environmental releases for this project. The first concern is that groundwater below the UMA might become impacted due to a release of chemicals or materials that are stored or used during mining operations. … The second concern is the possibility that environmental releases from past land use may become disturbed or mobilized as a result of mining operations."

9 *cont'd*

Dakota County staff concur with this assessment. The proposed mining operations can be expected to affect groundwater and surface water, but County staff's strongest concerns are based on how the mining operations might intersect with or exacerbate contamination from past land uses.

EIS Section 3.2.2 Environmental Consequences

Environmental Hazards Associated with Mine Operations (p. 31)

Regarding the proposed mining operations:

- The proposed mining operation and end use will significantly change the hydrologic condition for surface flows to the Vermillion River. Although the modeling effort shows that there would be little impact in a critical event (4-day, 100 yr); there likely would be significant impacts to lesser events. The condition of the river is maintained through flows extending across the entire spectrum of the hydrologic regime. It is important to address the impacts to lesser flow events and their impact to the river as well as the critical (flood flow) event. The reduction of surface drainage area and flows in the planned mining development and end use scenarios should be evaluated as to the potential impact to the Vermillion River as maintaining the river as a resource is a critical goal of the County.
- Dakota County staff find the proposed measures to prevent or mitigate spills or releases of fuels, asphalt, lubricants, and other hazardous materials to be reasonable and adequate.
- The draft EIS should outline how the University will work with the City of Rosemount as the city grows and its Drinking Water Supply Management Area (DWSMA) approaches the UMA, which currently is outside the DWSMA.
- County staff would like to emphasize that the nature of the site makes it critically important that the Spill Prevention, Control, and Countermeasures Plan (p. 31) be fully implemented as described in the draft EIS, especially that worker training be maintained when there is staff turnover and new workers begin at the site. In addition, any spills or releases must be reported to appropriate state officials (the PCA duty officer) and mitigated promptly to prevent groundwater contamination.

- Staff have reviewed the Groundwater Assessment Report prepared as part of the EIS and find it to be a reasonable and reliable evaluation of the site's groundwater hydrology.
- Staff concur with the Groundwater Assessment Report and EIS Section 3.8, that there appears to be a groundwater divide along the south side of the mining area, and that the Vermillion River would not be directly affected by mining operations via groundwater.
- Staff concur with the EIS conclusion (p. 121) that post-mining conversion of some land to open water would result in a net increase in groundwater recharge, a positive consequence.
- Staff find the principal negative groundwater consequence from mine operations is the potential for aquifer drawdown due to production wells pumping. The estimated average annual pumping rates are 6 gallons per minute (gpm) for wash water and 7.6 gpm for concrete production water. However, peak pumping rates would be much higher. Staff request the opportunity to review the groundwater modeling-produced 3-D path lines around the planned production wells. Staff recommend additional pumping tests to refine the assumptions used in the model.

Environmental Hazards Associated with Past Land Use (pp. 32-45)

County staff believe the draft EIS does not adequately address environmental concerns associated with identified sites of concern; does not designate enough places as SOCs where there is known elevated risk of contamination; and does not go far enough to identify potential sites of concern where the history is less fully known. The University should revise its draft EIS to eliminate the omissions associated with past land use identified below. **9** *cont'd*

The proposed mining activities increase the potential exposure risks from past land uses (pre-GOW, during GOW activities, and post-GOW), compared to the current farming and research activities. These potential exposure risks have not been fully investigated and, in some of the proposed UMA, relying on an Environmental Contingency Plan to identify and address these risks may be inadequate. Some of these potential risks include:

- Risks to mine workers from exposure to contaminated or explosive materials
- Risks to mine workers and future land users from removing, stockpiling, then rearranging inadequately characterized, contaminated soils
- Risks to users of aggregate products from exposure to contaminated sand or aggregate inadvertently extracted and sold from site
- Risks to future land users if soil or groundwater contamination is still present after mining
- Risk to drinking water aquifers if mine operations draw groundwater contamination from a shallow aquifer to a deeper one

The Phase II Investigations of the UMA were based on incomplete information, so there may be additional Sites of Concern (SOCs) that were not identified and there may be identified SOCs that were not adequately evaluated. The UMA Phase II Investigation work plans were developed without the benefit of a current Phase I Site Investigation focused on the UMA. As a result, the investigation activities may have been too limited in scope to achieve the stated investigation objectives. The investigation was constrained by both an incomplete accounting of potential SOCs present in the UMA and incomplete characterization of some identified SOCs because of limited sample numbers and analytical parameters. In addition, the potential environmental impacts of the six decades of agricultural and research uses of the site after GOW were not assessed or investigated.

Potential SOCs Not Evaluated

Lacking a thorough and complete Phase I site investigation, Dakota County staff believe the inventory of potential SOCs is incomplete and there are additional areas potentially affected due to the construction, operation and demolition activities at the former GOW. These sites may be eligible for further assessment under the policies and procedures relating to the Defense Environmental Restoration Program — Formerly Used Defense Sites (DERP/FUDS) program and should have been the subject of a preliminary assessment and site investigation consistent with the DERP/FUDS program requirements.

Additional non-evaluated SOCs associated with the construction, operation and demotion of the GOW facility include the following:

1. Heavy Gauge Railbed: County staff recommend that further investigation of the heavy gauge railbed be conducted before conclusions are finalized for additional Response Action Plans (EIS Section 4.2, p. 237).

Approximately 2.25 miles of railbed, constructed to support heavy gauge track, is within the UMA. The track was installed in 1942 to receive and distribute materials and equipment necessary for plant construction and operation, and to transport finished products from the facility. Railbeds were constructed of ballast rock and creosote-treated wooden ties. At several areas on the former GOW facility, slaglike materials have been observed along railroad grades. This suggests that fill material (whose composition is unknown) might also have been added to the railroad grade, potentially creating a contamination source.

9 *cont'd*

There are several contaminants of concern associated with construction and use of the heavy gauge rail line, including: polycyclic aromatic hydrocarbons (PAHs) from the burning of coal and diesel fuel and from creosoted timbers; arsenic from the application of arsenic-based herbicide used to control vegetation; petroleum from releases of fuel and lubricants and, in areas of loading and unloading, such as at SOC 4, the presence of explosives from spills of materials such as DNT, DPA, and finished powder.

Limited sampling of the rail lines in SOC 1 identified carcinogenic PAHs that exceed health risk standards. Although SOC 1 was removed from the UMA, several miles of rail line remain within the UMA. This railbed represents a SOC and should be investigated further in this EIS process.

2. Garage/Shop Site 5264: Along the northern edge of the UMA, Site 5264 was used during GOW operations to store and maintain snowplows. Operational details regarding the functions and activities conducted in this building are unavailable for review but it is suspected that releases may have occurred during vehicle maintenance activities at the site. The garage building was transferred to the University from the federal government by a quitclaim deed in 1947. As of May 1949, the building was used as a state highway garage. No additional information is currently available regarding this use.

The building apparently was razed sometime between 1957 and 1962 as determined through review of historical aerial photographs. The building outline and roadway remain visible on aerial photographs taken before 2006, when this area was disturbed by the excavation and installation of the pipe used to convey treated effluent from the Empire wastewater treatment plant to the Mississippi River. This site represents a SOC and should be investigated further in this EIS process.

3. Abandoned Farmstead — Former GOW Storage Site 5889 and Agronomy Research: Eight of the 80 farmsteads acquired by the federal government to construct the former GOW facility were

located within the UMA. In most cases, the buildings and structures associated with these farmsteads were either moved or were burned or demolished and buried onsite without addressing the need to permanently seal abandoned wells or remove solid wastes. Adverse environmental impacts from these farmsteads are expected to be minimal, but recognized environmental concerns likely exist. Some of the farm buildings were retained and used by DuPont or the U. S. War Department. In the case of the abandoned George Elliott Farm near the middle of the UMA, it appears that the farmhouse and barn were retained for unknown purposes by DuPont. The buildings were transferred to the University from the federal government in 1947. The University used the buildings and site as part of the agronomy research activities. The site did include a gasoline storage tank (presumably to fuel vehicles). Sometime in the mid-1990s the buildings associated with the former farmstead were razed. The unknown use of the site by DuPont and the University's subsequent use may have released contaminants of concern. Sampling and analysis of the soils and groundwater at the site are warranted in this EIS.

Area Wide Arsenic Sampling

Herbicides containing organic, arsenic-based compounds were used for routine operations and maintenance at World War II munitions plants in other parts of the country and are suspected to have been used to control vegetation at the GOW as a fire control measure. This contention is supported by the previous investigations of the former GOW facility, which identified elevated levels of arsenic in the soil near production facilities, disposal sites and surface water management structures. Based on the historic use of the property as a munitions plant, the use of arsenic-based herbicides is suspected at many areas throughout the GOW facility including the UMA. Mercury contamination of the soil is being addressed through Interim Corrective Actions (Section 4.2, p. 237); however, further assessment of arsenic contamination should also be conducted in this EIS.

9 *cont'd*

Environmental Hazards from Post-GOW Activities

In addition to identifying Recognized Environmental Conditions (RECs) from GOW operations, the absence of a current Phase II investigation also leaves open the question of what other RECs could be within the UMA resulting from the University's research activities between 1948 and 2010. The statement regarding current land use of the UMA as farmland downplays potential environmental releases during agricultural research activities at the UMA. Details about operations and research activities of the University and its tenants are notably missing from the evaluation of this EIS's SOCs.

During the past six decades, research and supporting operations conducted on UMore Park property included the use of a variety of hazardous chemicals. University documents, if they exist, describing the identity, location and use of buildings and infrastructure, have not been disclosed publicly but could be useful in developing a complete inventory of potential recognized environmental conditions. Additional RECs generated by the research and supportive operations conducted by the University and its tenants occurred in the following areas within the UMA: agricultural engineering complex, central services, plant pathology, agronomy research, dairy research, poultry research and test plots.

These areas include buildings and structures supporting the agricultural research conducted at the agricultural experiment station (AES) since the late 1940s. In addition to the potential releases associated with pesticide and fertilizer applications and research, documented operations associated with the agricultural research at the AES include: grain storage and treatment; research laboratories; individual sewage treatment systems; machine, mechanical and equipment repair shops; garages; petroleum storage and dispensing operations; ag-chemical storage and mixing operations; electrical transformers; and various equipment and material storage buildings. A complete inventory of the

operations and facilities creating potential RECs must be completed in this EIS to ensure that all areas potentially contaminated are identified and investigated.

Evaluation of Identified SOCs: Soil Contamination
Current and previous investigations of releases in the UMA have identified soils contamination that exceeds standards requiring cleanup for a number of chemicals including pesticides, metals, petroleum, explosives and polycyclic aromatic hydrocarbons. Dakota County staff disagree with the conclusions regarding the limited sites requiring future response actions included in the SSIRI (Table 8).

Results from the limited soil sampling conducted at the UMA to date cannot be considered representative of true UMA soil conditions because sites with potential contamination have not been tested. Also, the testing that has been done did not follow current U.S. Environmental Protection Agency (EPA) and MPCA procedures for collecting and analyzing soils. Therefore, decisions regarding the existence, extent, magnitude or absence of contamination cannot be made using the soil data collected thus far. Further sampling and analysis should be performed at the site in this EIS to obtain the data need to develop response action plans.

Evaluation of Identified SOCs: Groundwater Contamination
Results from the limited groundwater sampling at the site determined that hazardous substances have been released at several SOCs with groundwater impacts. Thallium, beryllium and lead were identified in drinking water wells at concentrations exceeding heath risk levels (HRLs). The supplemental site inspection and remedial investigation implies that the existence of beryllium and thallium above HRLs is from natural causes, but this assertion is not supported by any reference data. Thallium, for example, was used extensively in the past as a rodenticide and may have been used at the Agricultural Experimental Station to protect grain and seed storage areas. Other contaminants including petroleum, pesticides, and chlorinated compounds were also identified in shallow and quaternary (geological era) aquifers. The sources, extent and concentrations of these contaminants have not been determined and additional groundwater testing is required in this EIS to assess potential release sites and receptors.

9 *cont'd*

Summary
County staff support the MPCA's statement (in a letter dated May 28, 2010) to the U.S. Army Corps of Engineers that a comprehensive investigation and remediation of the complete GOW site is necessary, done in accordance with Minnesota Superfund standards and the Corps' FUDS guidance previously referenced. However, if a comprehensive approach to the former GOW is not forthcoming, Dakota County staff think that phased environmental investigations and remediation and phased mining can be conducted in the UMA, if conducted with sufficient advance planning. We are concerned that relying on the mitigation measures described in EIS Section 4.2, Proposed Future Actions outlined in Tables 8 and 9 of the EIS (p. 38 and p. 43) is not sufficient to protect human health and the environment. The referenced letter read, in part, "As has been stated in past correspondence (January 4, 2006, August 11, 2008 and January 30, 2009) to the Corps, it remains the MPCA's position that a full and complete Remedial Investigation/Feasibility Study is necessary for the entire GOW site."

We believe the Environmental Contingency Plan, as described in the draft EIS, relies too heavily on workers or inspectors detecting evidence of past releases. Unfortunately, many of the contaminants of concern detected at the UMA are not visually or olfactorily distinctive at concentrations exceeding human health or ecologic concerns. Additionally, because of high ionization potential of compounds including PAHs, explosives and metals, relying on visual or olfactory inspection or field screening instruments such as photo-ionization detector or X-ray fluorescence measurements, or observations

COMMENT LETTER F – DAKOTA COUNTY

made by site workers or an on-site environmental inspector, cannot be used as a substitute for more precise investigatory methods. As a result, the contingency-based "debris management" proposed in the EIS would do little to reduce exposure risks to workers or others. Examples of such contaminants of concern that would need to be addressed prior to soil disturbing activities would be metals such as arsenic, mercury, and lead; pesticides; and PAHs.

Because of the Draft EIS comments noted above, which question the SSIRI and other prior investigations reports, response action plans for the identified sites of concern would require further testing and appropriate investigation before they can be considered. In all cases, the response actions must comply with both MPCA rules and Dakota County ordinances.

Furthermore, before topsoil and earthen cover over the aggregate are removed from a mining phase area, unevaluated and potentially contaminated areas of the UMA must be the subject of a complete assessment of past land use. Potentially affected soil, overburden, and groundwater must be sampled and analyzed according to a Remedial Investigation Plan approved by the MPCA and Dakota County. Dakota County staff would be very pleased to assist the University, the Corps, the MPCA and other state agencies, respective consultants, and other parties by provide our expertise and the substantial, specific information we have accumulated about the environmental history of the site. This assistance should help all parties be focused and cost-effective in their efforts to assess, investigate, and remediate contamination in the UMA and the remainder of UMore Park.

9 *cont'd*

EIS Section 3.2.3 Mitigation (pp. 46-47)

Clean-up Criteria and Environmental Contingency Plan Contents
The criteria reference the SRV-Tier I soil screening but should also state that state HRLs should also apply to contaminants of concern detected in groundwater and drinking water supplies.

EIS Section 6.0: Approvals, Permits, or Consultation (p. 247)
The Draft EIS Section 6.0 incorrectly identifies the state Health Department as the regulatory agency for sealing abandoned wells. In Dakota County, the County's Delegated Well Program is the licensing agency for well-sealing permits. The University is required to locate all unsealed wells and hire a licensed well contractor to seal the wells in accordance with Minnesota Rules 4725 and Dakota County Ordinance Number 114. More information is available at:
http://www.co.dakota.mn.us/DoingBusiness/Permits/WellPermits/default.htm

Eight farmsteads present on 1937 aerial photography are within the UMA property. The state Health Department's rule of thumb for estimating the number of wells on a property is one well per generation. This can be used as a guide for the number of wells to expect to find on each farmstead located at UMore. For example, a farmstead established in 1880 and vacated in the 1940s could be expected to have approximately three wells on the property. The Environmental Contingency Plan should include worker training in identifying unused, abandoned wells, and in the requirement that unused wells be sealed by a licensed professional well contractor.

Also, Dakota County Ordinance 110 regulates solid waste disposal and Ordinance 111 regulates hazardous waste generation and disposal, including remediation of past hazardous waste disposal.

All Dakota County ordinances are at:
http://www.co.dakota.mn.us/LawJustice/Ordinances/CountyOrdinances/default.htm

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9 The next three pages are a copy of a letter from the University to Dakota County that includes responses to items contained under Comment #9 from the Dakota County letter.

Following the University's letter there is additional information related to comment #9.

UNIVERSITY OF MINNESOTA

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September 28, 2010

Ms. Lynn Thompson
Director, Physical Development Division
Dakota County
Western Service Center
14955 Galaxie Avenue
Apple Valley, MN 55124

Re: September 16, 2010 Meeting to Discuss Dakota County Comments on the Draft Environmental Impact Statement for the UMore Mining Area (UMA) Regarding Potential Soil and Groundwater Impacts

Dear Lynn:

Thank you for meeting with us to discuss the County's comments regarding the investigations conducted by the University as part of the environmental review for the proposed UMore Mining Area (UMA) project. The meeting was helpful to University staff in that it allowed us to better understand the County's comments and identify ways to increase the exchange of information as we move forward.

The focus of the meeting was on the narrative comments presented on pages 4 - 8 of the County's August 4, 2010 letter regarding the adequacy of the investigations completed to date, and steps to be taken in the future as part of the project to protect human health and the environment. The University will provide a detailed response to those comments, as well as the other issues raised in the County comment letter (e.g. transportation, etc.), as part of the Final Environmental Impact Statement. We did, however, want to follow up with you now on some of the points discussed during the September 16 meeting, and in particular, the process that was involved in scoping the investigations, the sampling and quality assurance plan approvals and the work plan approvals.

We discussed the Minnesota Pollution Control Agency's (MPCA) approval of the investigation work plans. The MPCA evaluated the sufficiency of the proposed level and frequency of sampling in part on whether the area to be tested contained "Recognized Environmental Conditions" (RECs) under ASTM E 1527-05, the industry standard for Phase I Environmental

Site Assessments, including known releases of hazardous substances. For those areas with RECs, the MPCA required the investigation be consistent with the Minnesota Environmental Response and Liability Act (MERLA) and associated guidance, as well as the National Contingency Plan, including a Quality Assurance Project Plan and Sampling Analysis Plan (QAPP/SAP). The work plan and QAPP/SAP for areas with RECs were approved by MPCA Superfund staff. Testing completed in other areas of the UMA not containing RECs or known releases, but for which additional information was desired due to available historical information, did not require a particular sample density or approved QAPP/SAP. This testing was instead intended as a "first look" at the nature of the subsurface. If this initial testing revealed evidence of a release, then additional investigation would have then been completed. The updated and fully compliant ASTM Phase I Environmental Site Assessment provided critical information that was used in developing the separate work plans for the two categories of sites.

During the meeting, County staff noted that their comments were not intended to suggest that there is an actual or perceived "potential for significant environmental effect" related to the proposed project. In particular, we discussed the criteria for significance included in the environmental review rules 4410.1700, Subp. 7. The County staff stated that they were satisfied that the University will proceed with the on-going investigations under MPCA oversight, and will continue to collaborate with the County in that process. County staff also commented that the County has its own Solid Waste Management Ordinance, which applies to non-conforming solid waste disposal sites.

As requested by Director Swenson, the University agreed that it will complete the following additional actions with respect to the UMA project:

- Complete soil sampling at the former maintenance garage site 5264 prior to the start of mining operations in the northern portion of the UMA;
- Review and assess any additional, available information for the Western Complex, including the former farmstead used by E. I. du Pont de Nemours, prior to the start of mining in that area;
- Prior to demolition of the former DNT bunkers and associated testing and remediation in SOC 5, review and assess any additional, available information regarding past tenants that may have stored explosives in those bunkers;
- Review and assess any additional, available information regarding University laboratories and pesticide storage areas, particularly those located within the Agricultural Engineering complex (SOC 3) and the Southern Complex (SOC 6), prior to commencement of mining activities in those areas;

- Complete "step-out" soil sampling during future investigations in the UMA where surface concentrations of arsenic are encountered above the Minnesota Tier I Soil Reference Value of 9 mg/Kg;
- Provide a review draft of future investigation and response action work plans regarding the UMA to the County in advance of field work;
- Provide the County with a sample Environmental Contingency Plan (ECP) and a general description of the additional investigation to be completed within the UMA; and
- Perform all mining activities under an ECP reviewed by the County and approved by MPCA.

The University acknowledges the significant contribution from County staff in shaping the investigation scope and greatly appreciates the County's cooperation in assembling and assessing the investigation areas for the UMA project.

Lynn, I want to especially thank you and your staff for the openness and cooperative nature of the meeting. With the UMore project intending to take up to 40 years, it is so important for complete and frank discussions on these matters. We are both large public agencies whose charter and goals are to serve the interests of the citizens of our State. The University was established nearly 160 years ago. We believe our mission is as strong as it was in 1862—when the Land Grant Colleges were established—to use the land for the best use of the citizens.

Please contact me if you have any questions.

Warm regards,

Charles C. Muscoplat

Charles C. Muscoplat
Senior Academic Adviser
McKnight Presidential Leadership Chair

c: Mr. David Swenson – Dakota County
Ms. Michelle Beeman – Dakota County
Mr. Jim Aiken – Barr Engineering
Mr. Steven Lott – UMore Park

RESPONSE 9 (continued)

In its August 4, 2010 comment letter, Dakota County provided several unnumbered narrative comments regarding potential environmental conditions associated with proposed future mining activities and the sufficiency of the environmental investigations completed as part of the EIS process regarding past land use. These comments may be reviewed in full starting on page 3 (paragraph 4) and ending on page 9 (paragraph 6) of the comment letter. For ease of reference and continuity, the County's comments, and corresponding University responses, have been organized under the following headings:

1. Certain aspects of the environmental investigations for Sites of Concern (SOCs) 1 through 8 are incomplete and/or inadequate.
2. The Phase II Investigation of the UMA is incomplete due to a lack of a current Phase I Site Environmental Site Assessment.
3. Future management of environmental conditions at the UMA rely too much on implementation of an Environmental Contingency Plan (ECP).
4. Groundwater supply, flow and influence of pumping wells:
   a. Rosemount Drinking Water Supply Management Area; and
   b. Potential groundwater draw-down due to production well pumping.
5. Miscellaneous Issues:
   a. Groundwater clean-up criteria; and
   b. Sealing abandoned wells (Dakota County Ordinance #114).

The University met with Dakota County staff to discuss these issues on September 16, 2010. The County agreed during that meeting that, given the nature of the identified impacts, the plans for additional investigation and remediation, and the continued oversight by MPCA and review by the County, none of the County's comments should be construed as an indication that there is a "potential for significant environmental effects" related to the mining project.

The University appreciates the County's comments and looks forward to continuing to work with County environmental staff to ensure that the proposed mining project is protective of public health and the environment. The University's responses to the August 4, 2010 comment letter are set forth below.

<u>Issue 1: Aspects of the environmental investigations for Sites of Concern (SOCs) 1 through 8 are incomplete and/or inadequate</u>

In the County's comment letter, staff asserts that some aspects of the SOC investigations in the UMA are incomplete or inadequate due to the following:

- The methods for soil collection and analysis did not follow regulatory procedures;
- Too few samples were collected and analyzed too limited a list of analytical parameters; and
- Metals parameters (i.e., lead, beryllium, thallium) were detected in groundwater and additional testing is required to complete the EIS.

Methods, Sample Density, and Parameters

The MPCA-approved Phase II and SSI/RI work plans and associated QAPP/SAP. The work plans and QAPP/SAP describe the number of planned samples, the analytical parameters, MPCA guidance, and EPA or other standard methods used to collect and analyze the samples during the investigations.

The methods and procedures used in the collection and laboratory analysis of samples completed as part of the Phase II and SSI/RI and subsequent investigations were reviewed and approved by the MPCA. MPCA acceptance of the environmental investigations and associated analytical procedures is demonstrated by signatures of the MPCA Project Manager, MPCA Quality Assurance Officer/Project Hydrogeologist, and the MPCA Quality Assurance Coordinator in the QAPP/SAP. The County's general statement that "the testing that has been done did not follow current U.S. EPA and MPCA procedures for collecting and analyzing soils" is therefore inconsistent with the assembled work plans, QAPP/SAP and above-referenced approvals.

Detected Groundwater Constituents
The County commented that the presence of thallium, beryllium and lead in drinking water wells sampled as part of the SSI/RI in excess of the Minnesota Health Risk Levels (HRLs) for those compounds suggests that further groundwater sampling is required. The County's assertion that additional groundwater testing is required as part of the EIS is not supported by reference to the hydrogeologic conditions or risks to potential receptors associated with mining operations.

After the SSI/RI Report was published, verification samples were collected from the referenced water supply wells and laboratory analysis indicated that the thallium and beryllium concentrations were below their respective HRLs. Because the initial results were not verified (reproduced) by re-sampling, and may have been the result of matrix interference or false positives, additional monitoring of these wells will continue. At this time there is no indication that groundwater impacts exist in these wells and there is no evidence of the potential for significant effects from mining. The suspected source of the lead detected in water samples collected at the UMore Administration Building has been identified as plumbing lines leading to the exterior building spigot. Potable water in the building facilities is provided through separate plumbing. The results of the verification sampling and follow-up sampling at the UMore Administration Building are posted on the UMA website.

<u>Issue 2: The Phase II Investigation of the UMA is incomplete due to a lack of a current Phase I Environmental Site Assessment</u>
In the County's comment letter, staff suggests that a Phase I Environmental Site Assessment (Phase I ESA) was not completed for the UMA and, as a result, the Phase II investigation of the UMA was based on an incomplete list of SOCs. The University disagrees with the County's comment that the Phase II investigation was based upon incomplete information due to a lack of a Phase I ESA.

In June 2006, a Phase I ESA that complied with both the current ASTM standard 1527-05 and U.S. EPA's "All Appropriate Inquiry" rule was completed for the portion of UMore Park located to the north of 170th Street, including the entire UMA. This Phase I ESA included extensive review of historical records, air photographs, and documentation of the former University tenants, GOW-era land use, and other file data. The Phase I ESA was submitted to MPCA and the County for review, and identified Recognized Environmental Conditions (RECs) associated with all land uses, including GOW, which occurred prior to the June 2006 effective date of the Report. Therefore, the County is incorrect is stating that no Phase I ESA has been performed with respect to the UMA.

As part of the EIS process, Barr Engineering updated the 2006 Phase I ESA to address all land uses and new information post-dating June 2006. The ESA update was compliant with

the information sources required by ASTM E 1527-05 and was completed as an integral part of the Phase II SOC and SSI/RI work plans approved by the MPCA. The Phase I ESA update activities met the requirements of VIC/MPCA and CERCLA guidance.

As part of the Phase I ESA update, the University followed ASTM requirements for identifying "recognized environmental conditions" or "RECs." The ASTM E 1527-05 standard defines a REC as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property." The term REC is not intended to include *de minimus* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimus* are not RECs.

The Phase II SOC work plan (dated December 29, 2008) for the UMA included the Phase I ESA update information for previously identified RECs as well as sites where it appeared more information was required (collectively, SOCs). This information was reviewed by Dakota County and, based on feedback the County provided to the University during a meeting, the scope of the Phase II SOC investigation was modified to include a new SOC (SOC 8), additional investigation of SOC 2, and establishment of the 0 to 6-inch default soil sampling depth.

In the August 4, 2010 comment letter, County staff identified several additional potential SOCs that they suggest may be present as a result of GOW or post-GOW land uses. As is indicated in the following table, the additional potential SOCs have either already been investigated or do not merit investigation.

County's Identified Potential SOCs	Comment
Heavy Gauge Rail Bed	Portions of the rail bed were already investigated in SOC 1, SOC 2, SOC 4, and the AUF investigation. One of the many soil samples collected during these investigations slightly exceeded a regulatory standard for one compound. As a result of the exceedence, the University committed to prepare and implement a RAP that will include provisions for additional sample collection and address soil stripping, stockpiling, and confirmation sampling of soil located along the rail bed, as described in the Phase II SOC Report.
Garage/Shop Site 5264	The referenced former garage was located in the utility right-of -way south of Highway 42. The area was visually observed by an environmental professional during the Phase I update and is located approximately 900 feet north of the mining footprint and will not be excavated as part of mining activities. This area was also extensively excavated by the Metropolitan Council during installation of a major sewer line in 2006 so that any impacted soil within this area would have been exposed. There were no reported soil impacts associated with that excavation. Therefore, this site does not appear to have potential for significant environmental effects associated with planned mining activities.
Abandoned Farmstead – Former GOW Storage Site 5889 and Agronomy Research	All of the abandoned farmsteads within the UMA were visually observed by an environmental professional during the Phase I ESA update. The possible presence of a fuel storage tank over 60 years ago was deemed an insufficient basis for assigning the site as a SOC. The available evidence did not suggest the potential for significant environmental impacts related to the proposed UMA mining activities. The abandoned farmsteads will all be evaluated in accordance with the ECP to be reviewed by the County and approved by the MPCA prior to commencement of mining. Any impacts identified during mining activities will be addressed in accordance with the ECP.
Area-wide Arsenic	The existence of area-wide arsenic impacts above potentially applicable standards is contradicted by the environmental investigation results. A total of 116 soil samples were collected within the UMA from locations and depths most likely to be impacted by past land use practices. Arsenic was present in concentrations slightly above the Minnesota Residential Tier I Soil Reference Value (SRV) of 9 milligrams per kilogram (mg/Kg) in just 3 of the 116 samples. The three samples were SOC3GP1 (0-0.5)--9.2 mg/Kg, SOC3TT6 (0-1)--9.8 mg/Kg, and SOC5GP5 (1.5-2.5)--9.4 mg/Kg. The MPCA commented in the Phase II Report technical review memorandum (dated February 24, 2010) that arsenic concentrations detected slightly above the SRV "are within the typical background concentration and are not wide spread." Accordingly, the levels of arsenic in the areas to be mined do not present the potential for significant environmental effects.
Unspecified University Research, Operations, and Buildings	The County's comments do not identify any particular buildings that require further investigation; however, the research, operations areas, and buildings that pose a theoretical risk of release have already been investigated as part of the Phase I ESA update, Phase II, SSI/RI and related studies. Further investigation of existing structures is planned as described in the DEIS and supporting investigation reports and other documents.

The evidence generated through these investigations indicate that the majority of the UMA has not been impacted above current regulatory criteria. The few areas within the UMA that have exhibited a potential for an environmental release above applicable standards are the subject of future investigation and/or clean up, or will be addressed through an ECP.

Issue 3: Future management of environmental conditions at the UMA rely too much on implementation of an Environmental Contingency Plan (ECP)

The County expressed a concern that the use of an ECP as described in the DEIS relies too heavily on workers or inspectors detecting or otherwise observing past releases of hazardous substances and, in some areas of the UMA, may lead to potential exposure risks to mining employees, users of aggregate products, future land users, and drinking water aquifers. County staff express the need for additional investigation of overburden materials located throughout the UMA prior to mining.

The ECP will include a description of the potential environmental concerns (including debris, asbestos, hazardous substances, and petroleum products) that may be associated with each phase of mining, areas where abandoned/unsealed water supply wells may be encountered, what sampling must be conducted prior to earthwork, and notification responsibilities and response actions to address suspected or confirmed areas impacted overburden and sand should it be encountered. The ECP will also address training and provide references to the Dakota County Ordinances that regulate solid waste disposal, hazardous waste generation and disposal, and well sealing requirements. The ECP will be subject to review and approved by the MPCA, and will be provided to Dakota County prior to the commencement of mining activities. For several reasons, the University has determined that use of an MPCA-approved ECP during mining activities will help avoid, rather than create, the potential for significant environmental effects as described below.

First, the use of ECP is consistent with MPCA guidance and has been successfully implemented during hundreds of development projects in Minnesota. The University has received the MPCA's concurrence for this approach and will implement the ECP in accordance with methods that will specifically address the issue of risk to on-site workers and field screening of soils for hazardous substances or pollutants that may be difficult to detect through visual observation and/or odor. These practices are consistent with standard industry methods and the ECP will be reviewed and approved by the MPCA prior to the work.

Second, the University agrees that it is possible that previously unidentified, isolated environmental soil impacts, such as a residual petroleum spill, debris or asbestos-containing materials will be identified during mining activities and will require proper management and disposal. However, these isolated areas within the approximately 1,700 acres of the UMA are inherently difficult (if not impossible) to effectively identify by standard investigation sampling methods. For many properties like the UMA that are undergoing a land use change involving excavation, the use of a well-managed ECP is the most effective means of revealing evidence of a release simply because a larger percentage of the subsurface is exposed than can be revealed with investigative soil sampling. In some cases, sites that were thought to be free of impacts were later found to have environmental issues only when site personnel had the opportunity to observe a significant volume of subsurface soils during excavation activities. Therefore, utilization of a ECP during mining will likely result in identification and management of a greater quantity of potentially impacted soil than simply employing standard environmental investigation techniques.

Finally, potential exposure risk to site workers in the UMA is no greater than that existing for a typical Brownfield site redevelopment project. The risk to on-site workers will be minimized through the ECP and by training, use of engineering controls, appropriate equipment, personal protection, and implementation of a health and safety plan.

Issue 4: Groundwater Supply, Flow and influence of Pumping Wells

Rosemount Drinking Water Supply Management Area (DWSMA)

The County indicated the EIS should outline how the University will work with the City of Rosemount at the DWSMA approaches the UMA due to future water demand increases. The location of Rosemount's future DWSMA is subject to future and on-going regulatory authority under City's groundwater protection plan, as well as City ordinance and therefore is not relevant to the adequacy of the EIS in accordance with MN Rule 4410.1700.

Potential Groundwater Draw-down due to Production Well Pumping
County staff requested the opportunity to review the groundwater modeling results to evaluate the drawdown the concrete plant productions wells may have if seasonal peak pumping rates significantly exceed the estimated average annual pumping rate used for the groundwater simulations conducted for the EIS. This information has been transmitted to Dakota County staff for review.

The DEIS found that there are no negative impacts related to draw-down from the proposed pumping at the site because the extent of head decline diminishes to negligible levels near the UMA boundary assuming long-term pumping. Peak production well rates are anticipated to be at or about the peak rates observed during the on-site pumping tests which showed relatively little drawdown in the outwash aquifer. Somewhat higher peak drawdown might be possible for the concrete production well, because this well will be used as part of a seasonal operation and within a less permeable aquifer. Wells within this aquifer would not be likely to sustain high pumping rates, nor is a high pumping rate necessary for the concrete operation. Therefore the potential to induce capture from the UMA is inherently limited.

The groundwater model has provided a robust characterization of existing conditions and was constructed with pumping tests performed at peak rates near those associated with the planned use. Although additional data will likely be collected in the future, this information would likely result in refinements of the model, but would not change the overall framework of predicted groundwater flow at the UMA. Therefore, the potential for impacts from the proposed mine operation have been thoroughly addressed.

Issue 5: Miscellaneous Issues

Groundwater Clean-up Criteria
The County suggested that the state Health Risk Limits (HRLs) be referenced in the EIS as applying to hazardous substances detected in groundwater and drinking water supplies. The University will address groundwater cleanup criteria on a case-by-case basis with input and oversight from the MPCA as part of the planning and implementation of any required response action. Currently, there is no indication that groundwater quality impacts will occur as a result of proposed mining activities in the UMA.

Sealing of Abandoned Wells (Dakota County Ordinance #114)
The County requested that the DEIS be revised to list Dakota County as the licensing agency for well-sealing permits and sealing activities in accordance with Minnesota Rules 4725 and Dakota County Ordinance #114. Section 6.0 of the EIS will be amended to reflect the requested change.

COMMENT LETTER G – VERMILLION RIVER WATERSHED JOINT POWERS ORGANIZATION

Vermillion River watershed reflecting life

August 5, 2010

Steven Lott
Project Manager
1605 160TH Street West
Rosemount, MN, 55068

Dear Mr. Lott:

The following comments are provided on behalf of the Vermillion River Watershed Joint Powers Organization in regard to the Draft Environmental Impact Statement for the UMORE Park Sand and Gravel Resources Project.

The proposed mining operation and end use will significantly change the hydrologic condition for surface flows to the Vermillion River. Although the modeling effort shows that there would be little impact in regard to the critical event (4-day, 100 yr); there likely would be significant impacts to lesser events. The condition of the river is maintained through flows extending across the entire spectrum of the hydrologic regime. It is important to address the impacts to lesser flow events and their impact to the river as well as the critical (flood flow) event. The reduction of surface drainage area and flows in the planned mining development and end use scenarios should be evaluated as to the potential impact to the Vermillion River as maintaining the river as a resource is a critical goal of the County and the VRWJPO. Planned mining development and end use should address how the impacts from changes in surface drainage area and delivery of flows are to be mitigated in both the mining development phase and in the planned end use of the project area. **1**

Sincerely,

Mark Zabel
Administrator
Vermillion River Watershed Joint Powers Organization

Vermillion River Watershed Joint Powers Organization
14955 Galaxie Avenue, Apple Valley, MN 55124, 952.891.7000, Fax 952.891.7588

1 The UMA is located in the uppermost portion of one of the tributary sub-watersheds that drain to the Vermillion River. Within this sub-watershed, the upstream portions of drainage ways tributary to the Vermillion River are not groundwater fed, and thus only convey flow following a rainfall event. Because the drainage ways near the site are intermittent and only convey water following a rainfall event, the proposed action will not impact the existing hydrology of those drainage ways (i.e. they will still only convey water following a rainfall event). Further groundwater analyses performed for the EIS reveal that groundwater

beneath the UMA currently flows northeast away from the Vermillion River and will continue to flow away from the Vermillion River in the future as discussed in Section 3.8.

The surface runoff modeling analysis completed for this EIS revealed that there was little impact even during a rare, severe 100-year, 4-day event. The surface water analysis performed for the EIS was modified to include a 1-year, 4-day event to aid in the determination that the proposed action would have an insignificant impact on the Vermillion River. The analysis demonstrated that the majority of precipitation infiltrates during smaller events because the existing soils are exceptionally sandy and permeable. Therefore, only a relatively small amount of runoff leaves the site during small, lower intensity, frequent events for existing conditions. Table 17 from the Draft EIS has been updated and is presented as Table 17 in the Final EIS. The modeling results for the 1-year, 4-day rainfall event presented in the updated Table 17 reveal that for the 1-year, 4-day event the volume reaching the Vermillion River is only reduced by a total of 7 ac-ft or only 3.3%. Additionally, the volume in the Vermillion River immediately downstream from the confluence with each tributary is reduced by less than 0.2% in all three locations. In addition, model results indicate the 1-year, 4-day peak flow rates in the Vermillion River will be unchanged following the proposed action.

Finally, the reduction in volume leaving the site across the spectrum of precipitation events included in this analysis is in compliance with the existing VRWJPO rules which are discussed in Section 3.7.2 of this EIS that state that runoff volume should not increase following a land disturbing activity. Additionally, the small reduction in volume seems to comply with Section 7.1, Item 6 of the VRWJPO standards states that "…it is the action of the VRWJPO to mitigate and reduce impacts of past increases in stormwater discharge on downstream conveyance systems."

COMMENT LETTER H – CITY OF ROSEMOUNT

ROSEMOUNT

ADMINISTRATION

August 4, 2010

UMore Park
Attn. Steven Lott, Project Manager
1605 160th Street West
Rosemount, MN 55068

Re: **Review of the Draft Environmental Impact Statement for the UMore Park Sand and Gravel Resources dated June 2010**

Dear Mr. Lott:

The City would like to begin by thanking the University of Minnesota for the opportunity to review the draft Environmental Impact Statement for the UMore Park Sand and Gravel Resources (Gravel EIS) dated June 2010. The City has reviewed the Gravel EIS and the comments provided below are based on that review.

General Comments: The Gravel EIS raises numerous technical issues regarding the potential impacts and proposed mitigation of those impacts. These topics are listed below by subject matter and section within the EIS. Additionally, the proposed mining operations, ancillary uses, and reclamation pose greater concerns to the Rosemount community than just the technical items enumerated below.

- The University continues to state that based on constitutional autonomy and status as a state entity that its properties including UMore are not subject to local land use controls and permitting requirements. The City does not agree that aggregate mining on the UMore property is consistent with the University's mission of education, research and outreach which would preclude local land use authority. The City's position is that any mining activity on the property must comply with all municipal land use controls currently in place or as amended in the future. **1**

- There are mining operations in Rosemount and the surrounding communities but not to the extent envisioned in the EIS. Appropriate mitigation measures must be put in place addressing noise, dust, traffic, and visual impacts so that current residents are not unduly affected by the operational impacts. Additionally, mitigation must be implemented over the term of the mining operations that benefits future residents of the City who will move into neighborhoods near the mine and ancillary uses.

- The City supports future development of the UMore property to bring the site into the community as a new sustainable neighborhood. The City is concerned that the proposed mining and ancillary uses will inhibit the ability to market and develop certain lands within UMore. There is a concern about the length of the mining operation and certainly the ancillary uses, which are proposed to remain until all mining, in both Rosemount and Empire Township is complete. **2**

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1 Comment Noted. As a matter of comity, the University includes in the EIS a discussion an analysis of the relevant local ordinances, permits and approvals otherwise applicable to the proposed Project as if it were being carried out by a private entity on privately owned land.

2 Section 4.0 of the Final EIS details the mitigation commitments and regulatory approvals that will be implemented and obtained prior to and during operations as applicable. The University is committed to working with the City to minimize adverse effects on both existing and future residents. Furthermore the University is committed to achieving the long term vision of developing UMore Park. Future development in proximity of the mining operations will proceed through the development approval process with awareness of current and future mining operations. The design and layout of future development will be focused on minimizing any potential adverse affects associated with the on-going mining operations. In

addition, it is anticipated that the mining permit issued by the City will be revisited as the mining operations transition from phase to phase. This process will provide an opportunity to account for potential land use changes around the UMA and enable the City to introduce stipulations in the permit to minimize adverse effects on the surrounding land uses.

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- The EIS does not provide details for reclamation of the properties impacted by mining. While the end use plan at this time is for agricultural use, the site within the 7-County metro area will at a future date develop. There has not been enough effort in determining appropriate reclamation of disturbed areas which can lead to additional developer costs for rectifying grading problems and providing public utilities to new development. **3**

- The EIS assumes that development outside of the study area will prompt infrastructure needs so that upgrades to the utility systems, particularly roads, will occur regardless of the mining operations. The City disagrees with that conclusion. In any event, the University of Minnesota should be aware that the City does not have the financial ability to implement all the anticipated infrastructure improvements without contributions from benefitting properties which includes the UMore site. **4**

- The City understands that an EIS needs to evaluate the all potential uses and the worst-case scenario to determine the most dramatic impacts and what are the appropriate mitigation measures to employ. However, the City has concerns about the type, number, and size of the ancillary uses described in the Gravel EIS. The University does not need to change the description of the ancillary uses in the Gravel EIS, but the City does want to make the University and Dakota Aggregates aware that the City may not adopt an Ordinance or mining permit that includes the ancillary uses as described. **5**

- The City commented in a letter dated January 22, 2010 (and in the scoping EAW) about the information obtained from Dakota County regarding the Rich Valley area in Rosemount as a covered karst valley. This is not addressed in the EIS nor has it been addressed in any response to previous comments. **6**

- The light generated from the gravel mining operation should be addressed with the EIS. **7**

Technical Comments:

Section 2.17, page 11: The Gravel EIS states the perimeter of the UMA will be reclaimed at a slope of 3:1 or flatter. The entire perimeter at this slope will prohibit the construction of roads into the reclamation area or public access to the new lake. Additional text should be added that commits to reclaiming the roadway corridors shown on the 2030 Roadway Function Classification Map (Figure 5.3 Rosemount Transportation Plan) at a maximum of a 6% grade and grading an area surrounding the created lake suitable for public access. **8**

Section 3.2.2, page 31: The statement that "the proposed AUF will be located in an area of low groundwater vulnerability and outside of the City of Rosemount's future conceptual Drinking Water Supply Management Area (DWSMA)" should be modified. As previously discussed, future potential development of the UMore property and adjacent properties may necessitate the establishment of municipal supply wells beyond the locations identified in the City's Comprehensive Water Supply Plan. These locations may result in future expansion of the City's DWSMA that includes the AUF area. **9**

A statement should be added to note that in addition to Minnesota Department of Health (MOH) requirements for protection of groundwater at aggregate mining sites that all operations **10**

2

3 Reclamation plans are presented in the Draft Mining Plan which is available at the UMore Administrative office in Rosemount. Given the location of the UMA in relation to the Twin Cities metropolitan area, it is reasonable to assume at some point following reclamation to agricultural use, that all or portions of the UMA may transition to urbanized land uses. As a result, the University will work with the City and the mining contractor to refine the reclamation plan to ensure the post-mining conditions do not introduce a landscape that would prohibit the ability for future land development.

4 On-going development outside the study area will prompt the need for future infrastructure improvements regardless of whether the mining operations occur. However, to the degree that the mining operations contribute to the need for any future improvements, it is reasonable to conclude that coordination will be required to determine what, if any, responsibility the mining operator will have in helping finance those improvements.

5 Comment noted.

6 Nearly all of Dakota County (and southeast Minnesota) is considered either covered karst, transition karst, or active karst due to the presence of carbonate bedrock (Alexander C.E. Jr., and Y. Gao, 2002). The specific information referenced by the City has not been provided to the University by Dakota County, nor has it been included in their comments.

The Rich Valley bedrock system is located east of the UMA and is not relevant to the proposed project. The Minnesota karst features database does not list any karst features near the site. There are no known geologic hazards associated with the UMA, nor are there any unusual groundwater flow patterns in the dolostone below the outwash that would indicate potential karst solution features are likely to influence future mine operations.

Despite the lack of karst features, Minnesota Department of Health guidance for delineating well head protection areas in fracture and solution-weathered bedrock were followed in evaluating the extent of the future conceptual DWSMA for Rosemount and Empire Township.

7 As noted on page 225 in the Draft EIS, lighting impacts may result from the proposed action. The document also notes that since the mining operations are proposed to occur in phases any impacts at any given location will be temporary. Furthermore, any lighting issues will be mitigated given that the majority of operations will occur during daylight hours, will drop below existing grade as mining progresses in each phase, and a 10-foot berm will be constructed at active mining locations. Since the completion of the draft EIS, the University has committed to significantly expanding the buffer zone between mining operations and the residential subdivisions north of County Road 42. The increased buffer will serve to further mitigate lighting concerns.

8 Existing public roads affected by mining operations will be maintained or reconstructed per acceptable roadway design standards. Planned roadway corridors, such as those illustrated on Figure 5.3 of Rosemount's Transportation Plan, will be developed by others in the future when warranted. As noted in the response to comment 3, the University will work with the City and the mining contractor to refine the reclamation plan to ensure the post-mining conditions do not introduce a landscape that would prohibit the ability for future development activities, to include construction of new road corridors.

9 The estimated extent of the DWSMA for Rosemount for year 2050 was evaluated using best available, sufficiently detailed, information; water demand projections from the Metropolitan Council and locations of future municipal supply wells as identified in the City's Comprehensive Water Supply Plan. The future conceptual DWSMA represents the most likely configuration given available data. Water demand projections and planned locations of municipal supply wells may change in the future, thereby affecting the delineation of the City's DWSMA. However, speculation on alternate demand projections and location of wells beyond those presented in published plans were deemed insufficient to reasonably characterize future flow conditions.

The location of Rosemount's future DWSMA is subject to future and on-going regulatory authority and therefore is not relevant to the adequacy of the EIS in accordance with MN Rule 4410.1700. The assessment of the proposed AUF being in an area of low aquifer vulnerability is not dependent on water demand or the locations of future municipal well.

10 Comment noted. The requested information is incorporated into the Final EIS.

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will be conducted in accordance with the City's current and future wellhead protection plan requirements. **10** cont'd

Figure 10, page 53: The end use cover plan continues to shows bare ground adjacent to the future open water. As indicated in the City's January 22, 2010 review letter to the U of M, bare ground will result in erosion and instability of the shore of the open water area. This should be clarified as to the intent of the bare ground and/or the figure revised. **11**

Section 3.3.3, page 56: The Gravel EIS states that mitigation for cover types and vegetation will be addressed in greater detail in a reclamation plan. As indicated in the City's comments in a letter dated January 22, 2010, the City does have a tree preservation and replacement ordinance that should be referenced in the EIS. Reference to this ordinance should still be included in the EIS. **12**

Section 3.6, Figure 13, page 69: It is noted that the boundary has changed from the preliminary draft EIS from December 2009 to the Gravel EIS in June 2010. The north end of the study area has been shifted to the west. In the December 2009 EIS, Wetland R8 was shown on Figure 12 but is no longer shown in the June 2010 EIS, presumably because it is now outside the study area. However, it appears to be very close to the boundary and could be affected by changes to surface water patterns. It should be included on Figure 13 since it is referenced in the text. **13**

Section 3.6.3, page 71: The Gravel EIS states that wetland mitigation may be accomplished through on-site replacement, off-site replacement, or purchase of wetland credits. The U of M should be aware of the City's strong preference to on-site and/or in-City wetland replacement. **14**

Section 3.7, page 72: The watersheds identified in paragraph 3 as discharging off-site via culverts do not include the subwatersheds ExtN-6, ExtN-40, and ExtN-44 as shown on figure 14. The subwatersheds discharging off-site on the figure14 should correspond to subwatersheds identified in paragraph 3. **15**

Section 3.7.1, page 75: The post mining condition does not include the proposed drainage areas from the City Storm Water Managemement Plan (SWMP). The City's SWMP proposes to route the stormwater runoff from the west side of Biscayne Avenue to regional pond # 2302 on the UMA site. It is requested that this drainage area be included in the final runoff volume calculations for the site. It is evident that the SWMP has identified areas west of Biscayne Avenue that will drain to the regional pond #2302 and these areas should be included in the analysis. The statement that the SWMP drainage areas and proposed regional pond 2302 is at a concept level and should not be included in the analysis does not accommodate the City's long term planning for storm water management. The deviation from using regional basin #2302 for areas outside of the site will impact the developable area in the City of Rosemount on the west side of Biscayne Avenue. **16**

Does the final reclamation plan propose to equalize the Lake across the southern Municipal boundary? This question has not been addressed or answered in the EIS. Please provide a response. **17**

3

11 Any potential tree replacement that may need to occur in relation to the mining operation will be discussed and decided upon during the City of Rosemount permitting process for the mineral extraction permit. Figure 11 and the corresponding text in Section 3.3 of the Final EIS have been modified to indicate that the land adjacent to the lake shore will be seeded to provide a vegetative buffer.

12 Reference to the City's Tree Preservation Ordinance is included in the Final EIS.

13 Wetland R8 has been added back to Figure 13.

14 The University acknowledges the City of Rosemount's preference for on-site and/or in-City wetland replacement. The University will give serious consideration to utilizing this form of mitigation for the project

15 Based on site investigation, no culverts were observed at these locations. The arrows shown on Figures 14 and 15 are intended to illustrate general flow direction for non-landlocked areas either through culverts or over roadways when culverts are not present.

16 Section 3.7.1 of the EIS has been revised to state the University acknowledges that according to the 2007 SWMP the city is planning on directing stormwater runoff to the UMA and will accommodate these planned stormwater flows. This area was not included in the modeling analysis because based on the current SWMP it was unclear what type of stormwater detention ponds would be constructed during development to comply with the City of Rosemount standard to infiltrate the runoff from the 100-year 24-hour event, and by what method flow would be conveyed onsite (i.e. through culverts, overland swales, pump stations, etc.).

However, a January 20, 2010 comment letter from the City of Rosemount indicates an additional 3,625 acres west of Biscayne could potentially contribute runoff to the proposed UMA at some time in the future. Approximately 2,115 acre-feet of runoff from the 100-year 10-day runoff event (7.0-inches according to Technical Release 60, 2005) could potentially be conveyed to the UMA assuming the entire 3,625 acre area is developed without complying with the City's current SWMP of retaining and infiltrating the 100-year 24-hour storm (6-inches) onsite and there is no other storage in the watershed. This could certainly be classified as an extreme or worst case scenario. By comparison the mine-pit lake will have an available storage capacity of approximately 30,930 ac-ft between the anticipated normal water level of 885 and the natural overflow of 934. If the entire 3,625 acres west of Biscayne were to be drained to the UMA, the lake levels in the mine pit lake would only increase to approximately Elevation 891 which is still 43 feet below the natural overflow of the lake. Since the areas west of Biscayne Avenue yet to be developed will be required to comply with the City's SWMP, additional stormwater storage will be provided as development occurs, thus further reducing the volume of runoff directed to the UMA. Therefore the proposed mine pit lake will provide adequate stormwater runoff storage to meet the City's desire to utilize portions of the UMA for future regional ponding.

When the City of Rosemount determines a need to direct stormwater into the mine-pit lake, the University will discuss both jurisdictions' needs and concerns. The University acknowledges that according to the 2007 SWMP the City is planning on directing stormwater runoff to the UMA and will accommodate these planned stormwater flows.

17 The roadway embankment design has not been finalized as part of this EIS but it would likely include an equalizer pipe(s). However, the two lakes will likely equalize even if a solid embankment is constructed because of seepage through the embankment.

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The City's SWMP proposes to direct any storm water from the site to manage the NWL and storage volume to the north east. It is recommended that an overflow structure with storm sewer to the northeast be incorporated into the final design for the site as shown in the SWMP. The SWMP had a preliminary management elevation of 914 for regional basin 2302 on the UMA site. Based on the reclamation plan the overflow storm sewer trunkline to the northeast would be approximately 15' – 20' in depth across the dry mining section of the UMA site. This issue of water level management has not been addressed in the EIS. Please provide address how the water level management of basin 2302 will be accomplished upon completion of the site grading. **18**

The SWMP has proposed to route storm water from Shannon Pond, Wachter Lake, and the Business Park through the UMA site as needed to manage runoff volumes in these watersheds. It is anticipated that any discharge to the site from these areas will be for events that exceed the storm water storage volumes in the watershed. This item has not been addressed in the EIS post conditions analysis. The statement that the City plan is at a concept level does not address the plan to convey stormwater from the western third of the City through the proposed regional basin 2302 prior to conveyance to the east. The statement that the SWMP is at a "concept level planning stage" does not negate the direction of stormwater to the site as shown in the SWMP. The post mining conditions for the site should assume that the drainage area west of Biscayne Avenue to the depression at subwatershed ExtN40 will be to directed to Regional Basin 2302. The deviation from the SWMP without implementation of the proposed routing could result in significant expenditure of funds to manage storm water in this area. **19**

The final hydrologic analysis should assume that the Lake (Reg. Basin 2302) will receive storm water from areas outside of the site. The City SWMP has identified conveyance to the site under the fully developed conditions of the City. This issue has not been fully addressed. The EIS goes on to indicate that the area west of Biscayne Avenue is not included in the analysis. Please provide the City with specific justification as to why the regional basin drainage area should be modified as proposed in the EIS. **20**

How is the 34 Acre-feet of stormwater directed off-site from subwatershed PropN-9, PropN-65, PropN-54, PropN-52, PropN-48, and PropN-66 being managed in the future? The future conditions discharge off-site in the City of Rosemount should be to a regional pond or storm water storage area. The storm water plan should indicate that the Rosemount SWMP Section V policies will be implemented downstream in the future. **21**

The City of Rosemount design policies require storage and infiltration of the runoff volume from the 100-year 24 hour storm event if a regional system downstream will not be provided. Will this policy be meet by downstream improvements in the future? If yes, show proposed locations in the proposed conditions figure. Please provide a specific response to how the post mining conditions will meet the City design policies. **22**

Section 3.7.2, page 82: The runoff quantity and quality policies of the City of Rosemount in the SWMP should be addressed in the UMA plan. The SWMP regulations would be transferred to the downstream property owner to provided rate control, stormwater storage, water quality, and infiltration. It is requested that the City of Rosemount policies be addressed for the watersheds within the City. The 34 Ac-Ft of runoff leaving the UMA site in the City of Rosemount will need to be addressed as outlined in the SWMP Section V policies. The EIS states that **23**

4

18 The University acknowledges that according to the 2007 SWMP the city is planning on directing stormwater runoff to the UMA and will accommodate these planned stormwater flows when the City determines that it is necessary as part of development of the surrounding areas as stated Section 3.7.1 of the EIS. Given the significant available storage volume on the UMA site, even if all the 100-year, 10-day runoff from the entire 3,625 acre area west of Biscayne Avenue was directed to the UMA, water levels in the mine-pit lake would not reach the preliminary management level of 914 listed in the City's SWMP (See response to Comment 14). Following site reclamation, the upland areas are planned to be used for agricultural purposes. The water levels in the proposed mine pit lake will be managed through natural infiltrate into to the surrounding groundwater. If the City still

determines that there is a need to construct an emergency overflow structure from the mine pit lake, the University will work with the City to accommodate the City's requirements as stated in the 2007 SWMP regarding an emergency overflow.

19 See response to Comments 14 and 16 for additional details regarding water level management within the mine-pit lake.

20 See response to comments 14 and 16. In addition, Section 3.7.1 indicates the University acknowledges that the City is planning on directing stormwater runoff to the UMA and will accommodate these planned stormwater flows. Therefore the EIS does not suggest a modification to the regional drainage basin area. This area will be shown on Figure 18 of the EIS.

21 The proposed end land use for this EIS is agricultural, which is the same as existing conditions, and therefore no change in land use is proposed. Following completion of the proposed action the runoff volume within the City of Rosemount will be reduced from 70 ac-ft for the 100-year 24-hour event to 34 ac-ft, thus reducing the impact on existing City of Rosemount downstream stormwater management devices. As discussed in Section 3.7.2 of the EIS the remaining net discharge of 34-ac-ft will be managed following the City of Rosemount policies as outlined in Section V of the current SWMP.

22 As indicated on page Section 3.7.2 for the EIS, the final land use for this EIS is assumed to be agriculture, which is the same as existing conditions. Therefore, no development is proposed and the City of Rosemount's design policies are not applicable for this proposed action. Additionally, because it is unknown how the surrounding area outside the UMA will develop, potential future downstream improvements can not be identified at this time.

23 The proposed end land use for this EIS is agricultural, which is the same land use as existing conditions. Therefore no change in land use is proposed for final development of the site. Following completion of the proposed action, the runoff volume within the City of Rosemount will be reduced from 70 ac-ft for the 100-year 24-hour event to 34 ac-ft. However, the majority of runoff leaving the UMA following the proposed action will be conveyed to University property. . As discussed in Section 3.7.2 of the Draft EIS the remaining net discharge of 34-ac-ft will be managed following the City of Rosemount policies as outlined in Section V of the current SWMP.

COMMENT LETTER H – CITY OF ROSEMOUNT

agricultural landuse is assumed and that future development will comply with the City policies. How is the proposed agricultural runoff volume of 35 acre-feet being managed? Is the 35 acre-feet of runoff from the site going to be stored and infiltrated on property that may not be owned by Umore? Would off-site management be considered an impact on developable area? **23** cont'd

Section 3.8.1, page 105: For the particle tracking depicted on Figure 26, it should be noted that existing City municipal water supply wells RR 1 and 2 are located within the flow path as are potential future wells in the northern well field. Wells RR 1 and 2 are included in City's Water Supply Plan ultimate system and could potentially be replaced with new well(s) on the same site at a later date. **24**

Under "Model Simulations", it is noted "that the model was used along with information on projected future (~2050) pumping conditions to develop a preliminary DWSMA map and to help determine which mine operations will be located within the DWSMA (Figure 28)." What information was used to project these future pumping conditions? It appears throughout the groundwater evaluation that future proposed municipal supply well locations identified in the City's Comprehensive Water supply Plan have been interpreted as absolute and final locations. Depending on the timing and location of future development, it is likely that future municipal water supply well locations will deviate from the City's plan to accommodate the development of properties. This may result in the establishment of DWSMA's beyond that which is shown on Figure 28 as well as groundwater flow directions shown on Figure 29. **25**

Section 3.8.1, page 121: As previously noted, for the subsection "Mine Layout and Preliminary DWSMA Map (Barr 2019g)", it seems incomplete to conclude that the projected DWSMA as currently shown is representative of a future post-UMA operation. The EIS should include discussion about measures and controls that will be necessary should the DWSMA be expanded to include the AUF in the future. **26**

Subsection "Future (Post-Mining) Mine Lake Simulation (Barr 2009g)" makes reference to the latest land use projections for Rosemount, Empire Township, Coates, and UMore Park. What are the specific land use projections as referenced? Note that the City's Comprehensive Plan provides planning through 2030 and does not include UMore and the Water Supply Plan does include an ultimate system that assumed land use would be Urban Residential at UMore for planning purposes only. **27**

Section 3.8.2, page 122: The section "Environmental Consequences" states that "it does not appear the proposed mining operation will have substantial effects on groundwater flow directions or have a negative effect on heads in the aquifer." This could be interpreted to mean that there will be some impact and that there is a potential for significant impacts. Mitigative measures that would need to be employed should there be an impact to groundwater flow and heads in the aquifer should be addressed in the EIS. **28**

Section 3.8.3, page 122: For the subsection "Mitigation", it states that "detailed plans for environmental protection and/or monitoring will be addressed during the mine permitting stage." As noted above, as there is a potential for impacts to the groundwater flow and more importantly, the head related to existing and future municipal water supply wells, a discussion of appropriate measures to mitigate this potential impact shall be included in the EIS. The potential for mining operations to impact existing future municipal water supply wells are of **29**

5

24 The location of wells RR1 and RR2 are shown on Figure 26 of the DEIS and Figure 36 of the Groundwater Assessment Report. The project description provided in section 2.1.3 states that the mining operations have been designed to place fuels and chemical storage in areas that are "geologically the least vulnerable to the potential for accidental release or storage to affect groundwater." The location of RR1, RR2 and any replacement well are not located downgradient from areas used for fuel or chemical storage. Because the mining areas will not contain any significant sources of potential impact to groundwater, the potential for environmental effect on water from these wells is small.

25 As described in the resource document *Predictive Simulations to Assess Potential Effect of Mining Activities on Groundwater* prepared for the EIS, the projected pumping conditions were obtained from the Metropolitan Council.

The estimated extent of the DWSMA for Rosemount for year 2050 was evaluated using reasonably available, sufficiently detailed information; water demand projections from the Metropolitan Council and locations of future municipal supply wells as identified in the City's Comprehensive Water Supply Plan. Water demand projections and planned locations of municipal supply wells may change in the future. However, speculation of alternate demand projections and location of wells beyond those presented in published plans is not sufficient. Water demand projections and planned locations of municipal supply wells may change in the future affecting the delineation of the City's DWSMA and groundwater flow paths. This is subject to future and on-going regulatory action and therefore is not relevant to the adequacy of the EIS in accordance with MN Rules 4410.1700.

The results of the modeling indicate that the placement of the wells and the position of the DWSMA have little bearing on the potential for future environmental effects related to the proposed mining. This is because the Ancillary Use Facility is located in an area of very low aquifer vulnerability which is due to a physical barrier between groundwater wells and the proposed mine activities with potential to effect municipal supplies.

The Predictive Simulation report describes the difficulty of projecting future groundwater conditions at the site and the location and placement of the wells, but represents a reasonable effort to address the issue identified in the Scoping Environmental Assessment Worksheet. To the extent possible, assumptions were made to allow the simulations to be conducted and estimates to be made based on available information. There is no intent to represent the City's plans or attempt to project future well needs beyond the cited sources.

26 The potential for the DWSMA to be expanded in the future to include the AUF is subject to future and on-going regulatory action and therefore is not relevant to the adequacy of the EIS in accordance with MN Rules 4410.1700.

27 As described in the resource document *Predictive Simulations to Assess Potential Effect of Mining Activities on Groundwater* the references for the land use projections are as follows:

- UMore Park Concept Master Plan:
- Design Workshop. 2009. Concept Master Plan for the University of Minnesota's New Sustainable Community at UMore Park, January, 2009.
- Rosemount. 2009. 2030 Comprehensive Land Use Plan, May 2009.

28 The purpose of the EIS is to determine if the proposed project has the potential for significant environmental effects. "Some impact" is expected of any human activity and is therefore not relevant to the study. The modeling results indicate that the potential for significant negative effects on groundwater do not exist. The most likely effects from the mining will be positive with respect to groundwater heads. Because there are no negative effects anticipated, mitigation discussion is unwarranted.

29 As noted above, the mere possibility for "potential for impacts" is not relevant to the EIS particularly when the evidence points to negligible effects related to the project. The use of monitoring wells to identify a release is a standard feature that may be required in the state and local permits. This does not imply that a release in the AUF will impact municipal wells. Other environmental protections may relate to stormwater management, air quality, or spill prevention and control.

significance and should be addressed in the EIS rather than the mine permitting stage as proposed. Measures to monitor level and quality of the groundwater in the Jordan and Prairie du Chen between the mining activities and RR1, RR2 and the northern well field should be constructed and in place six months before any activity is initiated on site. In addition, the existing wells on the property should be monitored with data loggers starting six months prior to any activity on-site to assess any interference between Municipal Wells and the existing wells. **29** cont'd

Section 3.10, Traffic General Comment: There is no discussion in the transportation section of the Gravel EIS of the Rosemount/Empire/UMore Transportation System Study nor the Biscayne Avenue/Akron Avenue North/South Corridor described in that study. The Biscayne Avenue/Akron Avenue corridor goes through the study area for the Gravel EIS, specifically through the ancillary use facility (AUF). Please address how the construction of this corridor will occur when the AUF is proposed to exist through the year 2051. **30**

Section 3.10.1, page 140 and figure 34: The study indicates that "The existing access points serve on-going farm operation and agricultural research area and are expected to remain open until such time that mining operations cause them to be altered or closed". This should be clarified. How many of the existing access points will be maintained during the mining operations? Where will they be in relationship to the proposed site access locations? **31**

Section 3.10.1, pages 143 and 144: Tables 18 and 19 includes the "Site Generated Traffic" for the Average Daily, AM and PM conditions. It appears that the majority of this traffic will be new truck traffic. How was the additional truck traffic factored into the "Build" analysis? **32**

Section 3.10.2, page 159: The 2011 traffic projections were based on a straight line between 2007 and 2030. With the down turn in the economy over the past years, development has not occurred at the rate anticipated. It is unrealistic to assume that the traffic on the adjacent roadways would have grown at such a rate. Therefore, some of the "No Build' improvements may not be realistic. **33**

Section 3.10.2, page 171: The conclusions indicate several improvements necessary for the "No Build" conditions. Is it expected that the City and / or the County would make these improvements? This also is not realistic. **34**

Section 3.10.2, page 181: The 2011 Build conditions conclude that a traffic signal is (may be) warranted at the intersection of CSAH 42 and Biscayne Avenue. This assumption was based on 2011 projected ADT traffic on Biscayne Avenue. The projections were based on anticipated growth in the area that has not occurred (see comment above).Therefore, assuming a signalized intersection in the 2011 build condition is unrealistic. The analysis should be modified to discuss what impacts the development traffic would have on the intersection without signalization. The recommendation also indicate that additional turn lanes be provided by 2030 at this intersection. This recommendation should be modified and included when the intersection is signalized. **35**

Section 3.10.3, page 199: The conclusions indicate that the gravel roads will be paved as development occurs between 2011 and 2030. The City of Rosemount will be requiring either paving of gravel roads in their jurisdiction to any proposed access location or providing a maintenance plan for the gravel roads as part of the mining permit. Any signing associated with **36**

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30 The Rosemount/Empire/UMore Transportation System Study is referenced in Section 3.17.1 of the Draft and Final EIS. The Study is not referenced in the transportation section of the EIS because the purpose of that section is to analyze and identify potential traffic issues associated with the proposed sand and gravel operations. As noted in Section 3.17.1, the new north/south corridor connecting Akron Avenue to Biscayne Avenue is a long-term roadway extension that would occur in response to urbanizing development in the region. It is possible that the portion of the corridor extending through the eastern section of the UMA may need to be constructed while mining operations are still underway. If this occurs the

University and Dakota Aggregates will work with the appropriate local authorities to determine how to accommodate the proposed roadway.

31 When a mining phase is opened for mining operations, a determination of the best place for access to the mining phase will be made through the driveway permit process of the appropriate roadway authority. This new access may be at an existing access point or may be at a new location. Any other existing access points to the applicable mining phase will be closed after the approved access point to the mining phase is opened. After a mining phase has been mined out, the approved access to the mining phase will be closed, unless this same access is approved by the roadway authority as the access to the next mining phase. Any request to gain access to a previously mined area will need to follow the same driveway permit process.

32 For the traffic model used to analyze the "Build" scenarios, it was assumed that 100% of the traffic entering or exiting the site access points was truck traffic even though a small portion of the traffic will be passenger vehicles. This represents a worst-case scenario from a traffic operations perspective. The Synchro models used for the traffic analysis can be provided by the University to anyone wishing to review the details of how traffic was modeled.

33 The comment has been noted.

34 The improvements recommended for the "No Build" conditions are being proposed as mitigation measures for problems identified in the "No Build" analysis. The appropriateness and timing of these improvements will need to be determined by the roadway authority and implementation of the improvements will be the responsibility of the roadway authority. These improvements will need to go through the roadway authority's normal planning and project development process to determine if or when implementation will occur.

35 Based on discussions at the January 6, 2010 traffic technical issues meeting with Rosemount, Empire Township, and Dakota County, it was concluded that our traffic projections for 2011 were acceptable for use in the traffic impact study for the EIS since they represented a conservative (higher) estimate of traffic and were based on a standard forecasting methodology. Language has been added to the EIS to indicate that the proposed "No Build" mitigation measure of signalizing the CSAH 42/ Biscayne Avenue intersection would be implemented only if actual traffic volumes in 2011 were sufficient to meet the MMUTCD signal warrants.

Additional traffic analysis has been conducted that addressed the concerns raised by the City of Rosemount. The findings and recommendation of the analysis are incorporated in the Traffic Technical Memorandum, the Final EIS, and have been distributed to the City.

The EIS indicates that UMA site-generated traffic is expected to add 17 vehicles/hour to the CSAH 42/Biscayne Avenue intersection in the AM peak hour in 2011 and 10 vehicles/hour to the intersection in the PM peak hour in 2011. With this low amount of site-generated traffic using the intersection, the 2011 analysis of this intersection indicates that the "Build" conditions at the intersection will not require any additional improvement measures over what the "No Build" conditions will require.

36 The comment has been noted.

directing traffic to specific access locations will be the responsibility of UMore and will be included in the access permit. **36** *cont'd*

Section 3.11, Noise General Comment: The City does not believe that all the noise factors are being modeled in the Noise Section particularly the lack of truck noise generated during acceleration or through the use of "jake" brakes. Without modeling of all the sources of noise, it is difficult to believe that the model's generated noise impacts are accurate and that the proposed mitigation measures will adequately address the noise generated from the mining activities. If the models used in the Gravel EIS do not adequately address all noise factors, the City may need to require an additional noise study that does include all the relevant noise sources during mining permit review. **37**

Section 3.11.1, page 203: The results indicate that although there are locations that currently exceed state standards because the roadways are under City or County jurisdiction these standards do not apply. One of the rationales for this is that the roadways are not "Access Controlled". The description of "Access Control" should be verified with MPCA. We do not believe that this only applies to freeway conditions. **38**

Section 3.11.2, page 205: There is text provided about "jake" braking noting that they are required to emit less than 80 dBAs. In Chris Hiniker's response on June 18 to our previous request to add acceleration speeds and "jake" braking, Chris stated that the model is not capable of adding acceleration/deceleration conditions. This is difficult to understand. If it is known that "jake" braking generates 80 dBAs and it is known that the use of the brakes is most likely to occur at the access points or turning movements, it should be able to model 80 dBAs at the proposed access points and determine how far away it is before the noise levels are reduced to 65 dBAs daytime and 60 dBAs nighttime. This is similar to the statement on page 209 in which it is stated that the 90 dBAs from the crushing equipment takes 900 feet to drop to 65 dBAs. **39**

Section 3.11.2, page 209: The Site Noise analysis references typically reductions of noise levels from a point source. It does not indicate how this applies to this site. Where will the location of the closest equipment be in relationship to the existing and potential residential properties? What would the predicted noise levels be at those locations as a result of the site? **40**

Section 3.11.3, page 210; section 4.11, page 241: The Technical Memo references a 12 foot high berm that will be constructed to help screen site noise. However, the "Mitigation" section does not include it as a discussion. **41**

Section 3.12.3 and Section 4.12, Air Quality Mitigation General Comment: A mitigation strategy should be added addressing the size of open mining activity. Dakota Aggregates has provided the City a mining plan that has 17 mining phases of approximately 90 acres each. Within the 17 phases, Dakota Aggregates has subdivided each phase into sub-phases of about 30 acres each. Discussion should be had on the amount of sub-phases that would be open at any one time and how fast the sub-phases would be reclaimed after mining is complete. Limiting the amount of area open for mine at any given time and timely reclamation can be effective in limiting dust generated from a mine. **42**

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37 The traffic noise model used in the EIS is the most commonly used traffic noise software in the State of Minnesota. Inputs to the model include AM and PM peak hour traffic levels and vehicle mix assumptions. For the background traffic the assumed vehicle mix is 95 percent autos and 5 percent trucks. The truck traffic associated with the proposed operations (as detailed in Section 3.10) was then added to the background truck mix assumption which had the net effect of increasing the proportion of trucks to autos in noise model. Engine or "Jake" braking can become a noise nuisance especially in or near residential land uses. Contractor operator trucks will be kept up to local and state standards including local and state truck inspection rules. All independent truck operators (ITO's) are required by law to keep the

same records and standards as those required for the contractor's truck. Local governments have the authority to regulate or prohibit the use of jake braking in appropriate circumstances.

38 Minnesota Statute 2000, Section 116.07 Subdivision 2a. states the following: No standards adopted by any state agency for limiting levels of noise in terms of sound pressure which may occur in the outdoor atmosphere shall apply….(3) except for the cities of Minneapolis and St. Paul, an existing or newly constructed segment of a road, street, or highway under the jurisdiction of a road authority of a town, statutory or home rule charter city, or county, except for roadways for which full control of access has been acquired. Full control of access refers to roadways with grade-separated access.

39 Assuming an 80dBA noise source at 50 feet, which is the maximum allowable noise level for a vehicle with a weight rating greater than 10,000 pounds travelling 35 mph or less, an estimate can be generated to predict at what distance the 80dBA noise level will decrease to the State 65dBA daytime and 60dBA nighttime noise standards respectively. As noted on page 209 of the Draft EIS, a point noise source has an attenuation rate (reduction) of 6dBA for every doubling of distance. Given this the 80dBA noise source would decrease to 65dBA at approximately 300 feet and to 60dBA at approximately 500 to 600 feet.

40 In an effort to address comments expressed during the Draft EIS public review process regarding operational concerns associated with the proposed project, the University has committed to increase the buffer separating the mining operations and the existing residential subdivisions north of County Road 42. The buffer distance will be increased from the previous 350 feet to between 1,000 and 1,600 feet. Referring to the noise contour estimation presented in Section 3.11.2, there is a low potential for noise levels exceeding state standards in the adjoining subdivisions. However, if noise violations are encountered and verified during operations additional mitigation discussed with the local jurisdiction.

41 The noise mitigation section in the Final EIS has been revised to account for noise reduction benefit of the proposed berms.

42 One to two dry mining sub-phases will be active at the same time. However, this does not mean that two entire sub-phases will be completely removed and mined all at one time. For example, once dry mining phase sub-phase1A is underway and is close to being expired, mining activities will progress into dry mining sub-phase1B prior to reclamation being completed in dry mining sub-phase 1A because the reclamation materials to be utilized in dry mining sub-phase 1A will derive from material extracted in dry mining sub-phase 1B. However, reclamation of dry mining phase sub-phase 1A will be completed or will be close to completion by the time mining activities reach dry mining sub-phase 1C. By the time mining has expired in dry mining sub-phase 1C and dry mining phase 2A is opened, reclamation activities in dry mining sub-phase 1A will be complete. This would be the process throughout the life of the facility in relation to dry mining phases.

Operations will start on the west side of sub-phase 1A, and with progression to the east in sub-phase 1A, reclamation materials will be transferred to the west in the areas that have been mined to the proposed excavation limits to initiate reclamation. Eventually operations will get to the point where material from the next sub-phase will be required to finish reclamation in the previous sub-phase.

COMMENT LETTER H – CITY OF ROSEMOUNT

Traffic DEIS Section 3.10 and 4.10 (May 19, 2010 Study)

Section 3.10.1, page 140, 1st paragraph - The text indicates that the existing access points serve on-going farm operation and agricultural research area and are expected to remain open until such time that mining operations cause them to be altered or closed. This should be clarified. How many of the existing access points will be maintained during the mining operations? Where will they be in relationship to the proposed site access locations? **43**

Section 3.10.1, page 141, Figure 34 – This figure should be updated. It is the Cities understanding that access points A1 and A2 will not be used. Also, B2 should be shown to line up with Boulder Trial. **44**

Section 3.10.1, page 143, Third bullet point and following paragraph – The DEIS assumes that a full access to CSAH 42 from Auburn Avenue would be provided for the 2011 build conditions. Has this been approved by Dakota County? It is the Cities understanding that a ¾ access may be require with any change in intersection configuration. What is the anticipated impact of the 2011 traffic not being allowed to turn left at Auburn Avenue? This worst case condition should be analyzed. **45**

Section 3.10.1, page 143 and 144, Tables 18 and 19 - Site Generated Traffic for the Average Daily, AM and PM conditions has been provided. It appears that the majority of this traffic will be new truck traffic. How was the additional truck traffic factored into the "Build" analysis? What is the makeup of these trucks (i.e. size and type)? Were additional delays at un-signalized intersections assumed with the additional truck traffic? **46**

Section 3.10.1, General – Adding additional truck traffic to west CSAH 42 and subsequently north on TH 3 or other County roads though Rosemount should be minimized to the extent possible. **47**

Section 3.10.2, page 159, 1st and 2nd paragraph - The 2011 traffic projections were based on a straight line between 2007 and 2030. With the down turn in the economy over the past years, development has not occurred at the rate anticipated. It is unrealistic to assume that the traffic on the adjacent roadways would have grown at such a rate. Therefore, some of the "No Build' improvements assumed in the analysis may not be realistic. **48**

Section 3.10.2, page 159, 3rd paragraph - The traffic re-distribution for the future 2030 at Auburn Avenue indicates that the southbound left turn would go to 145th Street. With the future connection of Connemara Trail to CR 73, it is more likely that this traffic would move to the CR 73 / CSAH 42 intersection. The impacts of this shift in traffic should be documented. **49**

Section 3.10.2, page 171, Last two paragraphs - The 2011 No-build conditions conclude that a traffic signal is (may be) warranted at the intersection of CSAH 42 and Biscayne Avenue. This assumption was based on 2011 projected ADT traffic on Biscayne Avenue. The projections were based on anticipated growth in the area that has not occurred. Therefore, assuming a signalized intersection in the 2011 no-build or build conditions is unrealistic. The analysis should be modified to discuss what impacts the development traffic, including truck traffic, would have on the intersection without signalization. **50**

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43 When a mining phase is opened for mining operations, a determination of the best place for access to the mining phase will be made through the driveway permit process of the appropriate roadway authority. This new access may be at an existing access point or may be at a new location. Any other existing access points to the applicable mining phase will be closed after the approved access point to the mining phase is opened. After a mining phase has been mined out, the approved access to the mining phase will be closed, unless this same access is approved by the roadway authority as the access to the next mining phase. Any request to gain access to a previously mined area will need to follow the same driveway permit process.

44 Figure 34 shows existing access points to the UMA site. Access points A1, A2, and B2 on this figure do not represent access points to the proposed mining operations.

45 Discussions with Dakota County Transportation Department staff indicated that full access at the CR 42/Auburn Avenue intersection could be assumed for 2011 conditions. Conversion of the intersection to three-quarter access is not currently in the County's capital improvement program, but it was indicated that this conversion could be assumed to be in place for the analysis of 2030 conditions.

46 For the traffic model used to analyze the "Build" scenarios, it was assumed that 100% of the traffic entering or exiting the site access points was truck traffic even though a small portion of the traffic will be passenger vehicles. This represents a worst-case scenario from a traffic operations perspective. The Synchro models used for the traffic analysis can be provided by the University to anyone wishing to review the details of how traffic was modeled.

47 The comment has been noted.

48 The comment has been noted.

49 We agree that some of the southbound left turners from Auburn Avenue may shift to Connemara Trail/County Road 73 in 2030, but not all of the left turners would switch to this path since it would likely represent a longer travel time path than shifting to 145th Street. The assumption of having all the left turners shift to 145th Street represents a more conservative (higher) forecast for 2030 traffic at the CSAH 42/Auburn Avenue intersection. With our assumption, these left turners pass through the Auburn Avenue intersection on CSAH 42. With the assumption that the left turners switch to CR 73, these left turners would only show up at the CSAH 42/ County Road 73 intersection. Since the CSAH 42/ County Road 73 intersection is not part of the detailed traffic analysis (due to the low volume of UMA site-generated traffic expected to pass through this intersection), shifting traffic to this intersection would not change any of the findings or recommendations of the traffic impact study.

50 Based on discussions at the January 6, 2010 traffic technical issues meeting with Rosemount, Empire Township, and Dakota County, it was concluded that our traffic projections for 2011 were acceptable for use in the traffic impact study for the EIS since they represented a conservative (higher) estimate of traffic and were based on a standard forecasting methodology. Language has been added to the EIS to indicate that the proposed "No Build" mitigation measure of signalizing the CSAH 42/Biscayne Avenue intersection would be implemented only if actual traffic volumes in 2011 were sufficient to meet the MMUTCD signal warrants.

Additional traffic analysis at is being conducted that will address the concerns raised by the City of Rosemount. The findings and recommendation of the analysis are incorporated in the Traffic Technical Memorandum and the Final EIS.

The EIS indicates that UMA site-generated traffic is expected to add 17 vehicles/hour to the CSAH 42/Biscayne Avenue intersection in the AM peak hour in 2011 and 10 vehicles/hour to the intersection in the PM peak hour in 2011. With this low amount of site-generated traffic using the intersection, the 2011 analysis of this intersection indicates that the "Build" conditions at the intersection will not require any additional improvement measures over what the "No Build" conditions will require.

COMMENT LETTER H – CITY OF ROSEMOUNT

Section 3.10.2, page 181, 2nd paragraph – The statement "it was also assumed that mining trucks would be prohibited from using the existing unpaved section of Biscayne Avenue from Boulder Trail to County Road 46" should be carefully reviewed. Can truck traffic to the north and west be minimized without using Biscayne Avenue? Could paving Biscayne Avenue be considered as a mitigation measure to the impacts at the intersection of Biscayne Avenue and CSAH 42? **51**

Section 3.10.2, General - The conclusions indicate that the gravel roads will be paved as development occurs between 2011 and 2030. The City of Rosemount will be requiring either paving of gravel roads in their jurisdiction to any proposed access location or providing a maintenance plan for the gravel roads as part of the Mining permit. Any signing associated with directing traffic to specific access locations will be the responsibility of UMore and will be included in the Mining permit. **52**

Section 3.10.2, page 195, last paragraph – The review of the ADT volumes in relationship to the roadway capacity was completed for the primary roadways. Typical roadway capacities were presented. What are these capacities based on? Do these capacities correspond to Dakota County's transportation plan? Typical capacity of a two lane gravel road should also be presented. **53**

Section 3.10.2, page 196, first bullet point – It is the Cities understanding that CSAH 42 will be at the need for a 6 lane facility with the future development of the UMore property. This should be addressed. **54**

Section 3.10.3 and Section 4.10, General – Several no-build and build mitigation measures have been identified, this section should be modified based on the comments above (i.e. no signal at CSAH 42 and Biscayne Avenue in 2011, ¾ intersection at CSAH 42 and Auburn Avenue in 2011, paving Biscayne Avenue, etc). In addition, each mitigation measure should identify who is responsible for implementation. **55**

Noise DEIS Section 3.11 and 4.11 (April 21, 2010 Technical Memo)

Section 3.11.1, page 201, Figure 48 – There were no noise monitoring or modeling receptor locations on the east side of the proposed site. This area should be looked at in reference to future development of the UMore site. **56**

Section 3.11.1, page 203, 3rd paragraph - The text indicates that because the roadways are under City or County jurisdiction State Noise Standards do not apply. One of the rationales for this is that the roadways are not "Access Controlled". The description of "Access Control" should be verified with MPCA. We do not believe that this only applies to freeway conditions. **57**

Section 3.11.1, page 204, 1st paragraph – Although the model can't predict noise levels for acceleration and deceleration of trucks, these levels or estimated levels need to be documented and / or mitigated. More detail should be provided for this issue. **58**

Section 3.11.1, page 204, 6th paragraph – Noise monitoring was conducted on November, 10th and 11th, 2008. November 11th was a holiday. How was the reduced traffic volumes factored into the analysis? **59**

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51 UMA site-generated traffic that is expected to use Biscayne Avenue and CR 42 to go to the north and west is a relatively small amount of the total site-generated traffic (approximately 4% of the site-generated traffic). The impacts at the CR 42/Biscayne Avenue intersection that result in proposed mitigation measures for 2011 and 2030 No Build conditions at the intersection are being caused by the background traffic growth associated with No Build conditions. Elimination of the UMA site-generated traffic from the CR 42/Biscayne Avenue intersection will not change the identified problems at the intersection nor will it change the recommended mitigation measures.

52 The comment has been noted.

53 The capacities are based on typical planning level capacities used by agencies for transportation plans and studies in the Twin Cities area. The capacity of a 2-lane gravel road is the same as for a paved 2-lane road.

54 The latest assumptions for land development in the study area were used in development of the 2030 forecasts for CR 42. These forecasts suggest that the existing lane geometry for CR 42 should be adequate for 2030 conditions.

55 No modifications to the No Build or Build mitigation measures are being made; however, some additional analysis has been undertaken and are incorporated into the Final EIS.

56 Noise monitoring and modeling was not conducted on the east side of the proposed site because noise regulations apply only to existing land uses or proposed land uses that have received plat approval. The development of future land uses will be able to be planned with awareness of the mining operations and incorporate appropriate provisions to address any potential concerns.

57 Minnesota Statute 2000, Section 116.07 Subdivision 2a. states the following: No standards adopted by any state agency for limiting levels of noise in terms of sound pressure which may occur in the outdoor atmosphere shall apply….(3) except for the cities of Minneapolis and St. Paul, an existing or newly constructed segment of a road, street, or highway under the jurisdiction of a road authority of a town, statutory or home rule charter city, or county, except for roadways for which full control of access has been acquired. Full control of access refers to roadways with grade-separated access.

58 State statute 7030.1040 details the maximum allowable noise levels for vehicles greater than 10,000 pounds. For speed limits greater than 35mph the noise limit is 90dBA at 50 feet from the noise source. Speed limits equal to or less than 35mph the limit is 80dBA. As noted on page 209 of the Draft EIS, assuming a 90 dBA noise level at 50 feet from the source, noise levels would reach the 65 dBA daytime limit at approximately 900 feet from the source.

59 Any changes in traffic volumes associated with the Veterans Day holiday would not significantly affect noise levels given that traffic volumes need to be reduced significantly to result in a noticeable change in noise levels (defined as 3 dBA or greater).Furthermore, consistent with noise modeling requirements, the noise monitoring was conducted and presented in the Draft EIS for general information purposes. The monitoring results are not part of the noise model.

COMMENT LETTER H – CITY OF ROSEMOUNT

Section 3.11.2, page 205, 6th paragraph – The text indicates that additional noise associated with "Jakebraking" would primarily be a maintenance issue. Will UMore be requiring its trucks or contractor trucks to have maintenance records that document meeting all state and local requirements? These requirements will be included in the Mining permit obtained from the City. **60**

Section 3.11.2, page 209, 3rd paragraph - The Site Noise analysis references typical reductions of noise levels from a point source. It does not indicate how this applies to this site. Where will the location of the closest equipment be in relationship to the existing and potential residential properties? What would the predicted noise levels be at those locations as a result of the site? A map should be provided showing more detailed relationship between the facility and existing residents with distances and noise contours. **61**

Section 3.11.3 and 4.11, General - The Technical Memo references a 12 foot high berm that will be constructed to help screen site noise. However, the "Mitigation" sections do not include it as a discussion. **62**

Air Quality DEIS Section 3.12 and 4.12 (November 4, 2009 Technical Memo)

Section 3.12.2, page 213, Material Processing / Handling and Stockpiles – What type of analysis was conducted for fugitive dust? What is the prevailing wind direction? At what distance will dust be an issue? Who will be impacted? Additional analysis and documentation needs to be provided. **63**

Section 3.12.2, page 213, Internal Haul Roads, Table 37 – Table 37 discusses estimated emissions on internal haul roads with different levels of control. Which control level is recommended? What are the control measures recommended? **64**

Section 3.12.2, page 215, Conclusions – The conclusions indicate that typical control measures for fugitive dust "should" not result in impacts to nearby residents. How can we be sure that there will not be impacts? **65**

Section 3.12.3, page 215, 6th paragraph – Additional information should be provided on the federal regulations with respect to "Opacity" and the amount of time emissions can be seen by the naked eye. **66**

Section 3.12.3 and 4.12, Mitigation, General – What is exactly being recommended for emissions control? There are a lot of general typical techniques discussed. These sections should be expanded to discus which techniques should be used for specific situations. **67**

Sincerely,

William H. Droste

William H. Droste, Rosemount Mayor

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60 Contractor operator trucks will be kept up to local and state standards including local and state truck inspection rules. All independent truck operators (ITO's) are required by law to keep the same records and standards as those required for the contractor's trucks.

61 In an effort to address comments expressed during the Draft EIS public review process regarding operational concerns associated with the proposed project, the University has committed to increase the buffer separating the mining operations and the existing residential subdivisions north of County Road 42. The buffer distance will be increased from the previous 350 feet to between 1,000 and 1,600 feet. Referring to the noise contour

estimation presented in Section 3.11.2, there is a low potential for noise levels exceeding state standards in the adjoining subdivisions. However, if noise violations are encountered and verified during operations additional mitigation will be discussed with the local jurisdiction.

A figure (Figure 49) has been added to Section 3.11.2 of the Final EIS that depicts the estimated distance the 65 dBA noise level (which is the State daytime standard) would extend from the proposed ancillary use area as well as a representative location where gravel mining is proposed to be closest to the residential properties along County Road 42.

62 The noise mitigation section in the Final EIS has been revised to account for the noise reduction benefit of the proposed berms.

63 Analysis of fugitive dust was conducted using Emission Factors and equations provided by EPA's AP-42, Compilation of Emission Factors. More information about emission factors is available from the EPA website (www.epa.gov/ttnchie1/ap42/).

The prevailing wind direction in Minnesota depends on the season. In the winter the wind is primarily out of the north or northwest; in the summer the wind is primarily out of the south or southwest. To compute wind erosion of stockpiles using EPA emission factors the following weather conditions were evaluated and are detailed in appendix A of the Nov 4, 2009 draft Air Quality technical memorandum:

- Number of days with >0.01 inches of precipitation: 111 (National Oceanic and Atmospheric Administration for St. Paul, MN)
- Percent of time wind speeds exceed 12 mph@ mean pile height: 30 (recommended default from MPCA's sand and gravel emission spreadsheet)

The site will be required to prevent avoidable visible dust emissions beyond the property boundary surrounding the stationary source by water application, commercial dust suppressant application, and use of a reduced speed limit on haul roads (i.e. 10 MPH). Following the permit requirements potential fugitive dust issues should be primarily limited to the UMA.

64 The needed level of control depends on the size of the operations. Assuming 3,000,000 ton throughout, the site is considered a large operation and will require 75% control efficiency. Large sites have increased record keeping obligations and also record weather information, install a rain gauge, post 10 MPH speed limit signs, and have water or dust suppressant equipment available at all times during operation. To be most effective water and/or dust suppressants need to be readily available and used when hauling or wind conditions create visible dust plumes.

65 Recommended control measures have been shown to be effective at reducing fugitive dust at other facilities. The operator will employ, as appropriate, the recommended control measures identified in Section 3.12.3 to be sure there are no visible dust emissions present at the edge of the site (lot line) which include:

- Use of conveyors for transport of a portion of raw material onsite to limit the number of internal truck trips.
- Active reclamation will minimized exposed open areas
- Use of water to minimize fugitive dust emissions.

- Wet suppression
- Chemical Stabilization
- Sequenced mining of smaller sub-phases

66 Section 3.12.1 Applicable State and Federal Requirements for Processing Equipment provides further discussion on opacity. The referenced NSPS standard (40 CFR Part 60, Subpart OOO) has methods and requirements for opacity limits based on dates and type of construction/modifications. EPA approved method(s) of testing for opacity is typically required within 60 days of cycling to maximum production rate or within 180 days of initial start-up (whichever is sooner). Limits based on type of operation and control measures typically range from 7-15% opacity, and specify testing at startup and a re-testing requirement of typically every 5 years. Emissions visible to the naked eye will be present on the site periodically during operations; the amount of time they are visible will depend on the type of operations and the surface conditions at that time. Visible dust onsite is an indication to use control measures such as water application.

67 All options listed in Sections 3.12.3 and 4.12 should be used as best determined by site needs and product availability. If conveyors are used for transport of raw materials, and silt content of roads is reduced by gravel surface application, likely only water will be necessary for dust suppression. If water alone is not enough to reduce visible dust such that it is crossing over the site boundary, then chemical stabilization should also be used. However, if conveyers are not a viable option, gravel roads will be used rather than dirt roads and water and chemical suppressants will be maintained on-site so it is available when needed based on road conditions (dry, high traffic volume, etc.).

Wind and traffic generated dust can be controlled with similar measures of dust suppression including application of water and/or chemical stabilizers. Areas of overburdened soils, reclaimed areas, or other areas needing long term erosion control will be seeded.

COMMENT LETTER I – BOLTON & MENK, INC. (FOR EMPIRE TOWNSHIP)

BOLTON & MENK, INC.
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August 5, 2010

Steven Lott
University of Minnesota
UMore Park
1605 West 160th Street
Rosemount, MN 55068

RE: University of Minnesota's UMore Park Sand and Gravel Resources
Review of the draft Environmental Impact Statement for the UMore Park Sand & Gravel Resources

Dear Mr. Lott,

Empire Township would like to thank the University of Minnesota for the opportunity to comment on the draft Environmental Impact Statement for the UMore Park Sand & Gravel Resources. We would also like to thank you for our involvement in the Technical Advisory Committee and public participation process.

As you are aware, much of the anticipated mining within Empire Township (with the exception of the clay mining) does not occur until after 2030 according to the proposed mine phasing plan. One of our primary concerns is that supplemental technical studies and necessary mitigations be completed at that time to more closely reflect future ordinances, requirements, etc. Our additional comments are: **1**

- Empire Township expects that all mining and future development plans that occur within the Township boundaries will fall under the guidance of Empire's Comprehensive Plan, ordinances and other land use regulations. **2**
- We have attached our comments from the preliminary mining plan. We offered comments on November 30, 2009. To my knowledge, these comments were never formally responded to. The recommendations associated with our comments will be required as a part of the permitting process and we would recommend incorporating as many responses as possible into the FEIS. We are particularly concerned with things such as slopes adjacent to roadways, public safety, etc. **3**
- We are also attaching our comments from our review of the technical documents. Again to my knowledge, these have never been formally responded to, and it appears several of the comments are still not identified or resolved in the DEIS. We would like a formal response to where in the DEIS each comment has been addressed. **4**
- Figure 11 on page 57 indicates bare ground adjacent to the lake that is being created. This will be required to be vegetated according to the requirements in the Township's Water Resource Management Ordinance. **5**

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DESIGNING FOR A BETTER TOMORROW

Bolton & Menk is an equal opportunity employer.

1 The mining operations will be reviewed and monitored over the duration of mining activities. At this point it is reasonable to expect that the traffic analysis will likely need to be updated at some point given that the current analysis extends to the year 2030.

2 Comment Noted. As a matter of comity, the University will include in the EIS a discussion and analysis of the relevant local ordinances, permits and approvals otherwise applicable to the proposed Project if it were being carried out by a private entity on privately owned land.

3 The mining plan has and will continue to be refined through the EIS, permitting and ordinance development process.

4 Empire Township's comments on the technical documents prepared for the traffic, air quality, groundwater, and noise subject areas were addressed to the extent practical and incorporated into the Draft and Final EIS.

5 The proposed seeding of grassland vegetation around the perimeter of the lake will fulfill the requirements of the Township's Water Resource Management Ordinance.

COMMENT LETTER I – BOLTEN & MENK, INC. (FOR EMPIRE TOWNSHIP)

- On page 89, the DEIS discusses impacts of storm water on downstream areas. We agree that water quality will likely improve with the post development drainage areas and discharge volumes reducing, however, there is a large wetland complex located between UMore Park and the Vermillion River. This complex is known as the "Butler Pond" and is considered to be an amenity to the Dakota County Regional Park. There should be some evaluation of the impacts to this wetland complex for wildlife and discussions should be had with Dakota County Parks staff. **6**

- The DEIS indicates that mitigation will be dealt with in permitting. The gravel mining in Empire will not begin for 20 years. The mitigation with respect to mining in Rosemount but potentially impacting Empire can't be dealt with through Empire permitting. The EIS should identify mitigation necessary in Empire before permitting and comment on its relationship with the Empire EIS monitoring program. **7**

- The members of the staff and boards of the respective governmental units will change several times in the interim. It is suggested that a Memorandum of Understanding (MOU) to regarding potential changes in the public road system be included in the EIS. The memorandum should be developed between the appropriate parties to provide a frame work for understanding extending over the conceptual life of the mine that sets forth the intent of each party that includes activities such as: **8**
    - subsequent environmental reviews.
    - how road and utility rights of way and easement will be expanded, eliminated, and acquired.
    - roadway design / improvements to be constructed.
    - understanding of construction cost distribution.
    - short term and long-term public transportation needs in and near the proposed mine while mining the aggregates.
    - the conceptual number and location of access/egress intersections should be included along with traffic signals, turning lanes if needed and who pays for them.

- On page 140 the EIS indicates mining access will be made to Biscayne Avenue and 170th Street ("Avenue") and on page 196 the EIS indicates that the two-lane sections on each road is adequate through the life of the mining. The traffic volumes may suggest two-lane is adequate, but use of either roadway will require upgrades to 10-ton design as a condition of permitting. All intersection turn lane and bypass improvements will similarly be required at the time of use (not the assumption that they will be in place as needed under No-Build scenarios). **9**

- On Page 196, the DEIS discusses traffic operations beyond 2030 in Empire Township. There are some generalized statements made about traffic generation at typical secondary access points. This assumption should be confirmed at that time. **10**

- There is no mention of the UMore/Dakota County/Empire/Rosemount Transportation Study completed in 2010. **11**

- Some of the traffic modeling for "No-Build" indicates ADT tripling from 2007-2011. This in fact is not true and is just a reminder that these are models that will need to be evaluated and updated throughout the life of the project. Comparing these models with the 2011-2030 models is misleading already. **12**

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6 The UMA is located in the uppermost portion of the drainage area tributary to the wetland complex known as Butler Pond. Streams and ditches in the area appear to only convey surface runoff flow following a rainfall and snowmelt events with no baseflow from groundwater. During small rainfall events virtually all of the precipitation falling in the UMA infiltrates through the sand and gravel soil that is present on site, and very little runoff leaves the UMA or contributes to flows in tributaries to the Vermillion River. In fact, the modeling analysis completed for this EIS shows that the proposed action will not impact flows or volume in Tributary 5 for a range of precipitation events including the 1-, 10-, and 100-year

24-hour events as well as the 100-year 4-day event. Additionally, the groundwater analyses performed for the EIS reveals the groundwater beneath the UMA currently does not flow to Butler Pond and it will not flow to Butler Pond in the future as discussed in Section 3.8.

The 100-year 4-day modeling summarized in Table 17 and Figure 19 of the EIS indicates that peak flow rates and volume in Tributary 5 just upstream of the Vermillion River would not change from existing conditions following the proposed action. In addition model results summarized in Table 17 and Figures 19-21 reveal that the peak flow rate at the Vermillion River would not change in any of the three tributaries and the total runoff volume reaching the Vermillion River would be reduced by only 3.4 percent. The small reduction in volume is in compliance with the existing VRWJPO volume control standards (as summarized in Section 3.7.2 of the EIS) which indicate that following a land disturbance activity the runoff volume to the Vermillion River must prevent an increase in runoff volume.

The modeling analysis completed also demonstrates that for smaller precipitation events (1-, 10-, and 100-year 24-hour events), the proposed action will not impact the peak flows and volumes conveyed to Tributary 5 from the UMA. The existing peak flow rates and runoff volume from subwatersheds ExtN-6 and ExtN-4 shown in Figure 14 are essentially equal to the peak flow rates and runoff volumes following the proposed action from subwatersheds PropN-38 and PropN-40 (see Figure 15). The nearly identical results are because the subwatershed area tributary to Tributary 5 following the proposed action is nearly identical to the existing area tributary to Tributary 5.

7 The Final EIS presents mitigation commitments for the entire study area (both Rosemount and Empire Township). The potential effects on Empire Township of mining operations that occur in Rosemount are part of the EIS analysis.

8 The University acknowledges the comment, and is continually open to discussions with other governmental units regarding issues of concern. Assuming that the suggested Memorandum of Understanding would be helpful, the issues identified in this comment are subject to many variables and future events which would require considerable discussion. The University believes that the suggested negotiations of a Memorandum of Understanding is beyond the scope of the Final EIS.

9 It is understood that use of sections of Biscayne Avenue or 170th Street by UMA site-generated traffic will require that these sections be upgraded to 10-ton design standards. If other development in the area has not cause the upgrading of these roadways at the time an UMA access is being requested, the driveway permit from Empire Township will indicate what sections of roadway need to be upgraded to 10-ton design, as well as any intersection improvements needed for the UMA access.

10 Actual traffic conditions at the proposed driveway will need to be reviewed at the time any UMA access is requested from Empire Township.

11 The Rosemount/Empire/UMore Transportation System Study is referenced in Section 3.17.1 of the Draft and Final EIS.

12 This comment has been noted.

COMMENT LETTER I – BOLTEN & MENK, INC. (FOR EMPIRE TOWNSHIP)

Steven Lott
August 5, 2010
Page 3

- The "No-Build" ADT from 2011-2030 on 170th Street quadruples. This seems unreasonable since it will be a dead end road and at best an access to the regional park during this time frame. **13**
- We have requested that costs to anticipated improvements required as a part of the mitigation plan should have costs developed in today's dollars and funding mechanisms should be discussed. There is currently a gravel tax in place to help pay for anticipated transportation improvements, however, there may not be in 2020, 2030, etc. **14**
- In general, one of the biggest complaints the Township receives with current mining operations is with noise and dust. Mitigation needs to be more specific on how dust from either wind generated dust at the facility and/or truck traffic generated dust will be reduced to acceptable levels. **15**
- "Jake braking" was brought up in at least two different technical advisory committee meetings. If the noise associated with this can indeed not be modeled, it needs to be monitored as a part of mitigation so necessary changes in hauling routes, etc. can be made if necessary. **16**

Sincerely,

BOLTON & MENK, INC.

Brian Hilgardner, P.E.
Township Engineer

Cc: Kathy Krippner, Township Clerk (Town Board)
Dean Johnson, Township Planner
Chris Hiniker, SEH

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13 The 2030 No Build ADT forecasts for 170th Street were obtained from a subarea model based on the latest Twin Cities Regional Model which reflects the most recent comprehensive plan updates. Standard methods and procedures for traffic forecasting for the Metro Area were used to develop the forecasts. The population of Empire Township is expected to increase by 120% to almost 4,800 by the year 2030, and 170th Street is a continuous east/west street connecting areas expected to be developed by 2030.

14 The scope, cost, timing, and funding of improvements identified as mitigation measures for No Build conditions will be developed through the roadway authority's normal project

development process. The scope, cost, timing, and funding of improvements identified as mitigation measures for Build conditions will be developed as part of the access permit process required by the roadway authority.

15 All options listed in Sections 3.12.3 and 4.12 should be used as best determined by site needs and product availability. If conveyors are used for transport of raw materials, and silt content of roads is reduced by gravel surface application, likely only water will be necessary for dust suppression. If water alone is not enough to reduce visible dust such that it is crossing over the site boundary, then chemical stabilization should also be used. However, if conveyers are not a viable option, gravel roads will be used rather than dirt roads and water and chemical suppressants will be maintained on-site so it is available when needed based on road conditions (dry, high traffic volume, etc.). Wind and traffic generated dust can be controlled with similar measures of dust suppression including application of water and/or chemical stabilizers. Areas of overburdened soils, reclaimed areas, or other areas needing long term erosion control will be seeded.

16 The contractor operation trucks will be kept up to local and state standards including local and state truck inspection rules. All independent truck operators (ITOs) are required by law to keep the same records and standards as those required for the contractor's trucks. If engine "jake " braking issues are encountered during operations Dakota Aggregates will coordinate with the local land use authority to address the issue.

Appendix A

Acronyms

List of Acronyms

ACM – Asbestos Containing Materials
ADT – Average Daily Traffic
AeCP – Asbestos Emissions Control Plan
AGR – Agricultural Research
AUF – Ancillary Use Facility
AURA – Alternative Urban Area-Wide Review
BMPs – Best Management Practices
BTEX – Benzene, toluene, ethyl benzene and xylenes
CEQ – Council on Environmental Quality
cfs – Cubic feet per second
CO – Carbon Monoxide
CPESA – Cumulative Potential Effect Study Area
CY – Cubic Yard
dB – Decibels
dBA – A Weighted Decibels
DBP – Di-butylphthalate
DNT – Dinitrotoluene
DPA – Diphenylanaline
DWSMA – Drinking Water Supply Management Area
ECP – Emergency Contingency Plan
EIS – Environmental Impact Statement
FAR – Floor Area Ratio
FSA – Farm Service Agency
FUDs – Formerly Used Defense Sites
GIS – Geographic Information System
GOW – Gopher Ordnance Works
gpm – gallons per minute
HCM – Highway Capacity Manual
ISTS – Individual Sewage Treatment Systems
ITE – Institute of Transportation Engineers
LGU – Local Government Unit
LOS – Level of Service
MCES – Metropolitan Council Environmental Services
MDA – Minnesota Department of Agriculture
MDH – Minnesota Department of Health
MEQB – Minnesota Environmental Quality Board
MINNOISE – Minnesota Noise Model
MLCCS – Minnesota Land Cover Classification System
Mn/DOT – Minnesota Department of Transportation
MNDNR – Minnesota Department of Natural Resources
MnLEAP – Minnesota Lake Entrophication Analysis Procedure
MnMUTCD – Minnesota Manual for Uniform Traffic Control Device
MOU – Memorandum of Understanding
MPCA – Minnesota Pollution Control Agency
MSHA – Mining Safety Health Administration
MSL – Mean Sea Level
NAC – Noise Area Classification
NC – Nitrocellulose
NHIS – Natured Heritage Information System
NOx – Nitrogen Oxides
NPDES – National Pollutant Discharge Elimination System
NRHP – National Register of Historic Places
NSPS – New Source Performance Standard
NWI – National Wetland Inventory
NWL – Normal Water Level
OSHA – Occupational Safety & Health Administration
OUs – Operable Units
PAH – Polycyclic Aromatic Hydrocarbons
PCBs – Polychlorinated Biphenyls
PDC – Prairie Du Chien
PFOS – Perfluorooctane Sulfate
PM – Particulate Matter
PM10 – Particulate Matter less than or equal to 10 microns
PWI – Public Waters Inventory
RAP – Response Action Plan
RECs – Recognized Environmental Conditions
RGU – Responsible Governmental Unit

RR & WMA – Research and Recreation Wildlife Management Area
SDD – Scoping Decision Document
SEAW – Scoping Environmental Assessment Worksheet
SGCN – Species of Greatest Conservation Need
SI/RI – Site Inspection/Remedial Investigation
SO2 – Sulfur Dioxide
SOCs – Sites of Concern
SPCC – Spill Prevention, Control, and Countermeasures
SRV – Soil Reference Values
SVOC – Semi-volatile Organic Compounds
SWB – Soil Water Balance
TAC – Technical Advisory Committee
TAZ – Traffic Analysis Zones
TP – Total Phosphorous
TSS – Total Suspended Solids
UMA – UMore Mining Area
UMore Park – University of Minnesota Outreach, Research and Education Park
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USGS – United States Geological Survey
VOC – Volatile Organic Compounds
VRWJPO – Vermillion River Watershed Joint Powers Organization
WCA – Wetland Conservation Act
WiLMS – Wisconsin Lake Modeling Suite
WWII – World War II

Appendix B

Glossary

Glossary

The terminology defined below is used throughout the document. The glossary is provided to assist the reader in better understanding the meaning of these key words and the overall context of the document.

Affected Environment - The social, natural, and economic character of the area potentially affected by a proposed action.

Air Toxics – Hazardous air pollutants that are known or suspected to cause serious health effects or adverse environmental effects.

Alternatives – A set of options to achieve a desired outcome.

No-Build Alternative – The option of taking no action. The No-Build serves as a baseline for assessing the relative effects of the Build Alternative(s).

Board of Regents – The 12-member Board of Regents is the governing body of the University of Minnesota. The legislature elects one regent from each of Minnesota's eight congressional districts and four from the state at large. One of the four at-large regents must be a University student at the time of election. The president of the University is ex-officio president of the Board.

Carbon Monoxide – is a gas composed of one carbon and one oxygen atom (CO). CO is a noxious by-product of internal combustion engines.

CAL3QHC – Is a versatile dispersion model for predicting carbon monoxide (CO) levels near transportation corridors.

Council on Environmental Quality – The CEQ is an advisory council to the President established by the National Environmental Policy Act of 1969. It reviews federal environmental programs, conducts environmental studies, coordinates federal environmental efforts, and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

Cumulative Effect – The impact on the environment which results from the incremental impact of a proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions.

dBA - Is the symbol for a sound level measured on an A-weighted scale. The A-weighted scale gives more weight to those frequencies that are audible to the human ear and discounts those frequencies outside the band of frequencies audible by the human ear.

Effects – Effects include direct and indirect effects. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Emission Factor - The relationship between the amount of pollution produced and the amount of raw material processed. For example, an emission factor for a blast furnace making iron would be the number of pounds of particulates per ton of raw materials.

Environmental Impact Statement (EIS) – A review process mandated in Minnesota law to assess the potential for significant environmental effects of a proposed action. The EIS provides information about the extent of the potential environmental impacts and how they may be avoided or minimized. An EIS is comprised of Draft and Final documents intended for government decision-makers who must approve the project, as well as the project proposer and the public.

Environmental Protection Agency (EPA) – The EPA leads the nation's environmental science, research, education, assessment, and regulation efforts.

Groundwater – Subsurface water that fills available openings in rock or soil materials.

L_{10} Noise Level – A sound level that exceeds Minnesota State Noise Standards for 10 percent of the time for a one-hour period.

L_{50} Noise Level – A sound level that exceeds Minnesota State Noise Standards for 50 percent of the time for a one-hour period.

Level of Service – A measure of delay and operating conditions defined by the Highway Capacity Manual and ranges from A (good operating conditions) to F (heavy congestion).

MINNNOISE – The MINNOISE model is a Mn/DOT modified version of the FHWA's Optima/Stamina model. The model is used to predict noise levels from road projects and to assist with the development of noise barriers.

Minnesota Environmental Quality Board (MEQB) – State agency that adopts environmental review rules, monitors their effectiveness, and revises rules/regulations as appropriate. The MEQB provides technical assistance to interpret and apply these rules.

Minnesota Pollution Control Agency (MPCA) - A State agency whose purpose is to protect Minnesota's environment through monitoring environmental quality and enforcing environmental regulations.

Mitigation – Mitigation includes: (a) avoiding the impacts altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impacts by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

MOBILE6 – A computer model used for predicting emissions of Hydrocarbons (HC), Carbon Monoxide (CO), Nitrogen Oxides (NOx), Carbon Dioxide (CO_2), Particulate Matter (PM), and toxics from cars, trucks, and motorcycles under various conditions.

MODFLOW – A quasi-3D finite difference groundwater flow computer model. The model is widely accepted and can be linked with various other computer codes for predictive simulation modeling.

National Ambient Air Quality Standards (NAAQS) – As part of the Clean Air Act, amended 1990, the EPA is required to set NAAQSs for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards: Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; and secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

National Pollutant Discharge Elimination Systems (NPDES) – The NPDES is part of a national program for issuing, modifying, revoking, reissuing, terminating, monitoring and enforcing water discharge permits, and imposing and enforcing pretreatment requirements, in accordance with the Clean Water Act.

Nationwide Urban Runoff Program – From 1978 through 1983, the EPA conducted a comprehensive study of urban runoff called the Nationwide Urban Runoff Program (NURP). This study provided a better understanding of the nature of urban pollutants from various urban land uses. This study focused primarily on monitoring runoff from residential, commercial, and industrial land and clearly presents information on the magnitude and variety of pollutants encountered in the urban environment. NURP today provides standards and guidelines for conveying, storing and treating storm water runoff.

New Source Performance Standards - Uniform national EPA air emission and water effluent standards which limit the amount of pollution allowed from new sources or from modified existing sources.

Nitrogen Oxides – NO are a mixture of gases that are composed of nitrogen and oxygen. Two of the most toxicologically significant nitrogen oxides are nitric oxide and nitrogen dioxide; both are nonflammable and colorless. Nitrogen oxides are released to the air from the exhaust of motor vehicles, the burning of coal, oil, or natural gas.

Noise Area Classification (NAC) – A classification system based on the land use activity at the location of a noise receptor and sets the noise standards applicable to that land use activity.

Noise Receptor – Represents a potentially sensitive land use (residential property, park,

school, hospital) where existing and/or forecast noise levels are monitored or modeled.

Ozone – Ozone is a bluish gas that is harmful to breathe. Ozone absorbs a band of ultraviolet radiation called UBV that is particularly harmful to living organisms. The ozone layer prevents most UVB from reaching the ground.

Particulate Matter – Particulate matter is composed of small solid and liquid particles suspended in the ambient air.

Peak Hour – One hour period of the day when traffic volumes are at their highest level.

Project Site – The area of the proposed UMore Mining Area.

Responsible Governmental Unit – The government unit responsible for conducting the environmental review process, usually the unit with the greatest authority over the project as a whole.

Runoff – The portion of the rainfall that is not absorbed by the ground, vegetation, or lost by evaporation, or that may find its way into receiving water bodies by surface flow.

Scoping – The process of identifying a full range of actions, alternatives, and impacts to be considered in an EIS.

Scoping Decision Document – This document identifies the alternatives dismissed from further consideration and the alternatives to be carried forward in the EIS. The SDD helps to clarify and focus on the potentially significant environmental issues which will be analyzed in the EIS.

Scoping Environmental Assessment Worksheet (SEAW) – A document providing basic information about a proposed project that may have potential for significant environmental effects. The SEAW is prepared by the RGU to determine which alternatives will be carried forward into the Draft EIS and which social, economic, and environmental impact categories will be studied in the EIS.

STAMINA 2.0 – This federally accepted computer program is used for predicting highway traffic noise. It is utilized in project development to forecast the effect of traffic-generated noise on surrounding land uses and to assess mitigation measures such as noise barrier walls.

Sulfur Dioxide - An acidic gas with the formula SO_2 that is formed in the combustion of many fuels and in the oxidation of naturally occurring sulfur gases. It is the primary sulfur gas emitted from combustion sources and is a precursor to sulfuric acid, which is a major constituent of acid rain.

Sychro/SimTraffic Model – A computer software model that evaluates existing and forecast traffic operations given a set of parameters (traffic volumes, roadway type, intersection geometry, speeds, etc.) for an identified area.

Transmission Loss – The accumulated decrease in acoustic intensity as an acoustic pressure wave propagates outwards from a source. As the acoustic wave propagates outwards the intensity of the signal is reduced with increasing range due to spreading and attenuation.

Vermillion River Watershed Joint Powers Organization – VRWJPO is an organization dedicated to improving the quality of water and the overall quality of life in the Vermillion River Watershed. The VRWJPO provides for the long-term management of its water and associated land resources through the development and implementation of projects, programs, and policies that respect ecosystem principles and reflect changing community values

Volatile Organic Compounds – Volatile organic chemicals (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

Wet Detention Basin – A storm water control structure that provides both retention and treatment of storm water runoff typically referred to as a pond. The pond consists of a permanent pool of water into which storm water runoff is directed. Runoff from each rain event is detained and treated in the pond until it is displaced by runoff from future storm events. By capturing and retaining runoff, wet detention basins control both storm water quantity and quality.