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1. Introduction

This Facilities Plan Amendment evaluates the potential financial and environmental benefits of installing a solar photovoltaic system at the Blue Lake Wastewater Treatment Plant. This Facilities Plan Amendment was prepared to describe a proposed system in terms of its benefits, capacity, function, features, and optional systems that were evaluated to recommend the best project. The Amendment includes cost information for purposes of alternative evaluations, budgeting, and PFA application.

2. Scope of Facilities Plan Amendment

The Amendment is a planning document used for decision making, budgeting, and funding applications. As a decision-making document, it identifies and recommends the best alternative for addressing a certain need, which for this project is to develop a cost-effective solar energy system. The Amendment addresses issues that affect project feasibility and costs.

The Amendment scope of work included the assembly and analysis of available data, the evaluation of alternatives, the selection of a recommended alternative, and the development of the recommended alternative in terms of layout, major facilities, space requirements, performance, and estimated costs.

3. Executive Summary

Six (6) solar energy system alternatives were evaluated, in three different configurations: static non-tracking systems, single-axis tracking systems, and dual-tracking systems. For each

configuration, two capacities were evaluated. Based on capacity and cost-effectiveness, the recommended system is a 1.25 MW AC static system. This system is identified as Alternative No. 1 in the Amendment. The estimated capital cost of Alternative No. 1 is \$6,774,132. The estimated annual operation and maintenance cost is \$8,000 per year, plus future replacement costs in approximately the 12th and 20th years of \$470,000 and \$421,000, respectively.

The system will provide enough energy to meet 12.9% of the WWTP's annual demand, resulting in a savings of approximately \$100,000 per year in energy costs. The 25-year present worth of energy cost savings is \$2,616,090.

The recommended project is shown on the attached site plan. The project does not pose any significant environmental impacts and provides reserve space for future expansions of both the WWTP and the solar energy system.

4. Existing Conditions

The site issues addressed in this section apply to all alternatives, unless specifically noted.

The proposed site is undeveloped property owned by MCES directly west of the Blue Lake treatment plant site. The site provides significantly more area than what will be needed to construct either a 1.25 MW or 1.0 MW system, even after site constraints are addressed and/or avoided, and possesses space for future expansions of the system. There is shallow bedrock at the south boundary of the site and shallow saturated soils at the north boundary. The solar array is to be arranged to avoid this area

The site has the advantage of being separate from the treatment plant itself, greatly reducing any risks that the project could interfere with plant operations, or vice versa. Shadows that would reduce the solar energy collection are avoided. Construction will not be impeded by power lines and other utilities. The site offers large areas for staging and materials storage.

The project plan does not include removal of any trees to accommodate the installation of the system. In the event that trees do need to be removed, the city of Shakopee does have a tree management plan (Amended 4/17/2008) which could require cataloguing the existing trees and providing a preservation and/or replacement plan.

Many trees were removed from the levee area to construct additions to the Blue Lake WWTP. To conform with Corps of Engineer requirements and certify the levee, trees were removed from the levee face. These trees must be replaced as part of an overall landscaping project to be completed in 2012. At the request of the US Fish and Wildlife Service, the landscaping project will include approximately 17 acres of Oak Savanna, or prairie interspersed with oak trees, in lieu of complete re-forestation. The landscaping project must be taken into account with the final planning and design of the solar energy site.

Part of the site is within the 100-year floodplain, which is to be protected from the 100-year event by a berm to elevation 723 above mean sea level. The flood storage volume cut off by the berm is negligible (<5%).

The Department of Natural Resources (DNR) is the regulatory governmental unit (RGU) for flood-related issues, but the City of Shakopee requires a conditional use permit (CUP) for extending the flood protected area or constructing in the flood plain, which will trigger reviews from DNR, the Lower Minnesota River Watershed, and the Corps of Engineers. A permit would be required by the Minnesota DNR for filling within the floodplain.

5. Alternative Descriptions

This section describes the alternatives that were developed for evaluation, as well as necessary site development that applies to all alternatives.

The site will be accessed by an aggregate surfaced roadway of minimal width located on the south side of the site and traversing from the WWTP to the west of the site. The solar array site will be bounded by security fencing with a gate at the point of access for the roadway. The proposed plan includes security cameras on the south fence line.

The site will be graded to <2% slopes in any direction and will drain from south to north as it currently does. There is shallow bedrock at the south boundary of the site and the solar array is to be arranged to avoid this area. Within this limitation, the area provides the area needed for the system recommended by this Amendment, approximately 15 acres.

The project will include a berm to protect the site from the 100-year flood. Although the project can be constructed without the berm by elevating inverters, transformers, and switchgear to protect them, any cost savings by not constructing the berm are offset by the increased cost of equipment bases. What's more, the berm offers the advantage of preventing flood debris and sediments from accumulating around the arrays and avoiding the need to clean the site after a flood event. A gate in the berm, normally open for drainage, will be closed during flood events.

Alternatives For a solar energy facility at the Blue Lake WWTP, three system configurations and two capacities were evaluated, for a total of six alternatives, identified in this Amendment as Alternatives 1 through 6.

- Alternative No. 1: 1.25 megawatts (MW) AC - 1.5 MW DC static
- Alternative No. 2: 1.25 MW AC - 1.5 MW DC single-axis tracking
- Alternative No. 3: 1.25 MW AC - 1.5 MW DC dual-axis tracking
- Alternative No. 4: 1 MW AC - 1.25 MW DC static
- Alternative No. 5: 1 MW AC - 1.25 MW DC single-axis tracking
- Alternative No. 6: 1 MW AC – 1.25 MW DC dual-axis tracking

The Amendment evaluated systems of different capacity to investigate the potential performance and efficiency advantages of a smaller or larger system. Capacities were selected with consideration of the plant's current electrical demand and what the proposed site can support.

Each alternative was based on standard 280W modules manufactured by Suntech (or an equivalent company). In addition, polysilicon modules were selected over thin-film solar

modules as the preferred technology because of greater efficiency in terms of watts per square foot.

Regardless of alternative, the array in each system must be split into two separate and equally-sized sub-arrays for interconnection with parallel feeders in the WWTP. For the 1.25 MW AC arrays, the system is to be split between two 630kW SMA inverters (or equivalent). For the 1 MW AC arrays, the split is between two 500kW Advanced Energy inverters (or equivalent). Each inverter has its own step-up transformer to bring voltage up to 13.8 kilovolts (kV) for interconnection.

The static systems are a standard fixed-tilt rack oriented due south at a tilt angle of 35 degrees, an optimal tilt for Minnesota. Because of the shallow bedrock depth at the site, a ballasted rack system is included, with above-grade prefabricated concrete footings anchoring each rack.

A PVTracker 7.2DX (or an equivalent) is proposed for the dual-axis tracker. Each tracker holds 22 modules, the equivalent of two series strings. The shallow bedrock at the site requires a spread footing foundation.

Of the three configurations reviewed—fixed-tilt, single-axis tracking, and dual-axis tracking – the dual-axis tracker requires the highest land-to-tracker ratio. This is to ensure that each tracker is shade-free throughout the day as it follows the sun.

Energy Generation of Alternatives Table 1 shows the module and inverter parameters and Table 2 shows the energy generation estimates for each alternative.

Table 1: Module and Inverter Parameters

Modeling Variant	String Qty	Mod Qty	Inverter	Qty
1.25 MW AC - 1.50 MW DC Static	488	5368	SMA 630CP	2
1.25 MW AC - 1.50 MW DC 1-Axis Tracking	488	5368	SMA 630CP	2
1.25 MW AC - 1.50 MW DC Dual-Axis Tracking	488	5368	SMA 630CP	2
1.00 MW AC - 1.25 MW DC Static	406	4466	Advanced Energy 500	2
1.00 MW AC - 1.25 MW DC 1-Axis Tracking	406	4466	Advanced Energy 500	2
1.00 MW AC – 1.25 MW DC Dual-Axis Tracking	406	4466	Advanced Energy 500	2

Table 2: Energy Generation Estimates

Modeling Variant	Predicted Energy From Inverters (kWh/yr)	Specific Production (kWh/kWP (DC)/year)	Performance Ratio
1.25 MW AC - 1.50 MW DC Static	1,987,000	1322	80.6%
1.25 MW AC - 1.50 MW DC 1-Axis Tracking	2,223,000	1479	82.7%
1.25 MW AC - 1.50 MW DC Dual-Axis Tracking	2,694,749	1,793	83%
1.00 MW AC - 1.25 MW DC Static	1,650,000	1319	80.5%
1.00 MW AC - 1.25 MW DC 1-Axis Tracking	1,848,000	1478	82.6%
1.00 MW AC – 1.25 MW DC Dual-Axis Tracking	2,226,959	1,781	82.5%

Energy Demand The alternative evaluation included an analysis of the monthly energy use and demand at the Blue Lake WWTP. Data for 2010 is included in Table 3. Minimum demand is the lowest 15-minute demand period.

Table 3: 2010 WWTP Usage and Demand

Usage Month	Total Usage (kWh)	Average Demand (kW)	Minimum Demand (kW)
January	1,487,743	2,000	1,380
February	1,281,608	2,130	1,632
March	1,247,240	2,110	1,040
April	1,215,638	2,001	1,332
May	1,193,623	1,867	1,020
June	1,214,915	1,948	1,320
July	1,137,368	1,984	1,452
August	1,317,003	2,092	1,352
September	1,140,938	1,874	1,292
October	1,261,838	2,213	1,520
November	1,370,958	2,240	1,320
December	1,533,078	2,150	1,592
TOTAL	15,401,950	2,051 (Average)	

The minimum demands were taken from 2010 data during hours of sunlight. Minimum demands approximately match the capacity of a 1.0 MW system when operating under optimum sunlight conditions.

Table 4 compares the energy output of each alternative system to the WWTP total load, based on 2010 data.

Table 4: Solar Contribution to Total Load

Modeling Variant	Total Facility Usage	Predicted Energy From Inverters (kWh/yr)*	Solar Contribution
Alternative 1: 1.50 MW DC Static	15,401,950	1,987,000	12.90%
Alternative 2: 1.50 MW DC 1-Axis Tracking	15,401,950	2,223,000	14.43%
Alternative 3: 1.50 MW DC 2-Axis Tracking	15,401,950	2,694,749	17.5%
Alternative 4: 1.25 MW DC Static	15,401,950	1,650,000	10.71%
Alternative 5: 1.25 MW DC 1-Axis Tracking	15,401,950	1,848,000	12.00%
Alternative 6: 1.25 MW DC 2-Axis Tracking	15,401,950	2,226,959	14.44%

Tables 3 and 4 point out that the solar energy system could meet as much as 50% to 75% of the facility's demand during peak solar production periods, depending on whether a 1.0 or 1.25 MW system is installed. A facility's kW demand tends to sag in the middle of the day – the solar system's peak performance window – and rise in the afternoon and morning. Thus, a tracker system might be better able to match the facility's demand needs. However, due to the various ways that utilities calculate demand charges, it is not certain that on-site solar energy will reduce actual demand charges from the utility. There is not enough evidence that the matching of tracker power and facility demand would financially offset the additional investment of a tracker system.

The system should not exceed the 75% value. However, since the PV system is divided into two systems corresponding to the utility service to the facility, which is comprised of “Feeder BL62” and “Feeder BL71”, then the balanced production of the corresponding two PV systems could exceed the loading on either of the two individual utility feeders (resulting in exporting power) if the loads are not balanced between those feeders. This potential for over-production is inherent in the design of the existing electrical distribution system and cannot be controlled since switching of any individual load between the two feeders is always possible. The electrical distribution system loads must have the flexibility to switch between the two sources to provide the required redundancy and reliability for maintaining plants operations. It is expected that normally the loads will be balanced between the two feeders and thus exporting power to the utility will not normally be an issue.

6. Alternative Costs

Operation and Maintenance Costs For a solar PV system (static or tracking), typical O&M tasks include:

- Periodic visual inspection
- Preventive maintenance
- Site mowing
- Monitoring/production analysis/alert response
- Event response
- Module replacement

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- Inverter replacement in approximately the 10th year

Tracking systems require additional O&M tasks as follows:

- Tracker lubrication
- Motor/hydraulics repair and replacement

Replacement Costs Estimated future replacement costs are as follows:

Capacity: 1.25 MW AC – 1.5 MW DC Options (Alternatives 1 through 3)

- Inverters \$470,000 in 12th year
- Modules 20% of modules, or \$421,000, in 20th year

Capacity: 1.0 MW AC – 1.25 MW DC Options (Alternatives 4 through 6)

- Inverters \$295,000 in 12th year
- Modules 20% of modules, or \$351,000 in 20th year

Estimated OM&R (operation, maintenance and replacement costs) of the six alternatives are:

OM&R Costs	Alternative					
	1	2	3	4	5	6
	1.50 MW DC Static	1.50 MW DC 1-Axis Tracking	1.50 MW DC Dual- Axis	1.25 MW DC Static	1.25 MW DC 1-Axis Tracking	1.25 MW DC Dual- Axis
O&M	\$8,000	\$8,500	\$9,500	\$7,400	\$7,800	\$8,500
Replacement ,12 th yr	\$470,000	\$470,000	\$470,00	\$295,000	\$295,000	\$295,000
Replacement,20 th yr	\$421,000	\$421,000	\$421,000	\$351,000	\$351,000	\$351,000

The 35 degree slope of the fixed array panels should provide “self-cleaning” of the panels from snow; however, there is a reduction factor in the existing PV production estimates to account for loss of PV output due to clouding and snow accumulation based on our latitude. Snow removal is not included as a maintenance cost. Generally, snow melts or slides off the array quick enough that snow removal is not required.

The estimated downtime for a PV array due to a major event is not expected to vary significantly due to the presence of tracking technology. For example, even if a tracker section requires maintenance and is not tracking, the PV modules will still produce power at a reduced efficiency.

Capital Costs The opinion of probable capital costs is presented in Table 5.

Table 5: Alternative Capital Costs						
<i>Capacity</i>	1.25 MW AC - 1.5 MW DC Options			1 MW AC - 1.25 MW DC Options		
<i>Alternative No.</i>	1	2	3	4	5	6
<i>Type</i>	Static	1-Axis Tracking	Dual-Axis	Static	1-Axis Tracking	Dual-Axis
Racking	\$750,000	\$1,125,000	\$2,125,000	\$625,000	\$936,000	\$1,767,500
Footings	775,000	2,077,500	3,000,000	650,000	1,728,000	2,495,000
Modules	2,106,000	2,106,000	2,106,000	1,754,000	1,754,000	1,754,000
Inverters	470,000	470,000	470,000	295,000	295,000	295,000
Transformers	64,500	64,500	64,500	53,300	53,300	53,300
Switchgear	203,125	203,125	203,125	201,000	201,000	201,000
Balance of Supply (BOS) *	900,000	900,000	1,175,000	750,000	750,000	977,000
Fencing	50,200	56,100	64,800	47,500	49,300	59,000
Security	15,000	15,000	15,000	15,000	15,000	15,000
Civil Work	72,000	75,000	140,000	70,000	71,000	135,000
Construction Staking	6,000	6,000	6,000	5,000	5,000	5,000
Inverter Warranty **	38,000	38,000	38,000	38,000	38,000	38,000
Construction Contingency	544,983	713,623	940,743	450,380	589,560	779,480
Engineering	\$779,325	\$1,020,480	\$1,345,262	\$644,043	\$843,071	\$1,114,656
TOTAL CAPITAL COSTS	\$6,774,132	\$8,870,328	\$11,693,429	\$5,598,223	\$7,328,231	\$9,688,936
\$/W (DC)	\$4.52	\$5.91	\$7.80	\$4.48	\$5.86	\$7.75

* BOS includes many items not individually identified in the table but are necessary for a complete project, such as conduit, wiring, boxes, bolts, and rack posts. BOS is not a contingency.

** This cost extends the inverter warranty from 5 to 10 years.

As Table 5 shows, the least-cost system is Alternative 4 (1 MW AC static system) at \$5.6 million. Based on cost per watt, both static systems (Alternatives 1 and 4) are nearly equal (\$4.52 and \$4.48 respectively). Static systems exhibit the best efficiency in \$ per W based on capital costs. The costs per watt of both single-tracker systems are approximately 30% higher, and dual-tracker systems are 70% higher.

Salvage Value The estimated service life of the solar energy equipment is 25 years. This length of time was chosen for the life-cycle cost analysis of options. Based on a 25-year life cycle cost analysis of alternatives, the estimated salvage value of the equipment is zero, with the exception of equipment that was replaced during the 25-year period, and civil work such as footings with longer service life than 25 years. Based on a 50-year life of civil work, the salvage value of civil work is estimated to be 50% of its construction cost. The estimated 25-year salvage value of alternatives is as follows:

Salvage of Original Construction + Salvage of Future Replacement = Total Salvage Value

Alternative 1: \$424,000 + \$551,000 = \$975,000

Alternative 2: \$1,076,000 + \$551,000 = \$1,627,000

Alternative 3: \$1,570,000 + \$551,000 = \$2,121,000

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Alternative 4: \$360,000 + \$411,000 = \$771,000

Alternative 5: \$900,000 + \$411,000 = \$1,311,000

Alternative 6: \$1,315,000 + \$411,000 = \$1,726,000

Energy Cost Savings A solar energy project will result in cost savings through avoided energy purchase. The energy cost savings were calculated based on the following assumptions:

1. The rate applied to actual use was used in the analysis, without consideration of maximum demand charges under the assumption that demand charges would be the same for all alternatives. The rate applied to total actual use was 5.5 cents per kw-hr.
2. The use rate was assumed to increase 5% per year until the year 2020 and 3% per year after that.
3. Solar energy generation was assumed to decline 0.5% per year due to degradation of panels, which is an industry standard for annual power degradation.
4. The energy cost savings each year of the 25-year period were converted to a total present worth based on an interest rate of 4%.

The present worth of future energy cost savings of the six alternatives are estimated to be:

Alternative 1: \$2,616,100

Alternative 2: \$2,926,800

Alternative 3: \$3,547,900

Alternative 4: \$2,172,400

Alternative 5: \$2,433,100

Alternative 6: \$2,932,000

Table 6 contains a typical spreadsheet used in calculating future energy cost savings and the present worth of future energy cost savings for all alternatives. The figures in Table 6 apply to Alternative 1.

Table 6: Energy Cost Savings From Recommended Alternative						
No. of Years	Year	Energy Created, kWh	Energy w/.5% Loss	Energy Cost, User Rate	Energy Cost Savings	Present Worth of Energy Cost Savings
1	2013	1,987,000	1,977,065	\$0.055	\$108,739	\$105,061
2	2014	1,987,000	1,967,180	\$0.058	\$113,605	\$106,051
3	2015	1,987,000	1,957,344	\$0.061	\$118,688	\$107,050
4	2016	1,987,000	1,947,557	\$0.064	\$124,000	\$108,059
5	2017	1,987,000	1,937,819	\$0.067	\$129,549	\$109,077
6	2018	1,987,000	1,928,130	\$0.070	\$135,346	\$110,104
7	2019	1,987,000	1,918,490	\$0.074	\$141,403	\$111,141
8	2020	1,987,000	1,908,897	\$0.077	\$147,731	\$112,188
9	2021	1,987,000	1,899,353	\$0.080	\$151,402	\$111,088
10	2022	1,987,000	1,889,856	\$0.082	\$155,164	\$109,999
11	2023	1,987,000	1,880,407	\$0.085	\$159,020	\$108,920

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12	2024	1,987,000	1,871,005	\$0.087	\$162,971	\$107,852
13	2025	1,987,000	1,861,649	\$0.090	\$167,021	\$106,794
14	2026	1,987,000	1,852,341	\$0.092	\$171,172	\$105,747
15	2027	1,987,000	1,843,080	\$0.095	\$175,425	\$104,710
16	2028	1,987,000	1,833,864	\$0.098	\$179,785	\$103,683
17	2029	1,987,000	1,824,695	\$0.101	\$184,252	\$102,666
18	2030	1,987,000	1,815,571	\$0.104	\$188,831	\$101,659
19	2031	1,987,000	1,806,493	\$0.107	\$193,523	\$100,662
20	2032	1,987,000	1,797,461	\$0.110	\$198,333	\$99,675
21	2033	1,987,000	1,788,474	\$0.114	\$203,261	\$98,698
22	2034	1,987,000	1,779,531	\$0.117	\$208,312	\$97,730
23	2035	1,987,000	1,770,634	\$0.121	\$213,489	\$96,771
24	2036	1,987,000	1,761,781	\$0.124	\$218,794	\$95,822
25	2037	1,987,000	1,752,972	\$0.128	\$224,231	\$94,883
Total Present Worth of Future Energy Cost Savings						\$2,616,090

Total Life-Cycle Costs The Total Life-Cycle Cost of each alternative is a summary of all costs converted to a present value based on an assumed interest rate. The Total Life-Cycle Cost of each of the six alternatives is presented in Table 7 below. Life-cycle costs take into account capital costs, 25-years of operation and maintenance costs, and future replacement, as well as credits for future salvage and energy cost savings for 25 years. (Note: In Table 7, parenthetical figures are *cost credits or deductions* that reduce life-cycle costs. Non-parenthetical figures are positive values that increase the costs of each option.)).

Table 7: Total Life-Cycle Costs of Alternatives (i = 4%)						
Item	1	2	3	4	5	6
Capital Cost	\$6,774,132	\$8,870,328	\$11,693,429	\$5,598,223	\$7,328,231	\$9,688,936
Annual O&M Cost	\$8,000	\$8,500	\$9,500	\$7,400	\$7,800	8,500
Present Value of O&M	\$125,000	\$133,000	\$148,000	\$116,000	\$122,000	\$133,000
Present Value of Replacement Costs	\$486,000	\$486,000	\$486,000	\$344,000	\$344,000	\$344,000
25-Year Salvage	\$975,000	\$1,627,000	\$2,121,000	\$771,000	\$1,311,000	\$1,726,000
Present Value of Salvage Replacement	(\$366,000)	(\$610,000)	(\$796,000)	(\$289,000)	(\$492,000)	(\$647,000)
Present Value of Energy Cost Savings	(\$2,616,100)	(\$2,926,800)	(\$3,547,900)	(\$2,172,400)	(\$2,433,100)	(\$2,932,000)
Total Life-Cycle Costs	\$4,403,032	\$5,952,528	\$7,983,529	\$3,596,823	\$4,869,131	\$6,586,936

7. Future Expansion

The future expansion of the wastewater treatment plant and the solar energy system were addressed in the preparation of the Amendment.

WWTP Expansion See the attached site plan. The closest WWTP facilities to the solar site are the tanks and buildings that comprise the anaerobic digester complex, shown on the attached site plan. The solar energy site was selected to avoid this area without any shadowing concerns. The proposed solar energy system location creates no conflicts with the existing digester complex.

Within the existing digester complex there is space for two (2) additional digesters. Thus, the solar energy system can be constructed on the proposed site without restricting a future capacity increase to the digester complex.

Solar Energy System Expansion The proposed site cannot accommodate the installation of a significant number of additional solar arrays to the west without additional land acquisition. Additional solar capacity may be gained by constructing additional arrays to the north, where additional space is available, however this expansion may be limited to less than 100% because of protected wetlands in the area. A pre-design task should be the determination of whether or not the construction of future additional capacity is possible and how the proposed system should be placed to best accommodate the future capacity increase.

8. Evaluation of Non-Cost Benefits

The total life-cycle cost of the least-cost solar system alternative—Alternative No. 4—is \$3.6 million. The 2nd lowest alternative is Alternative No. 1, at \$4.4. Alternative No. 1 offers the benefit of 25% greater capacity. Total life-cycle costs take into account expected and estimated costs for: capital installation and construction costs, future costs for operation, maintenance, and replacement, avoided energy purchase, and future salvage value.

In addition, there are various non-cost benefits of the proposed project to be considered, including:

Greenhouse Gas Reduction Over the next 25 years the proposed system will reduce energy consumption from fossil-fuel sources by approximately 48 million kw-hours, with a corresponding reduction in greenhouse gas emissions.

Minnesota Energy Independence The proposed project would create the largest solar energy facility in Minnesota at a time when virtually 100% of fossil-fuel derived energy comes from outside the state, costing the state's economy billions of dollars. The installation within Minnesota will create jobs and also may have an economic multiplier benefit.

Minnesota Energy Security Less reliance on out-of-state and poorly diversified energy sources will contribute to Minnesota's energy security.

Greater Control Over Energy Costs In 2010 energy costs at MCES accounted for 13% of operations and maintenance costs. This project will reduce the plant's dependence on the utility for energy and the variability in pricing of that utility, giving MCES increased control over its energy costs in the future. This would contribute to budget stabilization for MCES by fixing some energy costs.

Demonstration Project The project creates a full-scale facility that will demonstrate the economics and feasibility of a large solar energy facility "behind the meter" to other interested entities. Data will be generated related to the costs (including interconnection and stand-by) and benefits of vertical integration through distributed power generation and reduced dependence on regulated utilities. Information and reports will be made publicly available.

9. Recommended Alternative

The alternatives with the lowest capital cost and life-cycle cost are the static system alternatives—Nos. 1 and 4. Alternative No. 1, by virtue of greater capacity, will produce approximately 25% more energy over the next 25 years. The capacity difference means that both options are essentially equal in terms of energy produced per unit cost of total life-cycle costs (9.4 cents per kwh for Alternative No. 1 vs. 9.3 cents per kwh for Alternative No. 4) Based on greater capacity provided, Alternative No. 1 is the recommended alternative. The site provides sufficient space for the recommended alternative, plus space for future expansion of the WWTP.

The recommended alternative will result in energy cost savings by avoiding energy purchase from the utility. The energy cost savings are estimated in Table 6.

10. Environmental Analysis

Attached as an appendix to this Amendment is a copy of the original Environmental Assessment Worksheet (EAW) that was prepared previously for the Blue Lake WWTP Improvements. This EAW was reviewed and approved prior to the start of the Blue Lake WWTP Improvements. Except for items listed below, the information contained in the EAW is unaffected by the proposed solar project. The solar project creates the need to add the following items to the EAW.

5. *Project Location* The site plan included in this report is to be included with maps for the improvement project.

6. *Description* Phase 1 includes the installation of a 1.25 MW solar energy facility

7. *Project Magnitude Data* Total project area for the solar facility is approximately 16 acres

10. *Cover Types* For the solar energy project the current site is brush/grassland. After the project is constructed, brush/grassland cover will remain, approximately 16 acres, minus small areas to be covered by pavement.

13. *Water Use* Construction dewatering is not expected to be necessary during installation of the solar energy system. Spread footings to frost depth will be used to reduce exaction depths.

14. Water-Related Land Use Management District Part of the solar energy site is within the 100-year flood plain of the Minnesota River. To protect the site, a berm is to be constructed across the northern edge of the site. Area taken from the floodplain will be insignificant, <5%.

16. Erosion and Sedimentation The existing site is sloped less than 2%. No grading or slope changes are necessary for the solar energy project. Best management practices will be used to control erosion. Silt fence bale checks will be used. Any erosion control barriers that are needed during construction will remain in place until they are no longer necessary.

17. Water quality: surface runoff The solar energy project will not change the surface cover of the site and will not result in any changes in the current surface runoff and the quality of that runoff. No storm water collection system will be needed.

19. Geologic hazards and soil conditions There are no sinkholes or karst conditions on the solar energy site. There is a weathered limestone formation close to the surface predominantly along the southern edge of the site, an area that will be avoided by placing all solar facilities in areas of deeper bedrock. Soils in the area are acceptable to the project.

23. Stationary Source Air Emissions None.

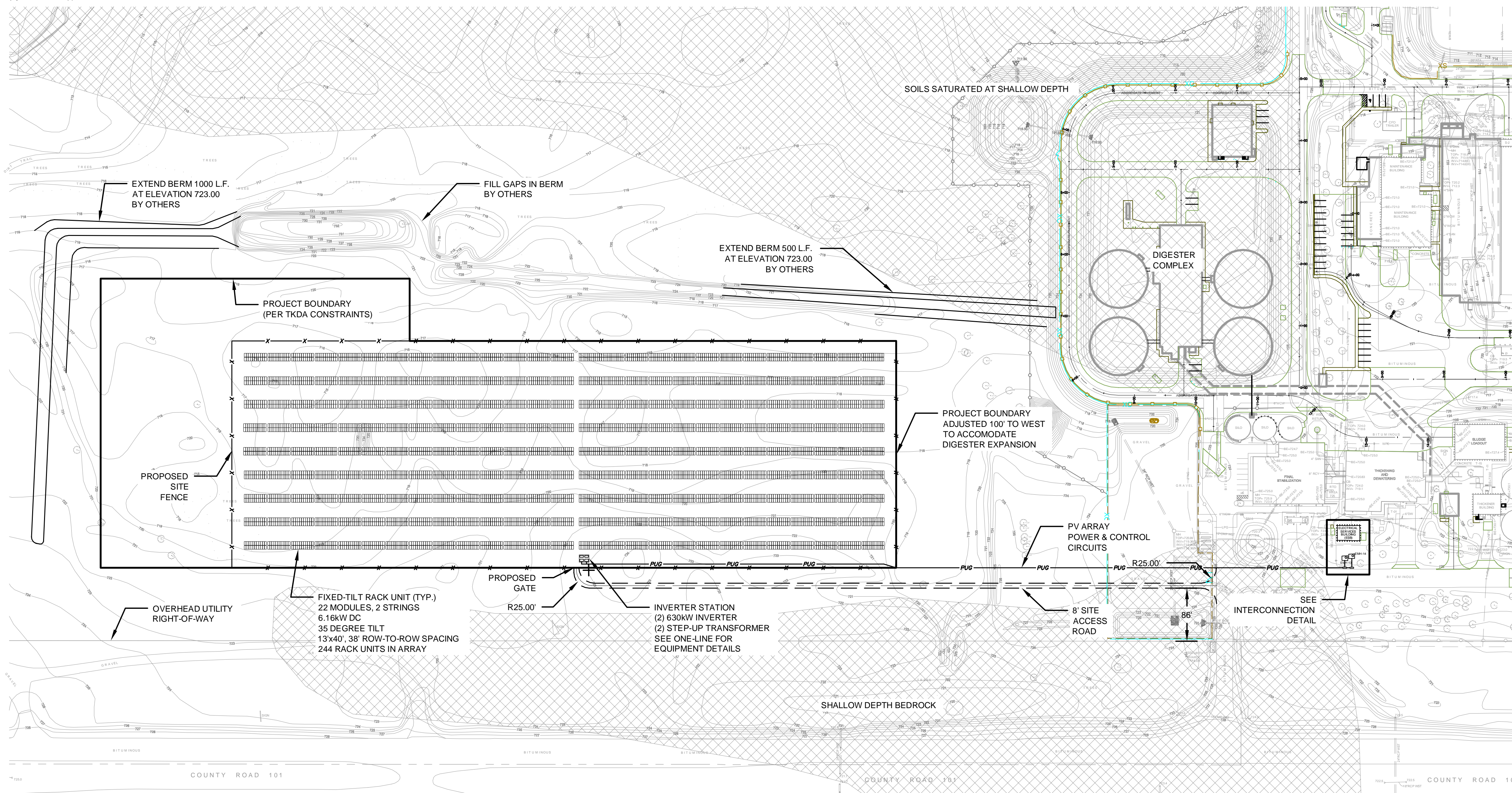
26. Visual impacts The panels are reflective surfaces and can create a glare that may be a temporary nuisance in surrounding areas.

US Fish and Wildlife must be consulted for their project input since the project area lies within the largest bird rookery in the Midwest. MCES enjoys a strong partnership with USFW, as evidenced by Blue Lake's use of an easement from USFW for the plant outfall line and the discharge of the plant's dewatering system into Blue Lake. Special permits are often needed for work around the plant.

End of Facilities Plan Amendment



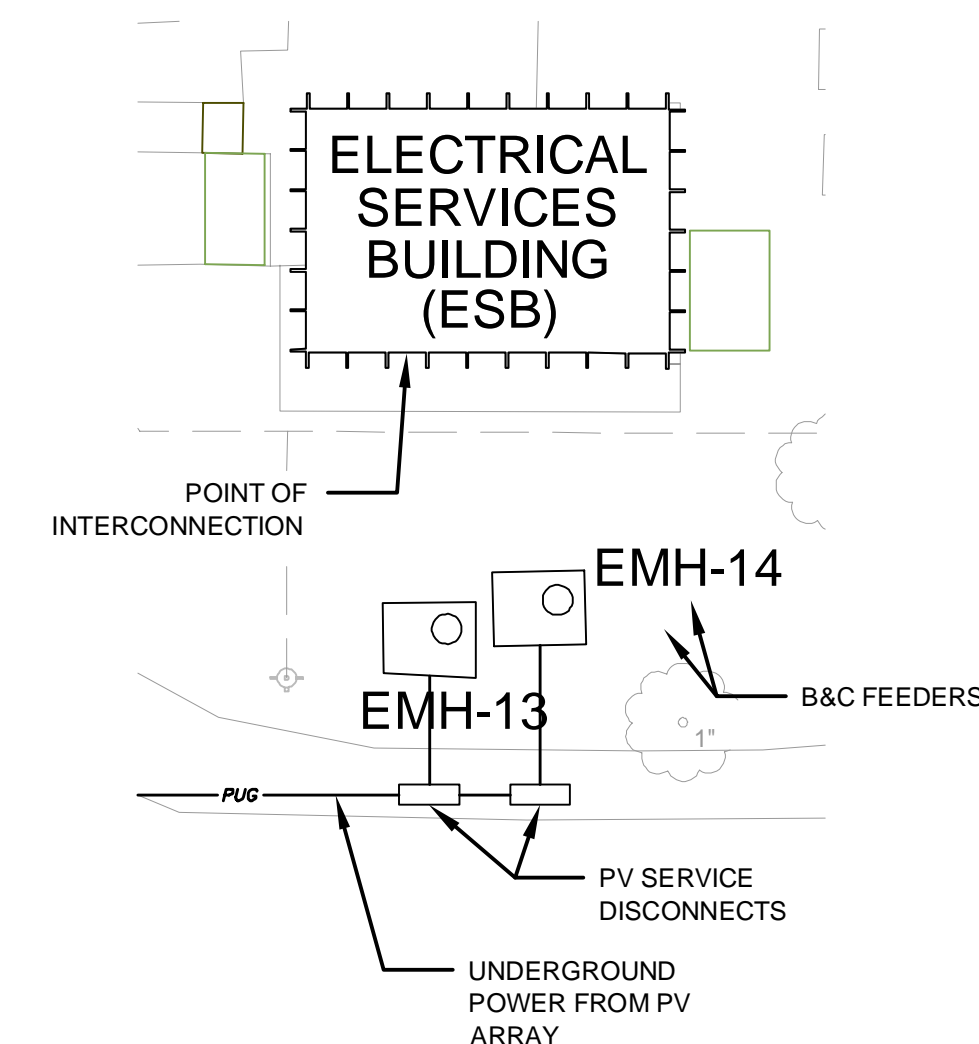
SCALE: 1" = 100'



1. PV SYSTEM AC POWER: 1.25 MEGAWATT (MW)
2. PV SYSTEM DC POWER: 4.5 MW AT STANDARD TEST CONDITIONS)
3. PV SYSTEM AC/DC WATT RATIO: 1Wac:1.2Wdc
4. SOLAR MODULE: 280Wp SUNTECH (OR EQUIV.)
- 4.1. SERIES STRING 11 MODULES.
- 4.2. 5,368 MODULES IN SOLAR ARRAY (406 STRINGS).
5. DC VOLTAGE: 600V OPEN CIRCUIT MAX.
6. INVERTER: (2) SMA SUNNY CENTRAL 630KW
7. SUPPORT STRUCTURE: INDUSTRY-STANDARD FIXED-TILT RACK.
- 7.1. RACK SHALL BE TILTED AT 35 DEGREES OFF OF HORIZON.
- 7.2. RACK SHALL BE ORIENTED 180° DUE SOUTH.
- 7.3. RACK UNIT SHALL SUPPORT 22 MODULES (2 STRINGS).
8. TRANSFORMER: (2) 750KVA STEP-UP TRANSFORMERS, 480V:13.8KV.
9. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF NATIONAL ELECTRIC CODE APPROVED BY LOCAL AUTHORITY HAVING JURISDICTION (AHL), ALL APPLICABLE LOCAL, STATE, AND NATIONAL CODES AND REGULATIONS.
10. PRELIMINARY SPECIFICATIONS. NOT FOR CONSTRUCTION.

1. SITE WILL BE LEFT IN CONDITION SUITABLE FOR SOLAR INSTALLATION AFTER ONGOING GRADING OPERATION.
2. FLOOD PROTECTION BERM WILL BE EXTENDED AND GAPS FILLED (BY OTHERS) TO ENSURE SITE IS OUT OF FLOOD PLAIN PRIOR TO SOLAR INSTALLATION.
3. SITE ACCESS ROAD WILL BE CONSTRUCTED OF 4" DEPTH GRAVEL ON COMPACTED SUBGRADE, MAXIMUM 2% SLOPE WITH 2% CROSS SLOPE.
4. FLOOD ELEVATION FROM FEMA FLOOD MAPS, ELEV. = 722.00. PROVIDED BY TKDA, SOILS AND BEDROCK INFORMATION FROM USGS SURVEY, PROVIDED BY TKDA.
5. EXISTING BOUNDARY AND TOPO INFORMATION FROM MCES, PROVIDED BY TKDA.
6. PRELIMINARY DRAWING, NOT FOR CONSTRUCTION.

SCALE: NTS



1.25 MW AC Static PV Array

Shakopee, Minnesota

Solar Array Plan

**PRELIMINARY
NOT FOR CONSTRUCTION**

Date: 9/28/11

Sheet: 1 OF 2

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form and EAW Guidelines are available at <http://www.eqb.state.mn.us>. The Environmental Assessment Worksheet provides information about a project that may have the potential for significant environmental effects. The EAW is prepared by the Responsible Governmental Unit or its agents to determine whether an Environmental Impact Statement should be prepared. The project proposer must supply any reasonably accessible data for — but should not complete — the final worksheet. If a complete answer does not fit in the space allotted, attach additional sheets as necessary. The complete question as well as the answer must be included if the EAW is prepared electronically.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project title Metropolitan Council Blue Lake WWTP Improvements – Shakopee, Minnesota

2. Proposer

Contact person: Carol Mordorski
Title: Principal Engineer
Address 230 E. 5th Street
City, state, ZIP St. Paul MN 55101

Phone 651 601-1173
Fax 651 601-1183
E-mail carol.mordorski@metc.state.mn.us

3. RGU

Contact person Bruce Henningsgaard
Title
Address 520 Lafayette Road N
City, state, ZIP St. Paul M55155

Phone 651 296-9289
Fax
E-mail
bruce.henningsgaard@mpca.state.mn.us

4. Reason for EAW preparation (check one)

EIS scoping ☒ Mandatory EAW Citizen petition RGU discretion Proposer
volunteered

If EAW or EIS is mandatory give EQB rule category subpart number: 4410.4300 Subp.18
and subpart name B. Wastewater systems

5. Project location County Scott

City/Township Shakopee

SW ¼	NE ¼	Section 2 Township 115N	Range 22W
S1/2 of NW ¼		Section 2 Township 115N	Range 22W
NE ¼	SW ¼	Section 2 Township 115N	Range 22W

Attach each of the following to the EAW:

- County map showing the general location of the project; Figure 1
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); Figure 2
- Site plan showing all significant project and natural features. Figures C2 and ES-2

6. Description

a. Provide a project summary of 50 words or less to be published in the *EQB Monitor*.

Wastewater flow to the Blue Lake WWTP in Shakopee Minnesota is predicted to increase from 28 to 47 MGD by year 2030, creating the need for expansion and upgrade to the plant facilities, process modifications to comply with a phosphorus removal standard and changes to a liquid disinfection system. Other improvements include addition of anaerobic digesters, and replacement process controls.

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

The Blue Lake Treatment Plant was constructed in 1969 as an aerated pond system and expanded in 1971 to an activated sludge treatment system to serve the southwestern area of the Twin Cities, including Shakopee, Prior Lake and the Lake Minnetonka area. The plant is currently owned and operated by the Metropolitan Council, and is permitted to treat an average annual flow of up to 32 mgd. The plant facilities include preliminary treatment (screening and grit removal), primary treatment, activated sludge treatment with biological phosphorus removal and nitrification, chlorination/dechlorination, effluent aeration and discharge to the Minnesota River. Primary sludge is gravity thickened, screened and combined with gravity belt thickened waste activated sludge prior to centrifuge dewatering and final stabilization using heat drying to make pellets that are land applied to farm land.

The service area sewered population is projected to increase 80% and employment by 60% by 2030. Ultimately, the proposed improvements will increase the plant average annual flow to 47 mgd. The expansion will occur in multiple stages as needed to meet permit requirements and treat incoming flows.

The first phase of improvements (Phase 1) will provide facilities and equipment to ensure process reliability and meet permit limits, including the total phosphorus limit effective in October 2008, at the current rated capacity.

Phase 1 includes the following improvements to liquid treatment facilities:

- Upgrading 2 of 4 bar screens to ½ bar openings;
- Improving the septage receiving station;
- Improving plant headworks to ensure even load distribution to the east and west sides of the plant;
- Improvements to activated sludge system to ensure the plant can meet an annual average total phosphorus standard of 1 mg/l by adding baffles to the aeration tanks and control valves for the air flow;
- Improvements and expansion of WAS pumping;
- Two additional aeration tanks, each 230' x 81' x 16' deep, one tank to be used for RAS/centrate process
- One 230' x 50' x 16' deep biological contact tank;
- A 20' x 30' low profile building to house a chemical feed system for addition of alkalinity to the RAS/centrate treatment;
- Two additional secondary clarifiers;

- Change from gaseous disinfection process to disinfection with liquid sodium hypochlorite and dechlorination with sodium bisulfite;
- Installation of an additional effluent screw pump with the same footprint as the other three pumps;
- Installation of effluent oxygen injection equipment.

The disinfection system will not require additional tankage, but the process change has potential safety and environmental advantages over the existing gaseous system, which runs a low but real risk of a chlorine or sulfur dioxide gas release.

Phase 1 will include the following improvements and expansion of solids processing facilities:

- Improvements to primary sludge screening;
- Addition of four (4) anaerobic digestion tanks and one (1) sludge holding tank;
- Digester sidestream treatment;
- Improvements to gravity thickener tanks and WAS thickeners;
- Improvements to odor control for the gravity thickeners and regenerative thermal oxidizer odor control system for the sludge pelletization system.

Each of the five digester tanks will be 90' in diameter and approximately 40' high, which is about the same height as the existing dryer building, and 30' lower than the three existing pellet storage silos. The four 135' diameter in ground secondary clarifiers will be similar to the existing eight clarifier tanks. The digesters and clarifiers will be added to the plant in areas that require expansion of the flood control dike. This construction must be timed to not leave the plant or partially completed construction vulnerable to flood conditions. Topsoil will be stockpiled and erosion control measures will be taken to protect this area.

A section (approximately 1000' long) of the RCP discharge line out to Blue Lake will be rehabilitated. This will involve removing roots that have penetrated the RCP joints. This will be conducted over a 4 to 6 hour period when wastewater flows are low to minimize interruption of plant flow. Reconstruction or modifications of the outfall pipe at the Minnesota River may be necessary if it is determined there is a hydraulic jump in that area that could damage the end of the outfall pipe.

Phase 1 will include the following rehabilitation of equipment and improvements to support systems:

Replacement of west primary pumps, west primary clarifier drives;

Replacement of compressors, and plant water pumps;

Replacement of most of the plant PLC based control equipment;

Structural, electrical and HVAC rehabilitation throughout the plant;

A 28'x44' addition to the existing Maintenance Building, which will match the existing 24' high shop section of the building.

Improvement to the dewatering system by deepening several existing 30' deep shallow wells to 100' deep and/or installation of new wells;

Installation of ballast or bracing to buildings and tunnels that are not designed to resist buoyant forces associated with the 100 year flood event.

Construction is expected to begin in late 2007 with construction of new units or rehabilitation of the same type of unit phased to ensure redundancy standards are met. Completion of improvements to the existing aeration tanks to ensure compliance with the phosphorus standard will be prioritized to be operational prior to the standard taking effect in October 2008.

Construction dewatering may be needed to build below grade tanks. Dewatering will be minimized to reduce impacts on groundwater levels. There have been no environmental impacts to surrounding areas due to construction dewatering in the past.

Best Management Practices will be utilized to cover noise, dust and runoff during the construction.

Multiple tanks are available for each process to ensure sufficient redundancy when tanks are removed from service for maintenance.

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

The project is needed to provide wastewater treatment to meet NPDES permit requirements, including a 1 mg/l phosphorus limit, which takes effect in October 2008; to enhance safety and security by replacing gaseous chemical with liquid chemicals for disinfection; to upgrade and rehabilitate the plant facilities to ensure continued permit compliance and to provide plant capacity for the service area

d. Are future stages of this development including development on any outlots planned or likely to happen? ☒ Yes ☐ No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

The second phase (Phase 2) of improvements will increase secondary treatment average annual capacity to approximately 38 mgd and is expected to provide capacity for the service area until about Year 2015.

The improvements needed to increase the plant capacity include the following:

- Two additional secondary clarifiers
- Two additional aeration blowers

There will be additional rehabilitation of equipment and support systems in Phase 2.

Subsequent stage improvements (Phases 3 and 4) will depend upon the actual versus projected rate of growth and development. Major additional improvement are anticipated to occur in five to ten year intervals and include the following improvements:

- Four additional 80 foot diameter primary clarifiers
- One additional grit removal train to serve the four clarifiers
- Additional 2.0-mg aeration tank(s).
- One additional effluent screw pump
- One additional 1.9 mg digester.
- Additional disinfection capacity
- Additional effluent polishing
- Rehabilitation or replacement of equipment and support systems as needed.

These facilities and improvements will be located on existing MCES property that is within the area at the Blue Lake site that is protected by the diked area.

Multiple tanks are available for each process to ensure sufficient redundancy when tanks are removed

from service for maintenance.

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

7. Project magnitude data

Total project acreage 6.4 (wastewater tanks, buildings and support systems)
Number of residential units: 0 unattached 0 attached 0 maximum units per building
Commercial, industrial or institutional building area (gross floor space): total square feet : 3,900

Indicate areas of specific uses (in square feet):

Office N/A	Manufacturing
Retail N/A	Other industrial chemical storage 1,400
Warehouse 2,500	Institutional
Light industrial	Agricultural
Other commercial (specify)	

Building height : ~12' high for chemical storage; 24' high for warehouse addition; 40' high for digesters.

If over 2 stories, compare to heights of nearby buildings

Three existing pellet storage silos are 70'; the existing Final Stabilization and Thickening & Dewatering buildings are 38' above finished grade.

8. Permits and approvals required. List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

<u>Unit of government</u>	<u>Type of application</u>	<u>Status</u>
Minnesota Pollution Control agency	Facility Plan Approval	To be obtained
Minnesota Pollution Control agency	MN State Loan Funding	Pending
Minnesota Pollution Control agency	Plan and Specifications Approval	Pending
Minnesota Pollution Control agency	NPDES Construction Storm Water	To be obtained
Minnesota Pollution Control agency	Upgrade existing Registration air Permit to a State Permit	To be obtained if necessary
Minnesota Pollution Control agency	Amend existing NPDES discharge permit	To be obtained prior to Phase 2
City of Shakopee	Conditional Use Permit	To be obtained
City of Shakopee	Building Permit	To be obtained
Lower Minnesota Watershed	Project Approval	To be obtained
Minnesota Dept of Natural Resources	Amendment to water appropriation permit for permanent dewatering	To be amended
Minnesota Dept of Natural Resources	Water appropriation permit – temporary construction dewatering	To be obtained
Administrative Department - State Building Codes	Project review and approval – occupied spaces	To be obtained
Xcel Energy	Outage for construction under high voltage power lines	To be obtained if necessary
Scott County	Well Construction and Sealing Permit	To be obtained
US Fish and Wildlife Service	Project Approval	To be obtained
U. S. Corps of Engineers	Project Approval	To be obtained

9. Land use. Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

The Project location is the existing Blue Lake Wastewater Treatment Plant (WWTP), an advanced secondary WWTP located south of a wetland area on the south bank of the Minnesota River. The existing plant operations occupy the eastern 67-acre tract of the 142-acre site owned by the Metropolitan Council. The 75 acre tract west of the existing plant operations is unoccupied and covered with natural vegetation.

The land west, north and east of the plant property are part of the Minnesota Valley National Wildlife Refuge which is owned and managed by the United States Fish and Wildlife Refuge. These areas are undeveloped lands in their natural state with large protected wetland areas.

CSAH 101, a four lane divided highway owned by MnDOT with right of way easements on Metropolitan Council plant property, forms the south border of the plant. Heavy industries including a pre-cast concrete pipe manufacturing facility and a power generation facility are located across Highway 101 south of the Plant. A race car track is located southwest of the plant west of the other industries.

Since the the surrounding vacant property is owned by Minnesota Valley National Refuge or the Metropolitan Council, it will not be negatively impacted by the project. The proposed wastewater plant facilities conform to Shakopee's comprehensive plan use and current industrial, I-2 zoning for this property.

The project duration for Phase 1 is anticipated to cover about 30 months. Contract award is anticipated for summer, 2007. Construction activity will include excavation for new tanks, pouring concrete for new tanks, installing/ replacing equipment, rehabilitation of buildings and support systems, constructing support buildings and service tunnels, replacing control systems, addition of another standby generator.

Two underground fuel storage tanks were removed in 1991. In May 2002 a petroleum sheen was observed by a contractor while drilling a soil boring. The contamination was investigated as LEAK 00014728. An investigation report was submitted to MPCA in May 2003, and MPCA closed the release site file in September 2003.

Since the Final Stabilization (sludge pelletization) facilities have been operating in 2000, Blue Lake has received about seven odor complaints per year from Raceway Park. The agency has pursued several remedies to resolve the problem and is currently experimenting with a masking agent. If those tests are not successful, additional odor reduction strategies will be pursued.

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

	Before	After		Before	After
Types 1-8 wetlands	1	1	Lawn/landscaping	10	9
Wooded/forest	28	28	Impervious surfaces	21	23
Brush/Grassland	65	59	Other - Open tanks	17	22
Cropland	0	0			
	TOTAL			142	142

If **Before** and **After** totals are not equal, explain why:

11. Fish, wildlife and ecologically sensitive resources

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts. If the DNR Natural Heritage and Nongame Research program has been contacted give the correspondence reference number.

The Blue Lake WWTP is adjacent to the Minnesota Valley National Wildlife Refuge, but the project is not anticipated to cause any effect on the fish and wildlife at the refuge (see response of DNR, ERDB 2006250, below). There will be some excavation for new tank treatment units requiring temporary dewatering, but the dewatering will only be needed during periods of higher groundwater levels as is true for the permanent dewatering system, which has been in operation for 12 years with no negative impacts.

Best management practices will be used to control fugitive dust and erosion to prevent impacts to surface water that affect the wetlands habitat – see also response to Items 12, 17 and 18 for measures to protect water quality. With the exception of some minor work removing roots from a section of the discharge line, construction activities will be confined to the main plant area, which is a distance away from the nesting areas.

ERDB 2006250, See Attachment 1

While 19 known occurrences of state-listed species, rare plant communities or other sensitive ecological resources are identified in the area searched, it is the opinion of the MN/DNR that the project will have no affect on natural resources based on the location and nature of the project proposed.

b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial water bird nesting colonies or regionally rare plant communities on or near the site?

☒ Yes ☐ No

If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the DNR Natural Heritage and Nongame Research program has been contacted, give the correspondence reference number:

Blue Lake is part of the National Wildlife Refuge. The areas north and east of the lake are home to several nesting colonies of protected bird species.

From ERDB 2006250, See Attachment 1

Natural resources found are four occurrences of birds, four occurrences of mammals, four colonial water bird nesting sites, and seven plants or plant communities.

c. Describe measures to minimize or avoid adverse impacts.

An agreement will be developed with USFW to schedule the work on the discharge line to avoid periods when protected bird species would be nesting. Vehicle traffic will be minimized to the outfall line area manholes, which are on Council property rather than refuge easement property, to remove the roots.

In the areas outside the existing dike where the new tanks will be constructed, silt fence will be installed to establish the limits of construction and prevent sediment from entering surface water runoff that flows into Blue Lake.

The remainder of the project will be conducted within the existing Blue Lake plant property and flood control dike. Plant drainage within the diked area is clarified in a drop manhole and discharged with the treated plant effluent to the Minnesota River.

- 12. Physical impacts on water resources.** Will the project involve the physical or hydrologic alteration — dredging, filling, stream diversion, outfall structure, diking, and impoundment — of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☐ Yes ☒ No

If yes, identify water resource affected and give the DNR Protected Waters Inventory number(s) if the water resources affected are on the PWI: . Describe alternatives considered and proposed mitigation measures to minimize impacts.

- 13. Water use.** Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)?
☒ Yes ☐ No

If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

Figure 3 shows all dewatering and monitoring wells on the Blue Lake site. Attachment 2 shows the unique well numbers for the dewatering and monitoring wells. The water source for all wells is the Prairie Du Chien formation.

FLOOD CONTROL DEWATERING

Five deep (~100') wells on site (known as DW1, DW2, DW3, DW4 and ATDW1) comprise the existing flood and high groundwater control system for the Blue Lake Plant. These permanent deep wells are used as needed during periods when the groundwater is above normal (~699 ' above sea level). A discharge up to 14,530 gpm for the 100-year flood event is allowed under DNR Appropriation Permit #92-6215.

As part of the project, additional dewatering will be provided to protect existing and new plant facilities. Several shallow wells (30 to 40' deep) constructed in 2000-2001 that were not effective in the 2001 flood are proposed to be deepened to approximately 100', and additional deep wells may be added to protect new process areas as part of the project. These wells will provide sufficient flood protection dewatering capacity for 100 year (or greater) flood events. Modeling will be performed to determine the locations of the wells to be deepened or constructed. The additional wells are not expected to increase the limits of the dewatering discharge rate in the permit, but the permit will be amended to include the modifications to existing wells or new wells.

CONSTRUCTION DEWATERING

Construction dewatering is expected to be needed during excavation for and construction of the aeration, contact, mixed liquor distribution and sidestream treatment tanks and the clarifiers, and may be needed for construction of the digesters. Dewatering will be needed during the spring and early summer of 2007 for site preparation. Construction dewatering may be discontinued until the new process units are under construction, and continued until the area surrounding the new tanks can be backfilled.

The contractor may benefit from dewatering from the existing deep wells if they are concurrently operated by MCES under the plant protection dewatering permit, and in addition, will likely need to use sump pumps in excavations under a separate construction permit. Sump pumps located in the excavation were used during construction periods in the past due to the unpredictability of dewatering the shallow excavation areas. The rate of dewatering discharge is hard to estimate and would be dependent on the concurrent flood dewatering needs. During periods of elevated groundwater levels, but below flood levels (700- 710' above MSL) the volumes would be unlikely to exceed the volume of two of the deep well pumps or approximately 2000 gpm.

14. **Water-related land use management district.** Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? ☒ Yes ☐ No

If yes, identify the district and discuss project compatibility with district land use restrictions.

The Blue Lake WWTP is located in the 100-year flood plain of the Minnesota River. The actively used plant site is surrounded by a levee that has been constructed to an elevation four feet higher than the 100-year flood elevation.

The four new secondary clarifiers and five digestion tanks will be constructed in areas that are currently outside the existing dike. The dike must be expanded to protect these areas. Both areas (each about 2 acres in area) are at the south end of the plant site, furthest away from the river and will have the least impact on changing the flood plain configuration.

The United States Corps of Engineers and Lower Minnesota Watershed District would need to review and approve the dike expansion.

The City of Shakopee Zoning Commission must also review and approve the plans, and issue a Conditional Use Permit to expand the protected area.

15. **Water surface use.** Will the project change the number or type of watercraft on any water body? ☐ Yes ☒ No

If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

16. **Erosion and sedimentation. Give the acreage to be graded or excavated and the cubic yards of soil to be moved:**

acres 7 ; cubic yards 185,176

Describe any steep slopes or highly erodable soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

The areas where the dike must be expanded to encircle the digesters and new secondary clarifiers will be built are about six to eight feet lower than the elevation required for the top of the dike. The dike extension will drop off at a slope of 3 to 1. The exposed dike slopes must be protected during construction of the dike.

Best Management Practices will be used to control erosion and sedimentation that may occur during construction, including the dike and excavation for process units. Council provides detailed instruction to the Contractor in the Project Manual for installation and maintenance of erosion control. Silt fence bale checks shall be used, and Council construction inspectors will inspect the protection measures for compliance with Council requirements and applicable regulations. Any erosion control barriers that are needed during construction and will remain in place until they are no longer needed.

17. **Water quality: surface water runoff**

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.

The project site is a wastewater treatment facility on a 142 acre site of which about 50 acres is devoted to process units, buildings, plant roads and green space. The other 90 acres of the site is wooded, wetland or natural grassland.

Site runoff within the dike is collected in a network of drainage ditches and culverts. Some of the runoff near the secondary clarifiers is discharged in a flap gate along the plant's east boundary. Runoff is collected in ditches and culverts running south to north then combined at an intermediate pump station along the southeast corner of Aeration Tank 8. This discharge is combined with other runoff from the southwest corner of the site to a ditch running along on the west side of the aerated pond. The ditch discharges to a drop sedimentation manhole prior to discharge by gravity or by pumping (during flood conditions) into the plant's effluent line. This discharges into the Minnesota River.

The plant has an NPDES General Stormwater Permit for Industrial Activity and follows a Stormwater Pollution Prevention Plan. The program includes good housekeeping measures, preventative maintenance, inspections, spill prevention and response, sedimentation and erosion control and management of runoff. Contamination of runoff from the site is minimal since traffic and outdoor storage of materials are minimal within the site.

Most of the work of the project is within the diked area of the existing established wastewater treatment facility, so the current collection system will continue to provide collection and sedimentation of runoff prior to discharge during construction. The dike expansion for the digesters and clarifiers will use the BMP described in Item 16 to prevent erosion and contamination of runoff.

The construction will disturb approximately seven acres of total land area, so an NPDES General Stormwater Permit for Construction Activities will be required, and must be obtained by the Contractor. The erosion control and stormwater management will be monitored and inspected regularly by Council staff. Best Management Practices for erosion control and runoff management will be employed as necessary.

After completion of construction, some parts of the proposed project will reduce the quantity of runoff from the Blue Lake WWTP since the open tanks (aeration tanks, clarifiers, contact tank, mixed liquor distribution, sidestream treatment) will capture precipitation that would have run off. Since this precipitation will be receiving treatment at the plant, its quality will likely be better than before the project. Areas for new process units (digesters, chemical handling, effluent pump) that will increase runoff will counter these areas of improved quality.

The project manual will direct the contractor to carefully control use of petroleum products or other hazardous liquids used in the construction process to prevent any contamination of runoff. This is standard practice at the plant.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

The route for nearly all the stormwater would be the current stormwater collection system on site as described in Item 17a above ; the drop manhole for sedimentation that precedes discharge of stormwater into the plant effluent line that carries it to the Minnesota River. No herbicides are used at the Blue Lake plant site. Due to the Stormwater Pollution Prevention Plan and sedimentation manhole, impacts on receiving waters have from site runoff have been minimized.

18. **Water quality: wastewaters**

a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

The Blue Lake WWTP treats residential, commercial, institutional and industrial wastewater from the Lake Minnetonka watershed area, Shakopee and Prior Lake. The plant is currently treating 28 mgd. The Phase 2 project is estimated to increase average annual wastewater flow to 38 mgd. The annual average flow projected for Year 2030 is 47 mgd.

The wastewater composition is typical of normal strength domestic wastewater. Major industries contributing to the Blue Lake Plant flow include barley malting, water softening manufacturing, instrumentation manufacturing, building material manufacturers, food and sugar processing, glass container manufacturing, and electronic and circuit board manufacturing.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

The treatment system consists of screening, grit removal, primary treatment, biological phosphorus removal and nitrification in the activated sludge process, secondary clarification, disinfection using gaseous chlorine and dechlorination using sulfur dioxide gas. Cascade aeration is used to increase effluent dissolved oxygen prior to discharge to the Minnesota River via a 1-mile discharge pipe.

Primary solids are thickened in gravity thickener tanks and secondary waste solids are thickened using a gravity belt. The flows are combined and dewatered using centrifuges prior to heat drying to produce fertilizer pellets that are applied to farmland.

The Blue Lake Plant has an excellent compliance record with meeting standards for all permit parameters, including effluent ammonia, total phosphorus, suspended solids and BOD. The plant routinely wins a Certificate of Commendation for outstanding operation, maintenance and management from the Minnesota Pollution Control Agency (MPCA) based on full compliance with clean water discharge permits. In addition, the plant routinely receives awards from the National Association of Clean Water Agencies (NACWA) – for full compliance with effluent limitations.

In 2004, the plant received the First Place Award of Excellence from EPA Region V for Outstanding Operation and Maintenance in the large, advanced treatment plant category, and went on to win the Second Place Award at the national competition.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

The project is the publicly owned facility. Any wastewater generated on site by the plant is treated at the plant.

The Council has the delegated authority to operate the Industrial Pretreatment program for the seven county metropolitan area. The Phase 1 improvements described in this project are necessary to continue to meet the NPDES permit requirements.

Phase 2 of the project, and future phases will provide the capacity at the plant to treat the service area's wastewater through the planning period ending in 2030.

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

Not applicable.

19. Geologic hazards and soil conditions

a. Approximate depth (in feet) to ground water: 4' minimum 15-30' average
to bedrock: 4' minimum 8'-10' average

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

There are no sinkholes or karst conditions on site.

There is a weathered limestone formation that is sometimes just a few feet below the surface. While the layer is fractured, it does not create problems with structural stability for construction on site.

b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil granularity and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

Soils on the site are a mixture of sandy loam or silty loam alluvial deposits and miscellaneous fill associated with construction of earlier phases of the wastewater treatment facilities

20. Solid wastes, hazardous wastes, storage tanks

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

Construction activities will generate waste materials. The contractor, in accordance with applicable state and local rules and regulations, will dispose of these materials.

The plant generates solid, hazardous wastes as a part of routine operation. Some municipal solids waste generated by routine activities and the screenings and grit removed from the wastewater via preliminary treatment are disposed at a local municipal landfill. The sludge removed from the treated wastewater is thickened, dewatered and processed in a heat drying system to produce fertilizer pellets that are disposed by applying to farmland. Metals and paper are recycled. Since the facility is a very small quantity generator of hazardous waste, no hazardous waste minimization plan is required.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

During construction, equipment and vehicles utilizing gasoline, diesel fuel, antifreeze, and oil will be used at the Project site. Portable storage tanks of fuel may be temporarily located at the site during construction. The General Conditions of the construction contract require that work on the site be conducted to protect the environment according to all Federal, state and local laws and regulations.

The plant uses chlorine and sulfur dioxide gas during the period (April to October) that disinfection and dechlorination are required by the NPDES permit. The gasses are stored in one ton cylinders located inside a building on the plant site. The building's ventilation is connected to a leak detection system so that if there is a leak, the system is shut down and closed to prevent any release of the gas to the atmosphere. However, this does not prevent risk from chemical release during transportation or by human error or intent.

Part of the project is to replace these gasses with the liquid chemicals to reduce these types of safety and security risks.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

As discussed above, portable storage tanks of fuel may be temporarily located at the site during construction. See 20b above.

There are two above ground storage tanks that contain gasoline (1,000 gallon) and diesel fuel (10,000 gallon) that are located near the sludge loadout area at the plant. Both tanks are double wall and have leak detection systems.

There is one 12,000 gallon fiberglass double wall underground storage tank that is used to provide #2 fuel oil for the standby generator serving the sludge pelletizing facility. The tank has a leak detection system.

There are polymer, caustic and hypochlorite storage tanks located in the Thickening and Dewatering Building and Final Stabilization building. These tanks are surrounded by concrete curbs to contain spills, and pump spillage slowly into the treatment system.

There is a petroleum product and hazardous liquid storage area in the Maintenance Building that is designed for containment of spills.

The plant has an emergency response plan that complies with the Clean Air Act Risk Management Plan and OSHA EMERGENCY RESPONSE 1910.38 requirements for responding to emergencies with all chemicals and gasses used or generated in the waste treatment process.

The plan includes procedures for providing assistance and first aid to personnel, evacuation and/or accounting for all personnel on site, summoning assistance from appropriate departments and agencies and notification of authorities. The plan identifies the types of emergencies, including chemical release, fire, operational failure, natural or other disaster. The types of alarms that are used and appropriate response are identified. Lists of emergency contacts are provided.

The Blue Lake WWTP has numerous process tanks that contain sewage at various stages of treatment. These tanks include:

- Primary clarifiers
- Aeration tanks
- Final clarifiers
- Disinfection basins
- Gravity sludge thickeners
- Blending tank
- Septage receiving tank

Minn R. ch. 7151.1300, subp.2a, specifically exempts wastewater structures and tanks from regulation as above ground tanks, since they are already regulated under the NPDES program.

21. Traffic. Parking spaces added 0

The existing Maintenance Building parking area located on the east side of the building will be moved to the west side of the building due to the construction of a new aeration tank. However, no additional permanent parking spaces will be needed since the existing parking on site is more than adequate for the current number of plant operators. The few additional operators who will be needed for the improved facilities will be distributed over five working shifts in a week, and will not significantly increase the need for parking.

Existing spaces (if project involves expansion)

78

Estimated total average daily traffic generated 40

Estimated maximum peak hour traffic generated (if known) and time of occurrence 15 - 7-8 a.m.

A temporary increase in traffic will occur due to construction activities at the site. During the construction process, construction vehicles will be utilizing highways, county roads and local streets. Delivery of pipe, concrete, equipment and other materials will be restricted to major highways and county roads where possible. There will be some additional traffic due to construction workers entering the plant but it is not expected to be more than approximately 15 –20 vehicles per day, and will typically be less. This will be a temporary situation.

After completion, the few additional operators who will be needed for the improved facilities will be distributed over five working shifts in a week, and will not significantly increase the traffic to the site.

Provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system.

In the future, traffic in the service area of the Project will increase with increased urban development.

During the first phase of the project, residential, commercial, and other types of development will continue within the existing permitted plant capacity. The second and third phases of the project will increase the capacity of the plant to accommodate the need for growth in the service area.

As a result of increased development of these areas in the future, vehicular traffic in the service area will increase. Each of the contributory communities must prepare transportation plans that will allow them to plan for and mitigate the effects of the anticipated increase in traffic. It will be necessary for MnDOT, Hennepin, Scott, and Carver Counties and the cities to work together to provide appropriate roadway improvements and measures to mitigate traffic congestion.

22. **Vehicle-related air emissions.** Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult *EAW Guidelines* about whether a detailed air quality analysis is needed.

Vehicle emissions directly associated with the Project will not have a significant effect on air quality. However, residential and other development enabled by the construction of wastewater treatment capacity may result in measurable, but not likely significant impacts. If traffic increases due to the enabled development result locally in future deterioration in levels of service and/or air quality violations, mitigative measures are available. These measures include roadway improvements, signal installation, and provision of alternative transportation choices.

23. **Stationary source air emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

Emissions from the Blue Lake plant include boilers, the wastewater treatment plant process, pressure washer, make up air handling units, heat recovery units, chlorine storage, unit heaters, furnace, water heaters, biosolids processing systems (dust collector, pellet loadout, thermal oxidizer). Emissions from the heat drying train are controlled by an impingement tray, venturi scrubber and regenerative thermal oxidizer. The emission control devices meet particulate and volatile organic compound reduction requirements.

An existing 1,250 kW diesel powered standby generator is used to provide standby power to critical Blue Lake plant equipment and is used for peak shaving under an agreement with Xcel Energy.

Facilities that dry wastewater treatment sludge are included in the list of facilities subject to a NESHAP standard 61 40 CFR requirement for mercury. A registration permit has been issued to the facility to allow it to operate as an emission source. All emissions at the facility are well below the emission levels that require a major source permit.

New emission sources include the additional 1,250 kW diesel generator and gas from the digester flare.

The generator is proposed to operate in parallel with the existing 1,250 kW generator to provide power to essential treatment equipment in the event of a failure of the electrical supply system. If possible, this generator may be used for purposes other than emergency operations, i.e., additional peak shaving.

The anaerobic digesters will be used to reduce the volume and mass of waste solids processed by the dryer, and to generate methane gas that will offset energy requirements of operating the dryer. During times when the dryer is out of service, the digester gas must be flared.

The existing Registration Air Permit will likely need to be upgraded to a State Permit to include the effects of the additional generator and the digestion flares.

24. **Odors, noise and dust.** Will the project generate odors, noise or dust during construction or during operation? ☒ Yes ☐ No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

Varying degrees of noise due to construction equipment and normal construction activities can be expected during the construction period, but will be confined to the plant site. Mitigative measures would include standard mufflers on engine driven equipment and possible ear protection as necessary for workers engaged in periodic demolition or other short term noise intensive activities.

Generation of dust by equipment and machinery may be possible during dry periods. Dust may be controlled by daily cleanup of the construction site; water will be used to wet the soil and reduce airborne dust when necessary.

Odors may also be generated from construction equipment exhaust. Equipment will include trucks, backhoes, graders, compactors, bobcats, cranes, loaders, compressors, and de-watering pumps. The site is isolated enough from developed areas so that exhaust odors would not migrate off site.

Restricting the hours of operation to daylight hours will control noise and odor impacts from construction equipment, or those permitted by local ordinances.

The facilities constructed under this project will not increase dust and noise on or off site.

25. **Nearby resources.** Are any of the following resources on or in proximity to the site?

Archaeological, historical or architectural resources? ☒ Yes ☐ No

Prime or unique farmlands or land within an agricultural preserve? ☐ Yes ☒ No

Designated parks, recreation areas or trails? ☒ Yes ☐ No

Scenic views and vistas? ☐ Yes ☒ No

Other unique resources? ☐ Yes ☒ No

If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

The Minnesota State Historic Preservation Office has reviewed its inventory of databases and determined no historic properties. However, there are nine (9) occurrences of archaeological findings. Three occurrences are of earthwork type, one occurrence of single artifact and three occurrences of scattered artifacts.

See Figure 4 for map of occurrences and Attachment 3 for detailed inventory.

26. **Visual impacts.** Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☐ Yes ☒ No
If yes, explain.

Construction activities and vehicles will be visible from Hwy 101 to construct the tanks and building exteriors, otherwise, the project will not create any adverse visual impacts during or after construction.

27. **Compatibility with plans and land use regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☒ Yes ☐ No. If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

The area is zoned I-2, heavy industrial, and the project will not change the land usage. The project would be subject to compatibility with Scott County Water Planning and the comprehensive plans of the communities contributing to the plant. .

28. **Impact on infrastructure and public services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☒ Yes ☐ No. If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)

Although the Blue Lake WWTP facilities will not require additional infrastructure, the development planned for its service area will. As development of the area progresses, other utilities and infrastructure, such as roads, collector streets, collector sewers, potable water distribution systems, stormwater collection and treatment systems, schools, police, and fire protection, and other urban services will be needed to service the area. Each of the communities' comprehensive plans will ensure coordination of infrastructure for enabled development.

29. **Cumulative impacts.** Minnesota Rule part 4410.1700, subpart 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts *(or discuss each cumulative impact under appropriate item(s) elsewhere on this form)*

Future residential and commercial development of the service area has been considered in the planning of this Project. In Phases 2 -4, the plant will be modified to accommodate long-range wastewater flows as the area develops. Interceptor service will be provided in locations that best meet the long-term goals of the communities. The potential environmental impacts from future planned development will be mitigated through enforcement of local, state, and federal ordinances and regulations. Individual development projects may be subject to environmental review and the preparation of project specific EAWs or an Alternative Urban Areawide Review. Any sanitary sewer extensions will require a permit from the MPCA.

30. **Other potential environmental impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

None are known at this time.

31. **Summary of issues.** *Do not complete this section if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document, which must accompany the EAW.* List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

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

I hereby certify that:

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

Signature

Date

Title

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Administration Department. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-296-8253, or <http://www.eqb.state.mn.us>

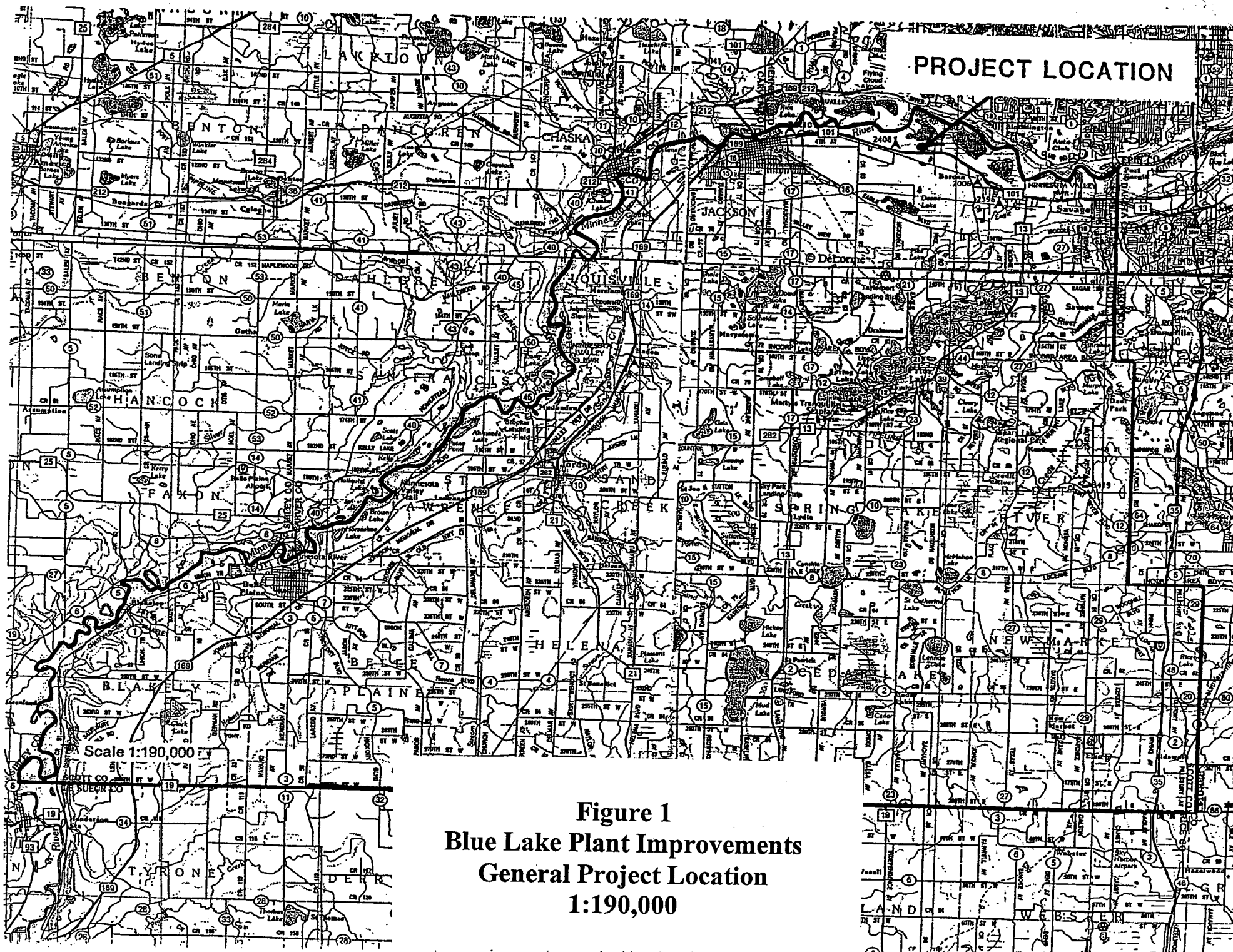
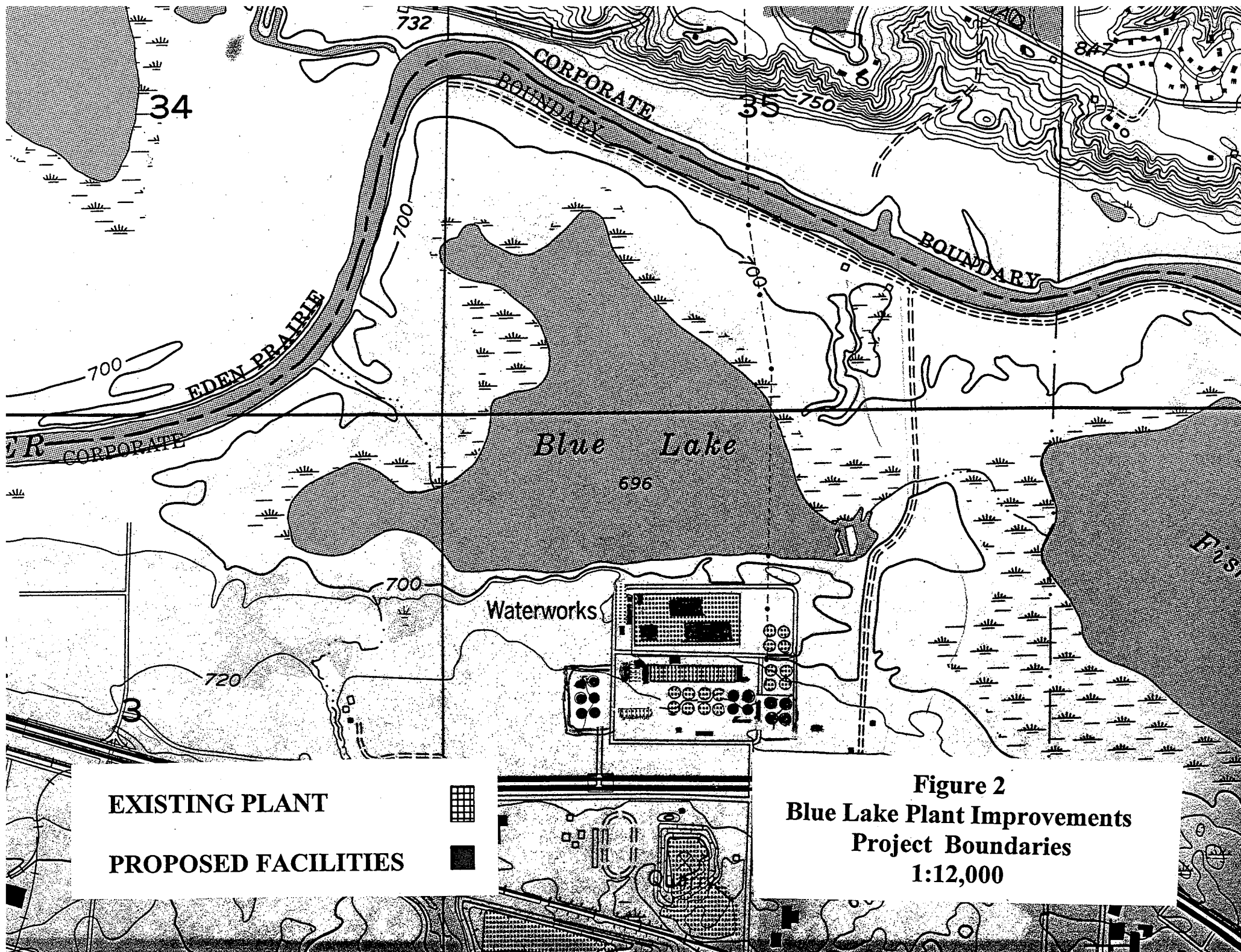
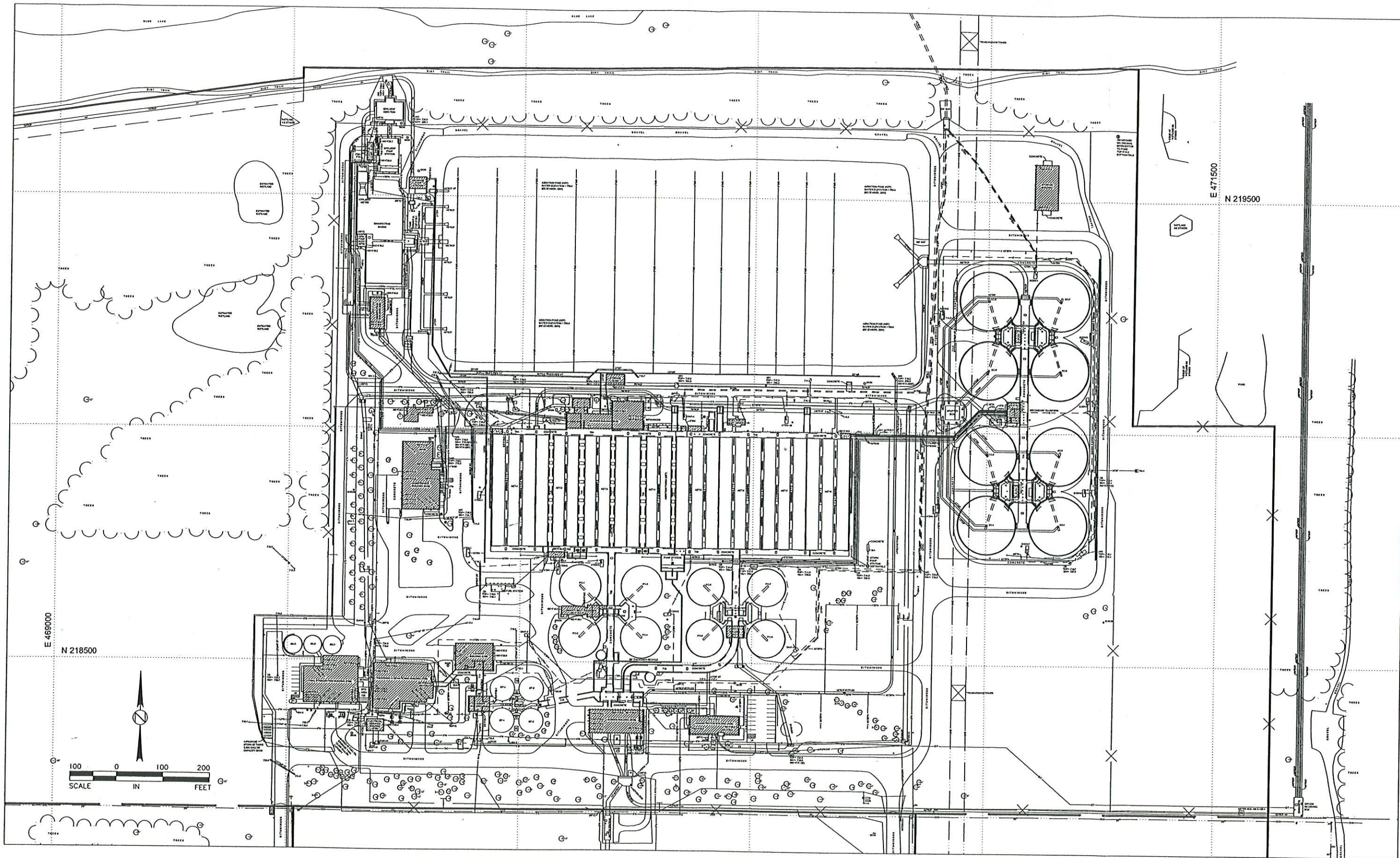


Figure 1
Blue Lake Plant Improvements
General Project Location
1:190,000



MODIFIED:



PLOTTED: September 29, 2005
BGENC20001A

NO.	DATE	BY	REVISIONS	REMARKS	NO.	DATE	BY	REVISIONS	REMARKS

DESIGNED	CHECKED
DRAWN	APPROVED
DATE	CONCL.
September 29, 2005	

I HEREBY CERTIFY THAT THIS SURVEY, PLAN, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE: _____

TYPE OR PRINTED NAME: MARK S HANSON

DATE: September 29, 2005 REG. NO. 15480

Sunde
Land Surveying, LLC.
9001 East Bloomington Freeway (35W) • Suite 118
Bloomington, Minnesota 55420-3435
Business: 952-881-2455 • FAX: 952-888-9526

APPROVED RECORD DRAWING

CONSULTING ENGR REP	DATE
MCS CONSTRUCTION DEPT REP	DATE
MCS ENGR DEPT REP	DATE

PROJECT NO.	801810
CONTRACT	04P113
FILE NAME	BSUPCXXEAS20.DWG

SHAKOPEE

BLUE LAKE WASTEWATER TREATMENT PLANT
UNIFIED PLANT SURVEY & RECORD DRAWING CONSOLIDATION
SITE UTILITY PLAN - EAST

SUP
C2

MINNESOTA

4 of 78

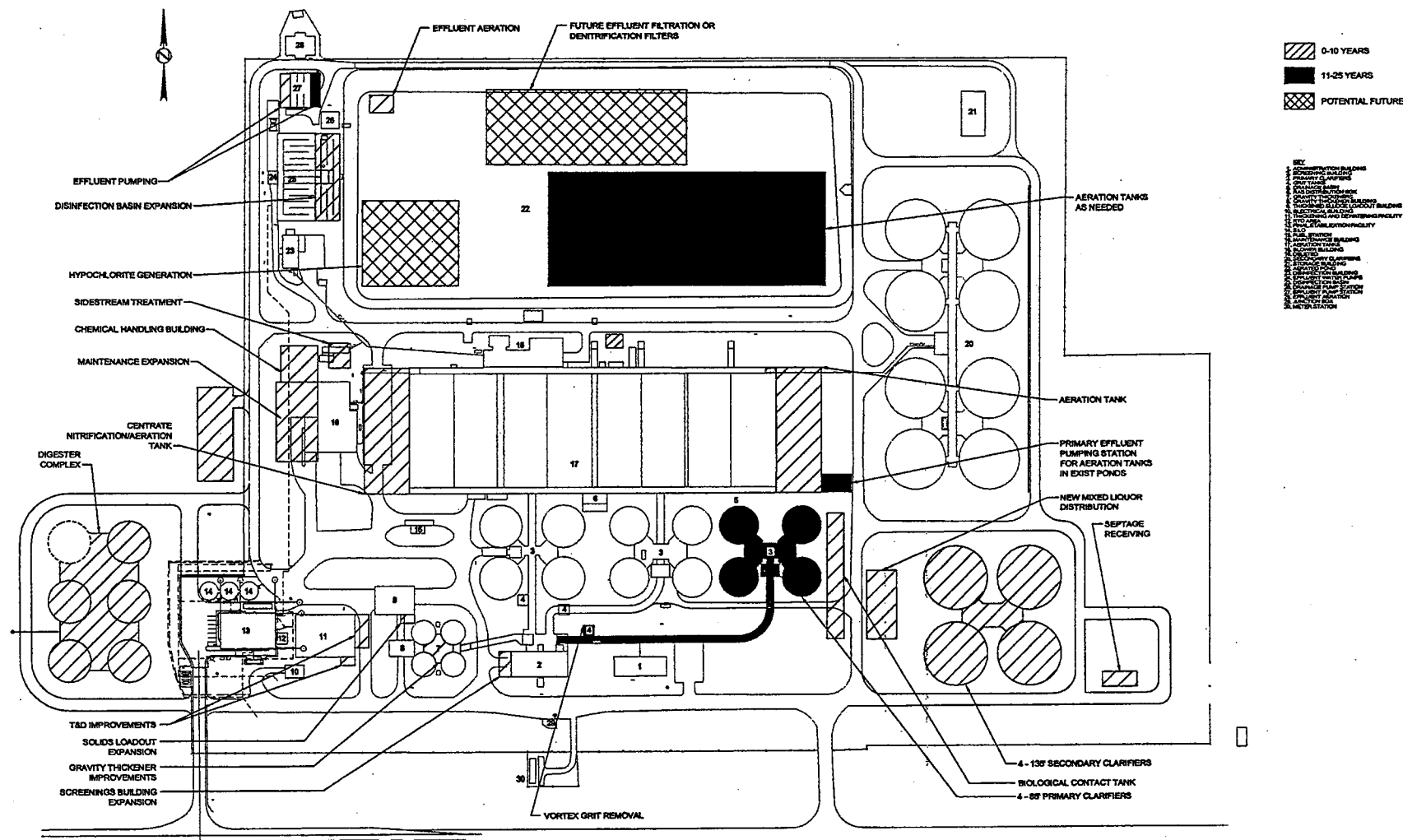


Figure ES-2. Blue Lake wastewater treatment plant facility facilities layout – Year 2030.

(Basis: Biological contact secondary treatment without centrate nitrification. Additional aeration tanks during Years 11 to 25 could vary from 0 to 6 depending on future investigations and analysis)



Minnesota Department of Natural Resources

Natural Heritage and Nongame Research Program, Box 25
500 Lafayette Road

St. Paul, Minnesota 55155-4000

Phone: (651) 296-7863 Fax: (651) 296-1811 E-mail: sarah.hoffmann@dnr.state.mn.us

October 3, 2005

Mr. Mike Prestine
Rani Engineering, Inc.
556 Rice Street
St. Paul, MN 55103

Re: Request for Natural Heritage information for vicinity of proposed Blue Lake Wastewater Treatment Plant Expansion, T115N R22W Section 2, Scott County
NHNRP Contact #: ERDB 20060250

Dear Mr. Prestine,

The Minnesota Natural Heritage database has been reviewed to determine if any rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the area indicated on the map enclosed with your information request. Based on this review, there are 19 known occurrences of rare species or native plant communities in the area searched (for details, see enclosed database printout and explanation of selected fields). However, based on the nature and location of the proposed project I do not believe it will affect any known occurrences of rare features.

The Natural Heritage database is maintained by the Natural Heritage and Nongame Research Program, a unit within the Division of Ecological Services, Department of Natural Resources. It is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and protection of these features.

Because our information is not based on a comprehensive inventory, there may be rare or otherwise significant natural features in the state that are not represented in the database. A county-by-county survey of rare natural features is now underway, and has been completed for Scott County. Our information about native plant communities is, therefore, quite thorough for that county. However, because survey work for rare plants and animals is less exhaustive, and because there has not been an on-site survey of all areas of the county, ecologically significant features for which we have no records may exist on the project area.

The enclosed results of the database search are provided in two formats: index and full record. To control the release of locational information, which might result in the damage or destruction of a rare element, both printout formats are copyrighted.

The index provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an Environmental Assessment Worksheet, municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index for any other purpose, please contact me to request written permission. **The full-record printout includes more detailed locational information, and is for your personal use only. If you wish to reprint the full-record printouts for any purpose, please contact me to request written permission.**

Please be aware that review by the Natural Heritage and Nongame Research Program focuses only on *rare natural features*. It does not constitute review or approval by the Department of Natural Resources as a whole. If you require further information on the environmental review process for other natural resource-related issues, you may contact your Regional Environmental Assessment Ecologist, Wayne Barstad, at (651) 772-7940.

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resource-related issues, you may contact your Regional Environmental Assessment Ecologist, Wayne Barstad, at (651) 772-7940.

An invoice in the amount of \$124.93 will be mailed to you under separate cover within two weeks of the date of this letter. You are being billed for map and database search and staff scientist review. Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

A handwritten signature in cursive script, reading "Sarah Hoffmann". The signature is written in dark ink and is positioned above the printed name and title.

Sarah D. Hoffmann

Endangered Species Environmental Review Coordinator

encl: Database search results
Rare Feature Database Print-Outs: An Explanation of Fields

TWP R1G PRIMARY SECTION MN STATUS S RANK ELEMENT and OCCURRENCE NUMBER

T115N R22W 01						COLONIAL WATERBIRD NESTING SITE #250	MINNESOTA VALLEY NWR
T115N R22W 01						COLONIAL WATERBIRD NESTING SITE #561	MINNESOTA VALLEY NWR
T115N R22W 01				SPC		STERNA FORSTERI (FORSTER'S TERN) #32	MINNESOTA VALLEY NWR
T115N R22W 03		LT		SPC		HALIAETUS LEUCOCEPHALUS (BALD EAGLE) #1683	MINNESOTA VALLEY NWR
T115N R22W 11					S1	DRY PRAIRIE (SOUTHEAST) BARRENS SUBTYPE #12	MINNESOTA VALLEY NWR
T115N R22W 11				SPC		ONOTHERA RHOMBIFOLIA (RHOMBIC-RETAILED EVENING PRIMROSE) #19	
T115N R22W 11				SPC		PEROGNATHUS FLAVESCENS (PLAINS POCKET MOUSE) #21	
T115N R22W 11				SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #99	
T115N R22W 12				SPC		SPEYERIA IDALIA (REGAL FRITILLARY) #40	
T116N R22W 34						COLONIAL WATERBIRD NESTING SITE #52	
T116N R22W 34					S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #111	MINNESOTA VALLEY NWR
T116N R22W 34		LT		SPC		MUSSEL SAMPLING SITE #137	MINNESOTA VALLEY NWR
T116N R22W 34						HALIAETUS LEUCOCEPHALUS (BALD EAGLE) #1442	
T116N R22W 34				SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #102	
T116N R22W 34				NON		REITHRODONTOMYS MEGALOTIS (WESTERN HARVEST MOUSE) #2	
T116N R22W 35						COLONIAL WATERBIRD NESTING SITE #846	
T116N R22W 35					S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #88	MINNESOTA VALLEY NWR
T116N R22W 35				SPC		STERNA FORSTERI (FORSTER'S TERN) #34	MINNESOTA VALLEY NWR
T116N R22W 36					S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #115	

T115N R22W 01 SCOTT COUNTY, MN
Element: COLONIAL WATERBIRD NESTING SITE #250

EO Size: EO Rank:
Site: WILKIE & RICE LAKE UNITS
Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
Managed Area(s): MINNESOTA VALLEY NWR
Source: HIRSCH, K. & GILLETTE, L.
FISHER LAKE, FORSTER'S TERN
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 1983
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 48' 0" Long: 93 24' 34"
Precision: within 0.25 mile, confirmed
Verification: verified
DNR Region: 6
Wildlife Area: 605
Forestry District: 613

T115N R22W 5W01 SCOTT COUNTY, MN
Element: COLONIAL WATERBIRD NESTING SITE #561

EO Size: EO Rank:
Site: WILKIE & RICE LAKE UNITS
Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
Managed Area(s): MINNESOTA VALLEY NWR
Source: PARKIN, D.
J. W. WILKIE PARK, GREEN HERON
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 1982
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 47' 35" Long: 93 24' 42"
Precision: within 0.25 mile, confirmed
Verification: verified
DNR Region: 6
Wildlife Area: 605
Forestry District: 613

T115N R22W 5W01 SCOTT COUNTY, MN
Element: STERNA FORSTERI (FORSTER'S TERN) #32
State Status: SPECIAL CONCERN

EO Size: EO Rank:
Site: MINNESOTA VALLEY NWR
Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
Managed Area(s): MINNESOTA VALLEY NWR
Source: HIRSCH, K. & GILLETTE, L.
POSITIVE NESTING, FISHER LAKE, OTCN-250.
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 1983
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 47' 57" Long: 93 24' 36"
Precision: within 0.25 mile, confirmed
Verification: verified
DNR Region: 6
Wildlife Area: 605
Forestry District: 613

T115N R22W 5W03 SCOTT COUNTY, MN
Element: HALIAETUS LEUCOEPHALUS (BALD EAGLE) #1683
State Status: SPECIAL CONCERN
Federal Status: THREATENED

EO Size: EO Rank:
Site: WILKIE & RICE LAKE UNITS
Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
Managed Area(s): MINNESOTA VALLEY NWR
Source: GALLI, J. (DNR)
NESTING AREA, BLUE LAKE.
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 2003
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 48' 12" Long: 93 26' 42"
Precision: within 0.25 mile, confirmed
Verification: verified
DNR Region: 6
Wildlife Area: 605
Forestry District: 613

15:00 Wednesday, SEPTEMBER 28, 2005
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BLUE LAKE WASTEWATER TREATMENT PLANT
 T115N R22W SECTION 2, SCOTT COUNTY
 MNDNR, Natural Heritage and Nongame Research Program

Last Observed Date: 01 December 1997 DNR Region: 6
 Wildlife Area: 605
 Forestry District: 613
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 55" Long: 93 25' 50"
 Precision: approx. boundaries have been determined

Voucher: Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

Last Observed Date: 15 August 1995 DNR Region: 6
 Wildlife Area: 605
 Forestry District: 613
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 43" Long: 93 25' 37"
 Precision: within 0.25 mile, confirmed

Voucher: MIN Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

*** SITE THREATENED ***
 Last Observed Date: 24 July 1997 DNR Region: 6
 Wildlife Area: 605
 Forestry District: 613
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 45" Long: 93 25' 40"
 Precision: within 0.25 mile, confirmed

Voucher: JFEM Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

Last Observed Date: 18 October 1997 DNR Region: 6
 Wildlife Area: 605
 Forestry District: 613
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 58" Long: 93 26' 17"
 Precision: within 0.25 mile, confirmed

Voucher: Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

Voucher: Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

Voucher: Verification: verified
 STIPA SP., PANICUM WIL. GOOD DIVERSITY OF TYPICAL
 SPP INCL PETALOSTEMON VILL., FROELICHIA, PASPALUM, OENOTHERA RHOMB., LONG HST OF GRAZING HAS PROMOTED WEEDS: POA COMP, AGROPYRON REPENS, BROMUS INER, DIGITARIA.
 IN LRG OPENINGS AMONG OAK WOODLAND PATCHES. LOCATED N OF BYPASS, AROUND NSP, IN NESW11 AND IN SE11. SHOULD RECOVER WELL W/FIRE. THREATENED BY DEVELOPMENT.

T116N R22W 12 SCOTT COUNTY, MN
 Element: SPEYERIA IDALIA (REGAL FRITILLARY) #40
 State Status: SPECIAL CONCERN
 EO Size: EO Rank: Current Status: Intended Status:
 Site: BARDEN DUNES
 Ownership: Owner unknown
 Managed Area(s): not managed or no record
 Source: TAYLOR, OR., JR. (R. HUBER, DATA LOG)
 COLLECTION RECORDED IN R. HUBER'S DATA LOG; LOCATION OF SPECIMEN UNKNOWN. SITE LISTED AS BARDEN DUNES. HABITAT NOT DESCRIBED.
 Last Observed Date: 09 September 1965
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 47" Long: 93 24' 48"
 Precision: within one mile
 Voucher: Verification: verified

T116N R22W 34 SCOTT COUNTY, MN
 Element: COLONIAL WATERBIRD NESTING SITE #52
 EO Size: EO Rank: Current Status: Intended Status:
 Site: WILKIE & RICE LAKE UNITS
 Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
 Managed Area(s): MINNESOTA VALLEY NWR
 Source: DNR NONGAME
 BLUE LAKE. GREAT BLUE HERON GREAT EGRET BLACK-CROWNED NIGHT HERON DOUBLE-CRESTED CORMORANT
 Last Observed Date: 1980
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 48' 20" Long: 93 26' 25"
 Precision: within 0.25 mile, confirmed
 Voucher: Verification: verified

T116N R22W 6S28NNE34 HENNEPIN COUNTY, MN
 Element: DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #111
 S Rank: S2
 EO Size: EO Rank: C Current Status: Intended Status:
 Site: FLYING CLOUD PRAIRIE
 Ownership: Private
 Managed Area(s): not managed or no record
 Source: HARRIS, F. (CO BIOL SURVEY 1996)
 2 MILE STRETCH OF STEEP, S-FACING SLOPES ON OUTWASH. COMMON DOM S INCL BOUTELOUA C, SCHIZACHYRIUM, STIPA S. DRY SPURS DOM BY SPOROBOLIS C, CALAMOVILFA, BOUTELOUA
 H. FAIR SPP DIVERSITY. HEAVY INFESTATIONS OF EUPHORBIA E. POA PRAT, POA COMP, & BROMUS IN MUCH OF AREA. GRAZED IN PAST. DRIEST PARTS IN BEST SHAPE. SCATTERED
 LARGE JUNIPERUS VIRG. ON EXCESSIVELY-DRAINED SANDY SOILS (SALIDA, HUBBARD) ON N SIDE MINN RIVER VALLEY. ONE OF LARGEST PRAIRIE REMNANTS LEFT IN METRO AREA.
 Last Observed Date: 06 August 1996
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 49' 2" Long: 93 26' 52"
 Precision: approx. boundaries have been determined
 Voucher: Verification: verified

T116N R22W SESE34 SCOTT COUNTY, MN
 Element: HALIAEETUS LEUCOCEPHALUS (BALD EAGLE) #1442
 State Status: SPECIAL CONCERN
 EO Size: EO Rank: Current Status: Intended Status:
 Site: WILKIE & RICE LAKE UNITS
 Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
 Managed Area(s): MINNESOTA VALLEY NWR
 Source: STEPANSKI, M. (MN VALLEY REFUGE)
 NESTING AREA. BLUE LAKE.
 Last Observed Date: 1998
 Quad Map: EDEN PRAIRIE (S16C)
 Latitude: 44 46' 20" Long: 93 26' 25"
 Precision: within 0.25 mile, confirmed
 Voucher: SC 001 Verification: verified

T116N R22W SEMWSE34 SCOTT COUNTY, MN
Element: MUSSEL SAMPLING SITE #137

EO Size: EO Rank:
Site: DNR RIVER MILE 19.5 SITE 53
Ownership: Owner unknown
Managed Area(s): not managed or no record
Source: BRIGHT, B. (MUSSEL SURVEY OF MINNESOTA RIVER)
ACCESS IS OFF MN RIVER VALLEY REFUGE SERVICE RD, APPROX 180 M DOWNSTREAM FROM BLUE LAKE INLET. TIMED SEARCH: NO MUSSELS FOUND. GRID SEARCH: DEAD SPECIES;
LEPTODEA FRAGILIS.
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 23 August 1989
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 48' 23" Long: 93 26' 34"
Precision: within 0.25 mile, confirmed
DNR Region: 6
Wildlife Area: 605
Forestry District: 613
Voucher: Verification:
Voucher: NO MUSSELS FOUND. GRID SEARCH: DEAD SPECIES;

T116N R22W NWNW34 HENNEPIN COUNTY, MN
Element: PITIOPHIS CATENIFER (GOPHER SNAKE) #102
State Status: SPECIAL CONCERN

EO Size: EO Rank:
Site: FLYING CLOUD PRAIRIE
Ownership: Owner unknown
Managed Area(s): not managed or no record
Source: HALL, C., J. LECLERE, J. CORDESS, B. HOPE, AND G. NORDQUIST (OO BIOL SURVEY 1997)
2 SHED SNAKE SKINS WERE FOUND IN GRASSLAND. SKINS HAD INITIALLY BEEN LOCATED BY BRETT HOPE IN FALL 1996. SKINS ROUGHLY MEASURED 1360 MM AND 2240 MM TEL.
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 09 May 1997
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 49' 7" Long: 93 27' 24"
Precision: within 0.25 mile, confirmed
DNR Region: 6
Wildlife Area: 610
Forestry District: 613
Voucher: Verification: sight or sound rec.

T116N R22W NW34 HENNEPIN COUNTY, MN
Element: REITHRODONTOMYS MEGALOTIS (WESTERN HARVEST MOUSE) #2
State Status: No Legal Status

EO Size: EO Rank:
Site: FLYING CLOUD PRAIRIE
Ownership: Owner unknown
Managed Area(s): not managed or no record
Source: MN RIVER VALLEY WILDLIFE INVENTORY (136); CLAUSON, B., JATNIEKS, S.
WESTERN HARVEST MOUSE. 9 PREV COLL(134-135, 198-202, 212-214, JFBM 14052-14053, 14055-14061). DRY PRAIRIE, STEEP DRY SLOPE ON HILLSIDE.
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: September 1979
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 49' 6" Long: 93 27' 25"
Precision: within 0.25 mile, confirmed
DNR Region: 6
Wildlife Area: 610
Forestry District: 613
Voucher: Verification: verified

T116N R22W SEMW35 SCOTT COUNTY, MN
Element: COLONIAL WATERBIRD NESTING SITE #846

EO Size: EO Rank:
Site: WILKIE & RICE LAKE UNITS
Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)
Managed Area(s): MINNESOTA VALLEY NWR
Source: USFWS
BLUE LAKE, FORSTER'S TERN
Current Status: Intended Status:
CBS Site #: 5
Last Observed Date: 1991
Quad Map: EDEN PRAIRIE (S16C)
Latitude: 44 48' 18" Long: 93 26' 1"
Precision: within 0.25 mile, confirmed
DNR Region: 6
Wildlife Area: 505
Forestry District: 613
Voucher: Verification: verified

Minnesota Natural Heritage Database

Element Occurrence Records

BLUE LAKE WASTEWATER TREATMENT PLANT

T116N R22W SECTION 2, SCOTT COUNTY

MNDNR, Natural Heritage and Nongame Research Program

15:00 Wednesday, SEPTEMBER 28, 2005

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T116N R22W SWNE35 HENNEPIN COUNTY, MN

Element: DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #68

S Rank: S2

EO Size: 8 acres approx. EO Rank: BC Current Status: 0 Intended Status: 2

Site: PURGATORY CREEK CBS Site #: 4

Ownership: Owner unknown

Managed Area(s): not managed or no record

Source: CUSHING, E. (1971); HARRIS, F. (CO BIOL SURVEY 1996)

1971: DRY MESIC PRAIRIE COVER CLASS ON S FACING BLUFF ABOVE MN R. ONE OF FINEST PRAIRIE REMNANTS IN COUNTY VARIES FROM TALL TO SHORT GRASS TYPES. 1996: MOSTLY DOM BY BUTELOUA C, SCHIZACH, STIPA SPART. DRIEST SPOTS DOM BY CALAMOVILFA & BUTELOUA H. DRY-MESIC DMSLOPE. LOW SPP DIVERS INCL: SPOBOBOLIS H, PSORALEA ES, KOELARIA, ASTER SER. RANGES FROM BC-CD QUAL. HEAVY INFEST EUPHORBIA ES, POA PRAT POA COMP. SCATT JUNIPERUS VIRG. HOUSES ON EDGE. ON STEEP S SLOPES ON OUTWASH.

Last Observed Date: 06 August 1996

DNR Region: 6

Wildlife Area: 610

Forestry District: 613

Quad Map: EDEN PRAIRIE (S16C)

Latitude: 44 48' 43" Long: 93 25' 37"

Precision: approx. boundaries have been determined

Voucher: Verification: verified

T116N R22W SESW35 SCOTT COUNTY, MN

Element: STERNA FORSTERI (FORSTER'S TERN) #34

State Status: SPECIAL CONCERN

EO Size: EO Rank: Current Status: Intended Status:

Site: JAMES W. WILKIE UNIT

Ownership: U.S. Fish and Wildlife Service (National Wildlife Refuge)

Managed Area(s): MINNESOTA VALLEY NWR

Source: USFWS

POSITIVE NESTING. BLUE LAKE. OTCN-846.

Last Observed Date: 1991

DNR Region: 6

Wildlife Area: 605

Forestry District: 613

Quad Map: EDEN PRAIRIE (S16C)

Latitude: 44 48' 18" Long: 93 26' 1"

Precision: within 0.25 mile, confirmed

Voucher: Verification: verified

T116N R22W 36 HENNEPIN COUNTY, MN

Element: DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #315

S Rank: S2

EO Size: EO Rank: C Current Status: Intended Status:

Site: PURGATORY CREEK CBS Site #: 4

Ownership: Private

Managed Area(s): not managed or no record

Source: HARRIS, F. (CO BIOL SURVEY 1996)

SMALL AREAS ON UPPER PARTS OF SW SLOPES ON E SIDE OF VALLEY. RANGE FROM C TO D QUALITY. DOM MOSTLY BY BUTELOUA C, SCHIZACHYRIUM, STIPA S & EXOTICS. DRY SPOTS W/BUTELOUA H & SPOBOBOLIS CRYP. LOW SPP DIVERSITY, INCL KOELERIA, LIATRIS PUN, PETALOSTEMUM P, CALAMOVILFA, PENSTEMON. HEAVY INFESTATIONS OF EUPHORBIA E, POA PRAT, POA COMP, CORONILLA. DENSE HOUSING ON EDGE OF VALLEY. ON OUTWASH VALLEY OUTWASH GEOMORPHIC AREA.

Last Observed Date: 06 August 1996

DNR Region: 6

Wildlife Area: 610

Forestry District: 613

Quad Map: EDEN PRAIRIE (S16C)

Latitude: 44 48' 56" Long: 93 24' 42"

Precision: approx. boundaries have been determined

Voucher: Verification: verified

Rare Features Database Print-outs: An Explanation of Fields

The Rare Features database is part of the Natural Heritage Information System, and is maintained by the Natural Heritage and Nongame Research Program, a unit within the Division of Ecological Services, Minnesota Department of Natural Resources (DNR).

Please note that the print-outs are copyrighted and may not be reproduced without permission

Field Name: [Full (non-abbreviated) field name, if different]. Further explanation of field.

-C-

CBS Site: [County Biological Survey site number]. In each county, the numbering system begins with 1.

CLASS: A code which classifies features by broad taxonomic group: NC = natural community; SA = special animal; SP = special plant; GP = geologic process; GT = geologic time; OT = other (e.g. colonial waterbird colonies, bat hibernacula).

Cty: [County]. Minnesota counties (ordered alphabetically) are numbered from 1 (Aitkin) to 87 (Yellow Medicine).

CURRENT STATUS: Present protection status, from 0 (owner is not aware of record) to 9 (dedicated as a Scientific and Natural Area).

-D-

DNR Region: 1=NW, 2=NE, 3=E Central, 4=SW, 5=SE, 6= Minneapolis/St. Paul Metro.

DNR Quad: [DNR Quadrangle code]. DNR-assigned code of the U.S. Geologic Survey topographic map on which the rare feature occurs.

-E-

ELEMENT or Element: See AElement Name (Common Name)@

Element Name (Common Name): The name of the rare feature. For plant and animal species records, this field holds the scientific name, followed by the common name in parentheses; for all other elements (such as plant communities, which have no scientific name) it is solely the element name.

EO RANK: [Element Occurrence Rank]. An evaluation of the quality and condition of natural communities from A (highest) to D (lowest).

EO Size: [Element Occurrence Size]. The size in acres (often estimated) of natural communities.

-F-

FED STATUS: [Federal Status]. Status of species under the Federal Endangered Species Law: LE=endangered, LT=threatened, C=species which have been proposed for federal listing.

Federal Status: See AFED STATUS@

Forestry District: The Minnesota DNR's Division of Forestry district number.

-G-

GLOBAL RANK: The abundance of an element globally, from G1 (critically imperiled due to extreme rarity on a world-wide basis) to G5 (demonstrably secure, though perhaps rare in parts of its range). Global ranks are determined by the Conservation Science Division of The Nature Conservancy.

-I-

INTENDED STATUS: Desired protection status. See also ACURRENT STATUS@. If a complete list of protection status codes is needed, please contact the Natural Heritage Program.

-L-

LAST OBSERVED or Last Observed Date or Last Observation: Date of the most recent record of the element at the location.

Latitude: The location at which the occurrence is mapped on Natural Heritage Program maps. NOTE: There are various levels of precision in the original information, but this is not reflected in the latitude/longitude data. For some of the data, particularly historical records, it was not possible to determine exactly where the original observation was made (e.g. "Fort Snelling", or "the south shore of Lake Owasso"). Thus the latitude/longitude reflect the mapped location, and not necessarily the observation location.

Legal: Township, range and section numbers.

Long: [Longitude]. See NOTE under ALatitude@

-M-

MANAGED AREA or Managed Area(s): Name of the federally, state, locally, or privately managed park, forest, preserve, etc., containing the occurrence, if any. If this field is blank, the element probably occurs on private land. If "(STATUTORY BOUNDARY)" occurs after the name of a managed area, the location may be a private inholding within the statutory boundary of a state forest or park.

Map Sym: [Map Symbol].

MN STATUS: [Minnesota Status]. Legal status of plant and animal species under the Minnesota endangered species law:

END=endangered, THR=threatened, SPC=special concern, NON=no legal status, but tracked. This field is blank for natural communities and colonial waterbird nesting sites, which have no legal status in Minnesota, but are tracked by the database.

-N-

NC Rank: [Natural Community Rank].

-O-

Occ #: [Occurrence Number]. The occurrence number, in combination with the element name, uniquely identifies each record.

OCCURRENCE NUMBER: See AOcc #@

OF OCCURS: The number of records existent in the database for each element within the area searched.

Ownership: Indicates whether the site is publicly or privately owned; for publicly owned land, the agency with management responsibility is listed.

-P-

Precision: Precision of locational information of occurrence: C (confirmed) = known within 1/4 mile radius, U (unconfirmed) = known within 1/2 mile, N (non-specific) = known within 1 mile, G (general) = occurs within the general region, X (unmappable)=location is unmappable on USGS topographic quadrangles (often known only to the nearest county), O (obscure/gone)=element no longer exists at the location.

PS: [Primary Section]. The section containing all or the greatest part of the occurrence.

-Q-

Quad Map: See ADNR Quad@

-R-

Rec #: [Record number].

RNG or Rng: [Range number].

-S-

SECTION or Section: [Section number(s)]. Some records are given only to the nearest section (s), but most are given to the nearest quarter-section or quarter-quarter-section (e.g., SWNW32 denotes the SW1/4 of the NW1/4 of section 32). A "0" is used as a place holder when a half-section is specified (e.g., ON03 refers to the north 1/2 of section 3). When an occurrence crosses section boundaries, both sections are listed, without punctuation (e.g., the NE1/4 of section 19 and NW 1/4 of section 20 is displayed as ANE19NW20").

Site: A name which refers to the geographic area within which the occurrence lies. If no name for the area exists (a locally used name, for example), one is assigned by the County Biological Survey or the Natural Heritage Program.

Source: The collector or observer of the rare feature occurrence.

S RANK: [State Rank]. A rank assigned to the natural community type which reflects the known extent and condition of that community in Minnesota. Ranks range from 1 (in greatest need of conservation action in the state) to 5 (secure under present conditions). A "?" following a rank indicates little information is available to rank the community. Communities for which information is especially scarce are given a "U", for Arank undetermined@. The ranks do not represent a legal status. They are used by the Minnesota Department of Natural Resources to set priorities for research, inventory and conservation planning. The state ranks are updated as inventory information becomes available.

State Status: See AMN STATUS@

-T-

TWP or Twp: [Township number].

-V-

Verification: A reflection of the reliability of the information on which the record is based. The highest level of reliability is "verified," which usually indicates a collection was made or, in the case of bird records, nesting was observed. Plant records based on collections made before 1970 are unverified.

Voucher: The museum or herbarium where specimens are maintained, and the accession number assigned by the repository. In the case of bald eagles, this is the breeding area number.

-W-

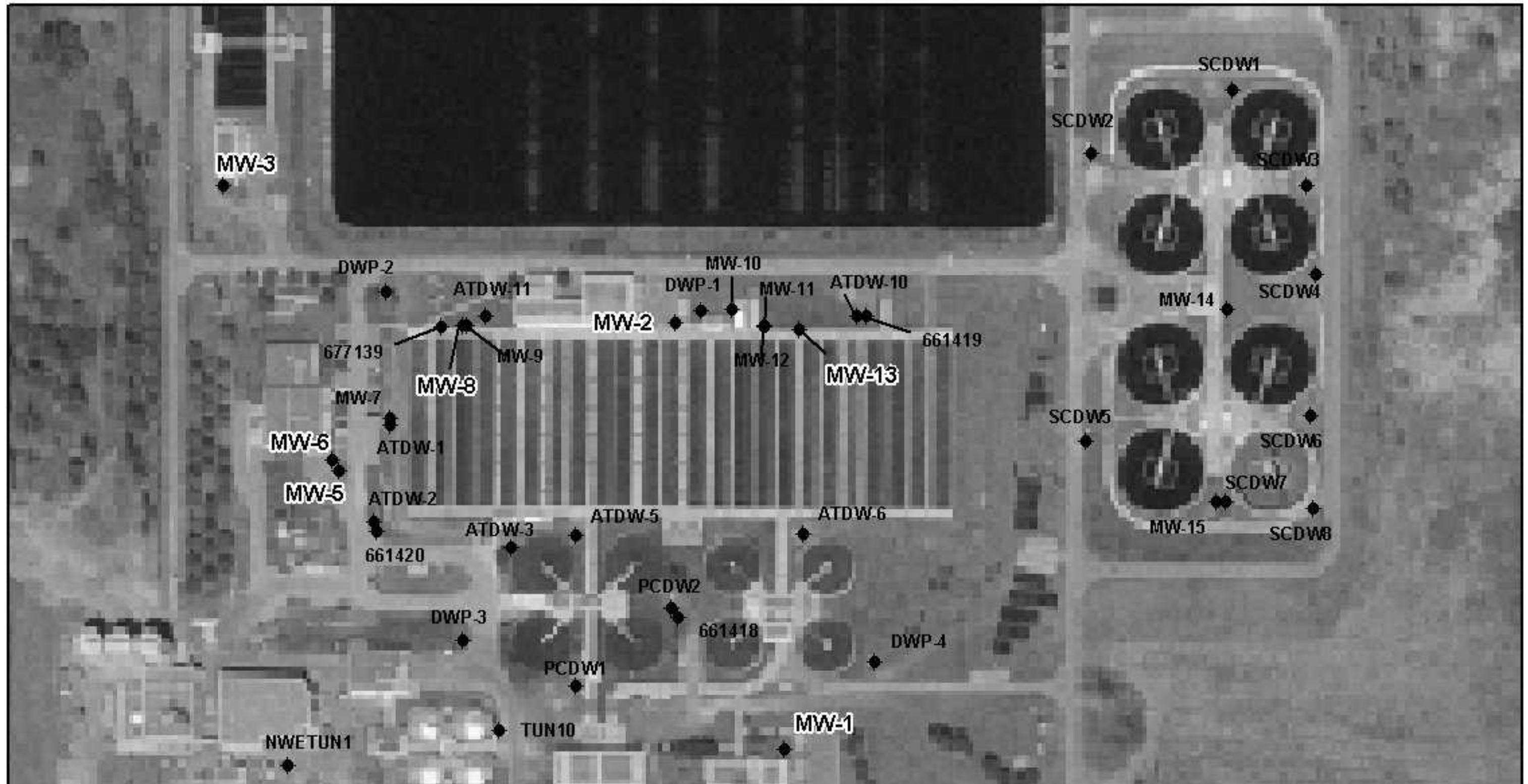
Wildlife Area: The Minnesota DNR=s Division of Wildlife administrative number.

Data Security

Locations of some rare features must be treated as sensitive information because widespread knowledge of these locations could result in harm to the rare features. For example, wildflowers such as orchids and economically valuable plants such as ginseng are vulnerable to exploitation by collectors; other species, such as bald eagles, are sensitive to disturbance by observers. For this reason, we prefer that publications not identify the precise locations of vulnerable species. We suggest describing the location only to the nearest section. If this is not acceptable for your purposes, please call and discuss this issue with the Environmental Review Specialist for the Natural Heritage and Nongame Research Program at 651/296-7863.

Figure 3

Blue Lake Wastewater Treatment Plant Wells



Legend

◆ BLWWTP Wells

0 50 100 200 300 400 500 600 Feet



Notes: The wells to sample are highlighted
The shallower of MW-5 and MW-6 should be sampled

Attachment 2 Blue Lake WWTP Well Inventory

Well Number	Unique Well Number	Current Use	Proposed Use	Flow Rate Gpm
MW1	443368	Monitoring	Monitoring	N/A
MW2	443496	Monitoring	Monitoring	N/A
MW3	443497	Monitoring	Monitoring	N/A
MW-5		Monitoring	Monitoring	N/A
MW-6		Monitoring	Monitoring	N/A
MW-7	659429	Monitoring	Monitoring	N/A
MW-8	659427	Monitoring	Monitoring	N/A
MW-9	659428	Monitoring	Monitoring	N/A
MW-10		Monitoring	Monitoring	N/A
MW-11	659426	Monitoring	Monitoring	N/A
MW-12	659425	Monitoring	Monitoring	N/A
MW-13	677138	Monitoring	Monitoring	N/A
MW-14	659424	Monitoring	Monitoring	N/A
MW-15	661421	Monitoring	Monitoring	N/A
Wenck test	677139	Monitoring	Monitoring	N/A
2001 emergency	661418	Monitoring	Monitoring	N/A
2001 emergency	661419	Monitoring	Monitoring	N/A
2001 emergency	661420	Monitoring	Monitoring	N/A
DW1	420993	Dewatering	Dewatering	1,090
DW2	420994	Dewatering	Dewatering	1,100
DW3	420995	Dewatering	Dewatering	490
DW4	420996	Dewatering	Dewatering	1,650
DW5		Abandoned	Abandoned	N/A
SCDW1	642021	Not in use	**	1,790
SCDW2	642022	Not in use	**	1,200
SCDW3	642023	Not in use	**	2,690
SCDW4	642024	Not in use	**	1,980
SCDW5	642025	Not in use	**	620
SCDW6	642026	Not in use	**	1,170
SCDW7	642027	Not in use	**	1,560
SCDW8	642032	Not in use	**	1,740
PCDW1	642033	Not in use	**	1570
PCDW2	642034	Not in use*	Abandon	N/A
ATDW1	633111	Dewatering	Dewat– new disch. piping & pump	2,200
ATDW2	642028	Not in use*	Abandon	1,610
ATDW3	642029	Not in use	**	670
ATDW5	642030	Not in use	**	710
ATDW6	642031	Not in use	**	640
ATDW10		Not in use*	Abandon	N/A
ATDW11	642020	Not in use*	Abandon	N/A
TUN10	642035	Not in use	**	1,340
NEWTUN	642036	Not in use	**	1,720

* No longer connected to discharge piping and controls

** Up to 6 of 14 wells currently “Not in use” but connected to controls and discharge piping will be deepened; remaining wells will be abandoned

Table 8
Monitoring Well Completion Information

Well Number	Unique Well Number	Date Installed	Surface Elevation	Top of Riser Elevation	Bottom of Well (Elevation)	Screen Interval (Elev. - Elev.)
MW1	443368	1/13/89	724	726	675	675-695
MW2	443496	1/13/89	718.2	720.4	670	670-690
MW3	443497	1/19/89	718.0	720.5	670	670-690
MW-5			721.1	723.1	721.1	
MW-6			721.34	723.34	721.34	
MW-7	659429	04/20/01	718.64	720.64	593.64	694-598
MW-8	659427	04/17/01	717.94	719.94	695.94	696-706
MW-9	659428	04/17/01	718.11	720.11	676.11	676-686
MW-10			718.84	720.84	718.84	
MW-11	659426	04/17/01	718.74	720.74	675.74	676-686
MW-12	659425	04/17/01	718.62	720.62	695.62	696-706
MW-13	677138	05/08/02	718.63	720.63	697.63	698-708
MW-14	659424	04/17/01	712.91	714.91	692.91	693-703
MW-15	661421	05/07/01	711.78	713.78	591.78	592-688
	677139	05/09/02	718.48	720.48	697.48	697-707
	661418	05/06/01	718.17	720.17	598.17	698-708
	661419	05/06/01	718.56	720.56	598.56	599-695
	661420	05/07/01	720.44	722.44	600.44	600-702

Notes: (location and elevation of benchmark)

Susan Rani

From: "Cinadr, Thomas" <thomas.cinadr@mnhs.org>
To: "Susan Rani" <Srani@rani.com>
Sent: Friday, September 23, 2005 10:19 AM
Attach: Archaeology.doc
Subject: RE: Request for SHPO Data - Metropolitan Council Blue Lake WWTP Improvement - Shakopee, MN

No historic properties were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested. A report containing the archaeological sites identified is attached.

The result of this database search provides a listing of recorded archaeological sites and historic architectural properties that are included in the current SHPO databases. Because the majority of archaeological sites in the state and many historic architectural properties have not been recorded, important sites or structures may exist within the search area and may be affected by development projects within that area. Additional research, including field survey, may be necessary to adequately assess the area's potential to contain historic properties.

With regard to Environmental Assessment Worksheets (EAW), a negative known site/structure response from the SHPO databases is not necessarily appropriate information on which to base a "No" response to EAW Question 25a. It is the Responsible Governmental Unit's (RGU) obligation to verify the accuracy of the information contained within the EAW. A "No" response to Question 25a without written justification should be carefully considered.

If you require a comprehensive assessment of a project's potential to impact archaeological sites or historic architectural properties, you may need to hire a qualified archaeologist and/or historian. Please contact the SHPO by phone at 651-296-5434 or by email at mnshpo@mnhs.org for current lists of professional consultants in these fields.

Tom Cinadr
Survey and Information Management Coordinator
Minnesota State Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. West
St. Paul, MN 55102

651-205-4197 (voice)
651-282-2374 (fax)

-----Original Message-----

From: Susan Rani [mailto:srani@rani.com]

Sent: Monday, September 19, 2005 10:49 AM

To: Cinadr, Thomas

Subject: Request for SHPO Data - Metropolitan Council Blue Lake WWTP Improvement - Shakopee, MN

Dear Mr. Cinadr,

Page 2 of 2

Please provide state historical preservation information for the proposed Phase I expansion of Blue Lake Treatment Plant (built in 1969) for liquid and solid treatment improvement in Shakopee, Scott County.

Proposed improvement is contained within the existing land owned by MCES. The work is expected in the following described areas:

- SW 1/4 of NE 1/4, Section 2, T115N, R22N
- S 1/2 of NW 1/4, Section 2, T115N, R22N
- NE 1/4 of SW 1/4, Section 2, T115N, R22N

The sketch of this project area, in pdf format, is attached.

The Metropolitan Council Environmental Services is the project proponent and the Minnesota Pollution Control Agency is the Responsible Government Unit (RGU). A concurrent Minnesota Environmental Assessment Worksheet (EAW) is being prepared by Ms. Carol Mordorski, MCES, 651.601.1173, to document this project in accordance with Minnesota Rules, 4410.4300.

Due to expected residential and commercial growth (80% increase in population by 2030) in the service area of Blue Lake WWTP, expansion of the plant is necessary to handle additional plant load and to be compliant with effluent discharge requirements imposed by state and federal regulatory agencies.

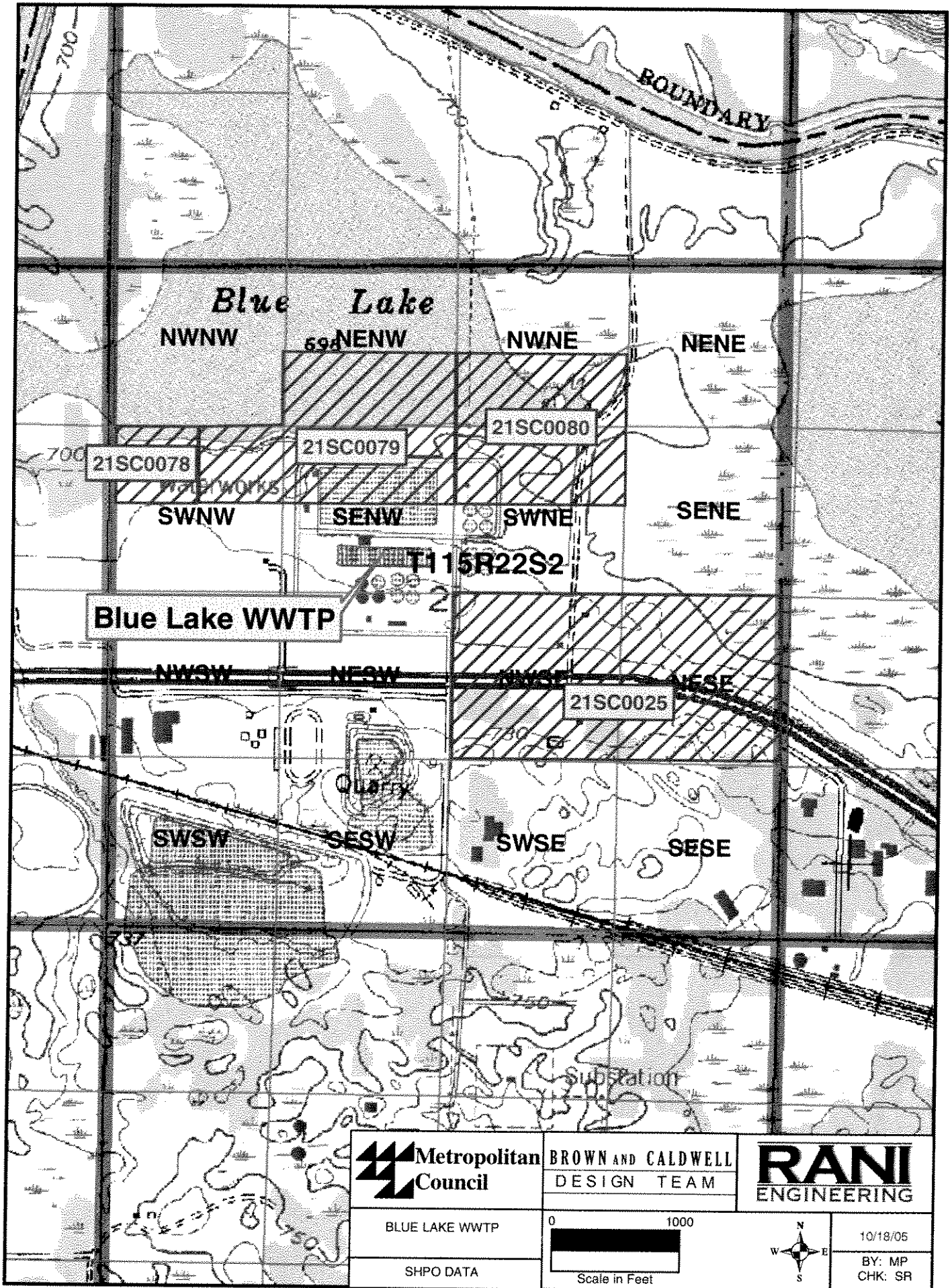
Thank you in advance for your cooperation and prompt attention this matter.

Susan Rani, PE
Rani Engineering, Inc.
556 Rice Street
St. Paul, MN 55103
Phone: 651.225.9789 Fax: 651.225.9792

Archaeological Site Locations

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Traditio	Context	Reports	NR	CEF	DOE
County: Scott	21SC0025	115	22	2	N-SE	0.1	1	EW	W-1		THY-73-01			
		115	22	2	N-SE	0.1	1	EW	W-1		SC-91-01			
		115	22	2	N-SE	0.1	1	EW	W-1		MULT-93-01			
21SC0078	Blue Lake #4	115	22	2	NW-SW-NW	0.1	1	SA	W-1					
21SC0079	Blue Lake #5	115	22	2	S-NE-NW	5.6	1	AS	W-1	EW-1				
	Blue Lake #5	115	22	2	N-SE-NW	5.6	1	AS	W-1	EW-1				
	Blue Lake #5	115	22	2	NE-SW-NW	5.6	1	AS	W-1	EW-1				
21SC0080	Blue Lake #6	115	22	2	S-NW-NE	1.5	1	AS	W-1					
	Blue Lake #6	115	22	2	N-SW-NE	1.5	1	AS	W-1					

Figure 4



**Metropolitan
Council**

**BROWN AND CALDWELL
DESIGN TEAM**

**RANI
ENGINEERING**

BLUE LAKE WWTP

SHPO DATA



10/18/05

BY: MP
CHK: SR



MINNESOTA HISTORICAL SOCIETY

Minnesota State Historic Preservation Office Archaeological Site Database Metadata

This list describes all variables in the SHPO's archaeological site database by Microsoft Access tables.

MAIN TABLE (ARCHAEOLOGY)

COUNTY [COUNTY] - Character Field, 20 characters

The name of the county in which the site is located. If a site extends across more than one county, the site will be listed in the database under both counties; however, the site number (SITENUM; see below) will correspond to the county in which the majority of the site lies. Therefore the "county" need not match that of the site number. Only one site number is assigned to each discrete site even if the site is located in more than one county.

SITE NUMBER [SITENUM] - Character Field, 8 characters

SITENUM refers to the Smithsonian Institution's trinomial archaeological site designation. It is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21" (the pre-1959 state alphabetical order), followed by a two-letter county code (see attachment for Minnesota county codes), followed by a one-up number. Paper copies of site information in the SHPO's site inventory are filed by site number within any given county. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit one-up number for each site. The SHPO Archaeological Database also contains site leads that are based on correspondence or written accounts, but have not been field verified by a professional archaeologist. These "possible" sites use the state and county codes as discussed above, followed by an alphabetic designation beginning with the letter *a*. Each site lead in a county will receive a one-up alphabetic designation *a* through *z*, followed by *aa*, *ab*, *ac*, etc. Such sites are occasionally referred to as "alpha sites."

SITE NAME [SITENAME] - Character Field, 80 characters

The archaeologist responsible for initially recording a site usually designates the SITENAME. It is standard procedure to use the landowner's last name, but if it is a common name (e.g., Peterson), a first name is also used. Sites are also named for a local topographic feature, unusual characteristic, etc. Some sites have multiple names. An entry for this category is not mandatory, but used when available. The word "site" is not used in the name in the database (i.e., the Joseph Peterson Site will be listed simply as "Joseph Peterson"). If a site has more than one record (i.e., if the site is located in more than one section), the site name should be followed with the record number as follows: (1/3), (2/3), (3/3), etc. If the "site" has been determined to be non-cultural, (NOT A SITE) is written in this field.

FIRST DATE [FIRSTDATE] - Character Field, 4 characters

This field refers to the year the site was initially recorded.

DATE of SURVEY [DATESURVEY] - Date Field, 8 characters

This field refers to the date of the most recent fieldwork by a professional archaeologist. If the exact date is not known, the first day of the month is listed; if only the year is known, the date is listed as 01/01/year.

FIELD NUMBER [FIELDNUM] - Character Field, 38 characters

Archaeologists frequently assign field numbers to designate sites before an official state site number is assigned. The FIELDNUM will appear in the database exactly as it was recorded by the archaeologist. All field numbers that apply will be listed.

ACRES [ACRES] - Numeric Field

The estimated area of the site to the nearest 0.1 acre. Single artifact finds are coded as 0.1 acre. Rough estimations are rounded to the nearest 0.5 acre. Each record for a site having multiple locations will reflect the area of the *entire* site.

SITE TYPE DESCRIPTION [DESCRIPT] - Character Field, 25 characters

This field is a brief description of the site type (i.e., how it appears in the field as an archaeological manifestation). All that apply are listed (e.g., an earthwork with a documented human burial is listed as **EW**, **CEM**):

SA - Single Artifact ("find spot")
LS - Lithic Scatter (a site with only lithic materials; i.e., tools, flakes, fire-cracked rock, etc.)
AS - Artifact Scatter (any multiple artifact site with more than just lithics)
EW - Earthwork (includes mounds, fortifications, ricing pits, etc.)
SR - Structural Ruin
RALN - Rock Alignment
RART - Rock Art (includes pictographs, petroglyphs, boulder outlines)
CEM - Cemetery, Burial (non-mound)
HD - Historic Documentation (e.g., ghost towns, trading posts, etc. in records but no field survey)
SHIP - Shipwreck
SM - Shell Midden
TR - Trail/Road
FEAT - Feature (e.g., pit, depression)
STR - Standing Structure/Building

SITE FUNCTION [FUNCTION] - Character Field, 40 characters

This describes the site function as inferred by archaeological materials or the literature (e.g., an artifact scatter may be a habitation site, a camp site, or butcher site, etc.) Typically, only sites that have been well documented will be given a function designation. Once historic contexts have been more fully developed, the function categories listed below should more closely correspond to *property type* descriptions in the contexts.

Agency - Indian Agency	LogCamp - Logging Camp
BMound - Burial Mound	LogDam - Logging Dam
Battle - Battleground	Mine - Mining
Bone - Bone Bed	Miss - Mission
Butcher - Butchering Site	Mort - Mortuary
CCC - CCC Camp	Oth - Other
Cache - Cache	Pglyph - Petroglyph
FMill - Flour Mill	Picto - Pictograph
Fac - Factory	Portage - Portage Trail
Farm - Farmstead	Quarry - Quarry
Fish - Fishing	Resid - Residential area (recent)
Fort - Fort	Rice - Ricing
GT - Ghost Town	SMill - Saw Mill
Garden - Gardening	Stage - Stage Stop
Gather - Gathering	Sugar - Maple Sugaring
Hab - Habitation (aboriginal camp, village)	TPost - Trading Post
Home - Homestead	Trans - Transportation
House - single domestic dwelling	Wcraft - Watercraft
Kill - large mammal kill	Wshop - Lithic Workshop

MOUNDS [MOUNDS] - Numeric Field, 3 characters

The number of mounds or earthworks contained in a site.

BURIAL AUTHENTICATED [BURIALAUTH] - Character Field, 1 character

If a site is a burial authenticated by the State Archaeologist, a **Y** is placed in this field otherwise it is left blank.

DEGREE OF DISTURBANCE [DISTURB] - Character Field, 1 character

Refers to the degree of disturbance to the site. This is coded on a scale from 0 to 5.

- 0 - Unknown
- 1 - The site is virtually undisturbed.
- 2 - The site has been minimally disturbed.
- 3 - The site is moderately disturbed. Includes plow zones.
- 4 - The site is heavily disturbed.
- 5 - The site has been virtually destroyed.

TEMPORAL PERIOD [PERIOD] - Character Field, 15 characters

PERIOD refers to the general temporal period of the site.

- P - Precontact (10,000 B.C. - A.D. 1680)
- C - Contact (A.D. 1680 - 1837)
- R - Post-Contact (Recent; A.D. 1837 - present)

TRADITION [TRADITION] - Character Field, 30 characters

TRADITION refers to the standard major taxonomic divisions of Minnesota prehistory: PaleoIndian, Archaic, Woodland, Mississippian, and Plains Village. (see below)

CONTEXT [CONTEXT] - Character Field, 60 characters

CONTEXT refers to the specific historic context of the site as listed in the Minnesota SHPO Historic Contexts. *Other (Oth)* is also an option for the Context field if the historic context is not listed below.

The fields PERIOD, TRADITION, and CONTEXT are as specific as possible. Only the terms listed below are used. As many fields as possible are completed for a particular site. It may have been possible to complete only the first field; for example, a lithic scatter with no diagnostic artifacts is cited as simply a "Precontact site"; a site containing ceramics but no specific types might be cited as "Precontact" and "Woodland", etc. Each determination is then followed with a number corresponding to the confidence of the cultural affiliation determination, as below:

Confidence Level

- 1 - Confirmed
- 2 - Suspected

If more than one term applies to a site in a particular field, all terms are listed, with commas separating. They are listed in chronological order. For example, a site that has yielded a Folsom projectile point, a Blackduck potsherd, and a suspected Archaic component would be cataloged as the following:

PERIOD: P-1
TRADITION: PL-1, A-2, W-1
CONTEXT: Fo-1, Bd-1.

Precontact Period - P

- Paleoindian Tradition - **PL** (13,000-8000 B.P.)
 - Clovis - **CI**
 - Folsom - **Fo**
 - Eastern Fluted - **EF**
 - Lanceolate Point/Plano - **PI**
- Archaic Tradition - **A** (8000-2500 B.P.)
 - Prairie Archaic - **AP**
 - Riverine Archaic - **AR**
 - Lake Forest Archaic - **AL**
 - Shield Archaic - **AS**

Woodland Tradition - **W** (2500-300 B.P.)
 Early Woodland - **EW**
 Middle Woodland - **MW**
 Fox Lake - **FL**
 Havana Related (Malmo, Howard Lake, Sorg) - **HR**
 Laurel - **La**
 Brainerd - **Br**
 Transitional Woodland (St. Croix, Onamia) - **SO**
 Lake Benton - **LB**
 Southeastern Minnesota Late Woodland - **SELW**
 Kathio - **Ka**
 Blackduck - **Bd**
 Psinomani (Sandy Lake, Wanikan, Ogechie) - **Ps**
 Unspecified Late Woodland - **LW**

Plains Village Tradition - **PV** (1000-500 B.P.)
 Great Oasis - **GO**
 Cambria - **Ca**
 Big Stone - **BS**

Mississippian Tradition - **M** (1000-800 B.P.)
 Silvernale - **Sn**

Oneota Tradition - **O** (1000-300 B.P.)
 Blue Earth - **BE**
 Orr - **Or**
 Oneota - **Oa**

Contact Period - C
 Western Dakota - **WD**
 Eastern Dakota - **ED**
 Chiwere Siouan - **CS**
 Ojibwe - **Oj**
 French - **Fr**
 English - **En**
 Initial U.S. - **US**

Post-Contact Period - R (Recent)
 Indian Communities and Reservations - **IC**
 St. Croix Triangle Lumbering - **SC**
 Early Agriculture and River Settlement - **EA**
 Railroad and Agricultural Development - **RA**
 Northern Minnesota Lumbering - **NL**
 Iron Range and North Shore Settlement - **IR**
 Tourism and Recreation - **TR**
 Urban - **Ur**

DATING METHOD [DATEMETHOD] - Character Field, 15 characters

DATEMETHOD refers to the method used to determine the time period of the site. All that apply are listed:

rc - radiocarbon dating	tl - thermoluminescence
ob - obsidian hydration	strat - site stratigraphy/geomorphology
style - artifact style/cross-dating	hist - historic documentation (e.g., plat map)
oth - other	

CERAMICS [CERAMIC] - Character Field, 35 characters

(see below)

LITHICS [LITHIC] - Character Field, 40 characters (see below)

BIOLOGICAL [BIOLOGICAL] - Character Field, 35 characters (see below)

OTHER [OTHER] - Character Field, 35 characters

The above four fields are used to give a more detailed summary of materials recovered from a site. Fields are completed only if the material type exists at a particular site. The terms used are listed below or the name given in a site report for a specific type. An unidentified projectile point would be cited as simply a projectile point. A Folsom point would be listed as **Fo**.

CERAMICS: **Ab** – Aboriginal (used only if no formal types identified)
 EA - Euro-American

Use these more specific terms for Aboriginal ceramics if possible (others may be used if necessary):

Bd - Blackduck	Lm - La Moille Thick
BE - Blue Earth	Ma - Malmo
Br - Brainerd	Og - Ogechie
Ca - Cambria	On - Onamia
CR - Clam River	Or - Orr
FL - Fox Lake	SC - St. Croix
GO - Great Oasis	Sg - Sorg
HL - Howard Lake	Sk - Selkirk
Ka - Kathio	Oa - Oneota
LB - Lake Benton	SL - Sandy Lake
La - Laurel	Sn - Silvernale

LITHICS

pp - projectile point	ground - ground/pecked stone
tool - other flaked stone tool	fcr - fire-cracked rock
deb - debitage	lithic - unspecified lithic material

Use these specific types of projectile points if possible: (others may be used if necessary)

CI - Clovis	fl - fluted	HG - Hell Gap
Fo - Folsom	Ed - Eden	AB - Agate Basin
BV - Browns Valley	Mid - Midland	Sb - Scottsbluff
Ang - Angostura	Pla - Plainview	Fred - Fredrick
Al - Alberta	lc - lanceolate	PI - Plano
DI - Dalton	Ms - Meserve	Hol - Holcomb
Rd - Raddatz	Steuben - Steuben	Oxbow - Oxbow
Par - Parkdale-eared	st - stemmed	cr - corner-notched
sn - side-notched	tr - triangular unnotched	bi - bifurcate

BIOLOGICAL:

an - animal remains	shell - shell
human - human remains	floral - seeds, plant remains, charcoal, etc.
unid - unidentified bone	

OTHER:

ochre	glass
metal	beads
mhst - miscellaneous historic	gf - gunflint
pipe - pipe	cupp - copper projectile point
cutool - copper tool	cuorn - copper ornament
shorn - shell ornament	shtool - shell tool
btool - bone tool	born - bone ornament

EXOTIC MATERIALS [EXOTIC] - Character Field, 20 characters

This field is completed when a raw material type not native to Minnesota or rarely found at archaeological sites in Minnesota has been recovered from a site.

Cp - Copper
Ob - Obsidian
Cat - Catlinite (pipestone)
Hxt - Hixton quartzite
BurC - Burlington Chert
KRF - Knife River Flint
MSh - marine shell
oth - Other

MAJOR DRAINAGE BASIN [DRAINAGE] - Character Field, 5 characters

The DRAINAGE field is based on the Minnesota DNR classification system and denotes the location of the site within a major drainage basin. Note: the distinction between the "Lower" and "Upper Mississippi River" categories occurs in the Twin Cities at the mouth of the Minnesota River. Also note, the Rock River in southwestern Minnesota is part of the "Missouri River" drainage system.

LS - Lake Superior	Red - Red River
RR - Rainy River	SCR - St. Croix River
LMR - Lower Mississippi River	CR - Cedar River
UMR - Upper Mississippi River	DMR - Des Moines River
MnR - Minnesota River	MR - Missouri River

PHYSIOGRAPHIC SETTING [SETTING] - Character Field, 60 characters

PHYSIOGRAPHIC SETTING refers to the general landform of the site area. Only the most predominate landscape element is listed.

Hill - Hilltop	Lacustrine - General Lake Area
Upland - Undifferentiated Upland	Lakeshore - Lakeshore
Marsh - Marsh, Swamp, Fen, Bog	Island - Island
Bluff - Bluff Edge	BluffB - Bluff Base
Alluvial - Alluvial Fan	Cove/Bay - Cove or Bay
Stream - Intermittent Stream	In/Out - Inlet/Outlet
Junction - Confluence of Streams/Rivers	Isthmus - Isthmus
River - General Riverine	Glacial - Glacial Beach Ridge
Terrace - Terrace	Cave - Cave/Rockshelter
Flood - Floodplain	Pen - Peninsula

OWNER TYPE [OWNERTYPE] - Character Field, 15 characters

Refers to the type of ownership of the property on which the site lies. All that apply are listed.

Fed - Federal	St - State of Minnesota
Chip - Chippewa National Forest	Sup - Superior National Forest
Loc - Local (Public)	Tribe - Tribal
Priv - Private	Unk - Unknown

WORK TYPE [WORKTYPE] - Character Field, 10 characters

This refers to the level (intensity) of archaeological investigation.

0 = Pre-field preparation, Literature Search, Historic Documentation
1 = Phase I (reconnaissance survey)
2 = Phase II (evaluation/formal testing)
3 = Phase III (mitigation/data recovery/major excavation; monitoring if part of DRP)
4 = Cultural Resource Management Plan (e.g., long-term management plan for resources within a specific project area; site monitoring if part of plan)
5 = Collections & Other Non-Field Studies (e.g., a study of projectile points)
6 = Research Design (independent document)
7 = Other, Non-Archaeological Studies (e.g., oral history, paleoenvironmental, HABS/HAER, geomorphology, TCP)
8 = Combined Phase I & II
9 = Combined Phase II & III

NATIONAL REGISTER [NRHP] - Character Field, 3 characters

If a site is listed on the National Register of Historic Places or is within a listed historic district, "Yes" is entered (otherwise it is left blank).

DETERMINATION of ELIGIBILITY FINDING [DOE] - Character Field, 3 characters

If a site has been determined to be eligible by the National Park Service/Secretary of the Interior for listing on the NRHP, but has not been actually listed, "Yes" is entered (otherwise it is left blank).

CONSIDERED ELIGIBLE FINDING [CEF] - Character Field, 3 characters

If a site has been considered to be *Eligible* for listing on the NRHP by the SHPO and a federal agency has formally agreed during the Section 106 process, "Yes" is entered. If it has been determined Not Eligible, "No" is entered. If only a portion of the site has been evaluated "PE" is entered for *Partially Eligible* and "PNE" for *Partially Not Eligible*.

STAFF ELIGIBLE FINDING [SEF] - Character Field, 3 characters

If a site has been considered to be *Eligible* for listing on the NRHP by the SHPO without federal agency concurrence, "Yes" is entered. If it is considered Not Eligible, "No" is entered. If only a portion of the site has been evaluated "PE" is entered for *Partially Eligible* and "PNE" for *Partially Not Eligible*.

ADDITIONAL NATIONAL REGISTER INFORMATION [XNR] - Character Field, 3 characters

If a site is individually listed on the National Register, "On" is entered. If a site is within a listed National Register District, "In" is entered.

STATE REGISTER [StReg] - Character Field, 3 characters

If a site is listed on the State Register of Historic Places, "Yes" is entered (otherwise it is left blank).

REFERENCE [REFERENCE] - Character Field, 65 characters

Major bibliographic references to the site not listed in the REPORTS field.

Andreas - 1874 Andreas Atlas
GeolSurv - Geological Survey (Winchell, Upham)
Brower Nx - J.V. Brower notebook
Brower xxxx - J.V. Brower publication
CHIP - Chippewa National Forest Inventory
Lewis xx - T. Lewis notebook
MHS(CF) - MHS County Miscellaneous File
MHS(DB) - MHS Doug Birk
MHS(FTF) - MHS Fur Trade File
MHS(GTF) - MHS Ghost Town File
MHS(LP) - MHS Les Peterson
MHS(SA) - MHS Scott Anfinson
SAS - Statewide Archaeological Survey
Tryggxx - J.W. Trygg Map/Sheet Number
Wilford XXXX - L.A. Wilford/year, County File Notes
Winchell - N. Winchell (1911)

LOCATION CONFIDENCE [LOCCONF] - Character Field, 1 character

The LOCCONF field is based on a 1-5 scale that reflects the confidence in locating a site on a USGS map according to the information existing on a site. The numbers should be interpreted as follows:

1 - Very High: the site can be accurately and precisely delineated on a 7.5" USGS quadrangle map and/or the site was examined and mapped by a professional archaeologist.

2 - High: the location of the site can be narrowed down to the quarter-quarter section level (if the site area is smaller than this) but no further and/or the site was given a cursory field examination by a professional archaeologist.

3 - Moderate: the site was mapped according to the best guess of several alternatives, or within a quarter section and/or a reliable informant provided information on the site.

4 - Low: SHPO staff were skeptical of the location given for a site or whether the site exists as described and/or the site was mapped using information provided by a local informant of unknown reliability and has not been field evaluated by a professional archaeologist.

5 - Very Low: SHPO staff were highly skeptical of the location of a site or whether the site exists as described and/or the site information was based on rumor or hearsay. Any site receiving a confidence of 5 will not be mapped on the SHPO's master USGS site maps.

NOTE: If the site has been determined to be non-cultural (i.e., not a confirmed archaeological site) by a professional archaeologist, an "N" will appear under the CHANGE field.

NOTES [NOTES] - Character Field, 10 characters

For additional information such as archaeological terminology that is no longer used in Minnesota to denote temporal or cultural affiliation, but still useful research terms (e.g., Arvilla, Old Copper).

OFFICE of STATE ARCHAEOLOGIST LICENSE NUMBER [STATEARCH] - Character Field, 20 characters. STATEARCH refers to the Office of the State Archaeologist license number given to a project that examined the site.

INPUT DATE [INDATE] - Date Field, 8 characters

INDATE is the date the site was added to site inventory or database.

UPDATE DATE [UPDATE] - Date Field, 8 characters

UPDATE is the date the site information was updated in site inventory or database.

CHANGE [CHANGE] - Character Field, 5 characters

This field notes changes made to the site database that differ from original information found in the site files or recorded on site forms.

D – Description (physical description of the site)

L – Location

T – Township, Range or Section

U - UTM

R - Redundant (same location as another site)

N - Non-cultural (not an archaeological site; shouldn't be assigned a site number)

City/Township Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

(same as Main Table)

CITY/TOWNSHIP [CITYTWP] - Character Field, 40 characters

CITYTWP refers to the name of the minor civil subdivision in which the site lies. If the site is located within the boundaries of a township or incorporated city, use the name of the township or city. For example: Welch Twp., Cannon Falls Twp., Red Wing, or Cannon Falls. Sites located outside of organized townships are cited as "Unorganized Territory".

Regions Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

(same as Main Table)

REGION [REGION] - Character Field, 5 characters

The SHPO archaeological research region in which the site is located. (see the attached map)

1 - Southwest Riverine	5c - Central Lakes Coniferous Central
2n - Prairie Lake North	5n - Central Lakes Coniferous North
2s - Prairie Lake South	5s - Central Lakes Coniferous South
2e - Prairie Lake East	6n - Red River Valley North
3e - Southeast Riverine East	6s - Red River Valley South
3w - Southeast Riverine West	7w - Northern Bog West
4w - Central Lakes Deciduous West	7e - Northern Bog East
4e - Central Lakes Deciduous East	8 - Border Lakes
4s - Central Lakes Deciduous South	9n - Lake Superior North
5w - Central Lakes Coniferous West	9s - Lake Superior South
5e - Central Lakes Coniferous East	

UTM Table

SITE NUMBER [SITENUM] - Character Field, 8 characters
(same as Main Table)

UTM ZONE [UTMZONE] - Numeric Field, 2 characters

EASTING [EASTING] - Numeric Field, 6 characters

NORTHING [NORTHING] - Numeric Field, 7 characters

These numbers refer to the exact location of a site, based on the Universal Transverse Mercator (UTM) grid. There are three UTM zones in Minnesota: 14, 15, and 16. Most of the state is in Zone 15. For some GIS applications, zones 14 and 16 have been placed in an "extended" Zone 15. These extended zone coordinates are included as separate fields in the table (see XEASTING and XNORTHING).

One set of UTM site coordinates is recorded in the database for each site. This should be as close as possible to the central point of each site. For sites located in multiple sections only the first record number will have the UTM coordinates recorded.

Under EASTING, a "0" is entered if the record is not unique (i.e., a repeated reference to the same site) or if the site is not actually an archaeological site when an official state number has been assigned. A "1" is entered when exact location data for a site is unavailable. This coding allows for searches of the ARCH database to find actual numbers of sites that exhibit certain characteristics if the search command includes "EASTING <> 0".

XEASTING [XEASTING] - Numeric Field, 6 characters

XNORTHING [XNORTHING] - Numeric Field, 7 characters

These two variables are used to plot the location of individual properties within Geographic Information Systems (GIS). Since Minnesota is located within UTM Zones 14, 15 and 16, the convention is to process Zones 14 and 16 locations into Extended Zone 15 so the properties can be more easily plotted.

DATUM [DATUM] - Character Field, 4 characters

The DATUM field is a four-digit number referring to the year when the U.S. Geological Survey UTM grid datum was established. This year is either 1927 or 1983. Also known as *NAD* or North American Datum.

Township/Range/Section and USGS Quadrangle Table

SITE NUMBER [SITENUM] - Character Field, 8 characters
(same as Main Table)

TOWNSHIP [TOWNSHIP] - Numeric Field, 3 characters

RANGE [RANGE] - Numeric Field, 2 characters

EAST/WEST [EASTWEST] - Character Field, 1 character

SECTION [SECTION] - Numeric Field, 2 characters

The TOWNSHIP field is a two or three-digit number referring to the vertical grid number assigned to the township where the site is located. In Minnesota, all townships are "North"; therefore only the number is given. RANGE is a two-digit number referring to the horizontal grid number. Ranges in Minnesota may be either "East" or "West", and the EASTWEST field is entered as **E** or **W**. SECTION is a one or two-digit number, 1 through 36, corresponding to a square mile within a township/range coordinate. If a site extends through more than one section, each section will be given an individual record. This is necessary to enable database searches by location. The section in which the majority of the site lies will be entered in the first record, with the record number (1/3) written in the SITENAME field.

QUARTER SECTIONS [XQUARTERS] - Character Field, 35 characters

This field will list the entire quarter section description of site location as one field. This description of site location is more precise than the following fields, but cannot be used in database searches.

¼ OF ¼ OF ¼ SECTION [QTRQTRQTR] - Character Field, 2 characters

¼ OF ¼ SECTION [QTRQTR] - Character Field, 2 characters

¼ SECTION [QTR] - Character Field, 2 characters

These fields indicate the portion of a section in which a property is located and must be used together. The smallest quarter description must encompass the entire site. The QTR field is used to describe a 160-acre cell within a section, followed by the QTRQTR field that designates the 40-acre cell. The QTRQTRQTR field is used to describe the 10-acre cell where the site is located. The size of a particular site will determine how many of the three fields are filled. It may be possible only to say that a site is located in the NE quarter. Half-sections and centers can be used also if necessary (e.g., "C-S" is the center of the southern half of a section; in this case the cell areas are 20-acre, 80-acre, and 320-acre, respectively). Only the largest area that includes the entire site is used. These will be completed for each section in which the property is located.

USGS QUADRANGLE [USGS] - Character Field, 50 characters

USGS refers to the name of the USGS 7.5' quadrangle map where the site is located. The map name is written as it appears on the map, including spacing. The state or province name is excluded; i.e., the Redwood Falls, Minn. map is written as "Redwood Falls". Two quadrangle names may be input.

Repository Table

SITE NUMBER [SITENUM] - **Character** Field, 8 characters
(same as Main Table)

REPOSITORY [REPOSITORY] - **Character** Field, 25 characters

ACCESSION NUMBER (S) [ACCNUMBER] - **Character** Field, 60 characters

These fields provide the location of the site's collection, any field notes, and the accession numbers of materials. Repositories are as follows:

MHS - Minnesota Historical Society
UM - University of Minnesota, Minneapolis
UMD - University of Minnesota, Duluth
BSU - Bemidji State University
MDSU - Moorhead State University
MKSU - Mankato State University
SCSU - St. Cloud State University
IMA - Institute for Minnesota Archaeology
HU - Hamline University
SMM - Science Museum of Minnesota
UND - University of North Dakota
MWAC - Midwest Archaeological Center
AC - Augustana College
LLHS - Leech Lake Heritage Sites Program
Co - County Historical Society
Priv - Private collection

Archaeological Reports Table

SITE NUMBER [SITENUM] - **Character** Field, 8 characters
(same as Main Table)

REPORTS [ArchReports] - **Character** Field, 40 characters

The number from the SHPO's **ARCHREP** table pertaining to reports discussing the site and on file at the SHPO. Multiple report numbers may be listed.

Review and Compliance Table

SITE NUMBER [SITENUM] - **Character** Field, 8 characters
(same as Main Table)

REVIEW AND COMPLIANCE NUMBER [RCNUMBER] - **Character** Field, 29 characters

RCNUMBER refers to SHPO Review and Compliance File Number. Many archaeological projects in Minnesota are initiated through the Review and Compliance process.

