November 6, 2012

David Sahli, P.E.
Principle Engineer
Minnesota Pollution Control Agency (MPCA)
520 LaFayette Road North
St. Paul, MN 55155

Re: Final Amendment to Birch Point Road Community Assessment Report (CAR)

Dear David:

A Community Assessment Report (CAR) for the Birch Point Road Sanitary District was submitted to the Minnesota Pollution Control Agency (MPCA) and St. Louis County on November 22, 2011. This CAR provided information on existing individual sewage treatment systems (ISTS) and a detailed evaluation of a cluster wastewater collection, treatment, and subsurface discharge system for the 34 homes in the project area. A subsequent stakeholder meeting was held on January 12, 2012 where the CAR was discussed. This meeting was attended by representatives from the residents in the project area, Town of Grand Lake, St. Louis County, MPCA, Western Lakes Sanitary Sewer District (WLSSD), and MSA. The discussion at the meeting resulted in a request for additional work in evaluating individual sewage treatment systems (ISTS) for the 34 homes in the project area. This additional work was funded through grants provided by WLSSD and St. Louis County Environmental Services.

MSA and MATRIX Soil Systems, Inc prepared a scope of work for the additional work (two tasks) which was approved by WLSSD and the Town of Grand Lake. The two tasks were as follows:

TASK 1 Develop Table for On-Site Systems (by MATRIX Soil & System, Inc)

1. Perform desktop evaluation
    a. Identify areas for potential replacement of onsite systems.
    b. Identify parcels which can only use holding tanks (Type II);
    c. Identify parcels with compliant ISTS systems (using existing sanitary survey and county information);
2. Perform site visit to confirm replacement area availability, site slope and cross-slope distance.
3. Identify parcels needing Types I, III, or IV systems and probable type for parcel.
4. Provide general description of system types that residents can understand with typical area requirements and typical construction, operation, and maintenance cost.
5. Assume minimum use of 3 bed rooms per lot for all parcels to account for future development and provide fair comparison to the system in the November 2011 CAR.
6. Provide summary table listing for each lot indicating
    a. Information on existing table in November CAR plus;
    b. Probable on-site system needed.

   c. Probable on-site area needed.
   d. Indicate if there are flow limits from each parcel based on the probable system identified.
7. Estimate cost for on-site systems for use in Task 2.

TASK 2 Develop and Compare Alternatives (MSA Professional Services)

1. Using information determined in Task 1 above develop a total capital and operation and maintenance cost for:
   a. All on-site systems for 34 homes.
      i. With holding tank waste disposal by hauling to WLSSD.
   b. A hybrid system of on-site systems and smaller treatment system
      i. With holding tank waste hauled by truck to treatment system at same location shown in the November CAR.
      ii. Treatment system will be evaluated for flows of <5,000 gpd only.
2. Develop comparison table for capital, O&M and Present Worth Costs
   a. Compare values from November CAR to two options above
   b. Develop "Pro" and "Con" table to compare non-monetary items.
3. Develop range of user rate costs for each of the three alternatives.
   a. Base rate on 1% interest rate, 30 year loan and 1.05 debt factor.
   b. Assume 50% grant for construction only from MPCA
   c. No grant for design of system.
   d. Subordinate sanitary district will pay for construction and O&M of all 34 systems as this is required for 50% grant.
4. Write brief (5 to 10 pages) amendment to the CAR with MATRIX table from Task 1 and cost and comparison tables from Task 2

This CAR amendment letter details the results of Tasks 1 and 2 outlined above.

ON-SITE SYSTEM EVALUATION

MATRIX Soils & Systems, Inc. conducted the work outlined in Task 1 above. A detailed report including detailed tables for each individual system and individual site maps is provided as **Attachment 1** to this letter report. The attached report also indicates the number of existing compliant systems and an estimate of what probable types of systems would be required for replacement of the existing ISTS system with new compliant systems. The individual maps indicate probable locations available on each property for future replacements. A table is included in the attached report which summarizes the information collected. In some cases, the method of subsurface treatment at a property was not completely determined.

The purpose of the ISTS work was to gather information needed to evaluate options other than the cluster system indentified in the CAR. A summary of baseline data on the existing systems is presented in **Table 1**. Estimated system type replacement and operation and maintenance costs are listed on a table on the last page of the MATRIX Soils & Systems, Inc. report.

Table 1
Baseline ISTS information for Birch Point Road Project

Item or ISTS System Type	Description	Existing	Future ISTS Replacement Type MPCA Rules	Future ISTS Replacement Type St. Louis County Rules	Future ISTS Replacement Type 3-Bedroom St. Louis County Rules
1-bedroom home		11			
2-bedroom home		9			
3-bedroom home		14			34
Seasonal Use		14			
Year Round Use		20			
Type I	Mound	15	12	**8**	4
Type II	Holding Tank	3	12	**17**	22
Type III	Reduced Flow Type I	1	7	**6**	6
Type IV	Registered Treatment Component	2	2	**2**	1
Type V	Unregistered Treatment Component	1	1	**1**	1
Other/Unknown	Other subsurface system	12			
Compliant System		7			
Non-Compliant Systems (1)		27			

(1) Groundwater Protection Failure

The most important findings in the ISTS field and desktop evaluation are as follows:

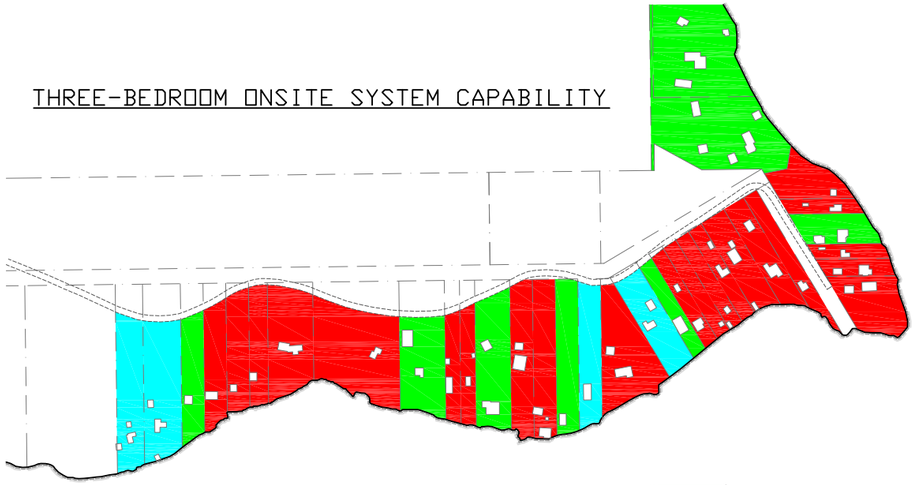
- A significant number of properties do not have sufficient room for a future on-site system and would need to install a holding tank. Under MPCA rules, 9 properties would need to convert to holding tanks. Under St. Louis County rules, 14 properties would need to convert to holding tanks.

- 79 percent of the existing systems appear to be non-compliant for failing to protect groundwater. At some point these systems will need to be replaced.
- To allow all people in the project area to develop their property up to 3-bedroom capacity, a total of 22 holding tanks would be needed (greater than two-thirds of the homes). This can be used to compare costs to the cluster type system presented in the original CAR. The majority of one and two bedroom homes would need to convert to holding tanks in order to expand to a 3-bedroom home.

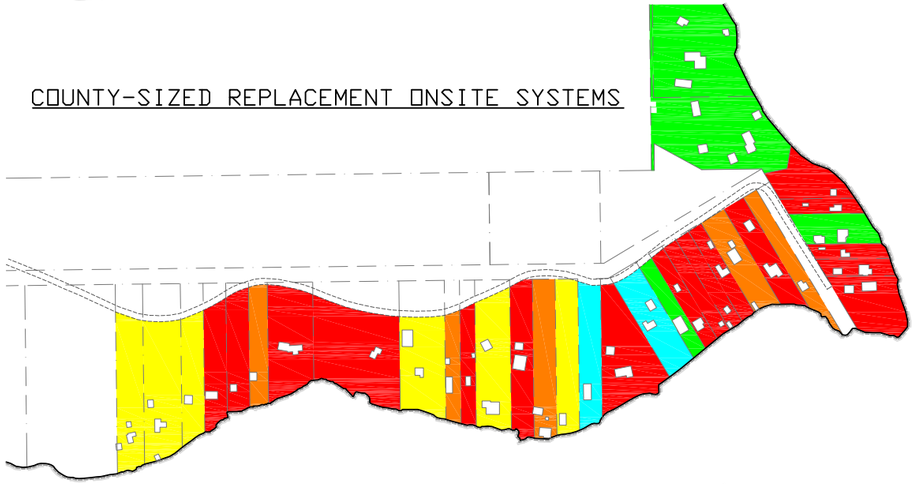
Figure 1 shows three color coded maps for system requirements for the 34 homes on Birch Point Road. The upper left hand color map shows the type of individual systems required if all properties were allowed to have three bedroom homes. The red color indicates those properties which would have to install a holding tank. The middle map in **Figure 1** shows the types of systems needed based on each resident staying with the existing bedroom size house and being limited to that house size in the future according to St. Louis County rules. Again, a significant number of homes would need to convert to holding tanks. The lower right hand map in **Figure 1** shows the types of systems needed based on each resident staying with the existing bedroom size house and being limited to that house size in the future according to MPCA rules. The color coded maps reflect the information provided in **Table 1** in a visual manner. The MATRIX Soils & Systems, Inc. report master table shows the probable future type system for each property owner, for the existing house size, and for a 3-bedroom house.

The data from the onsite evaluation gathered in Task 1was used in the alternatives evaluation presented in the next section.

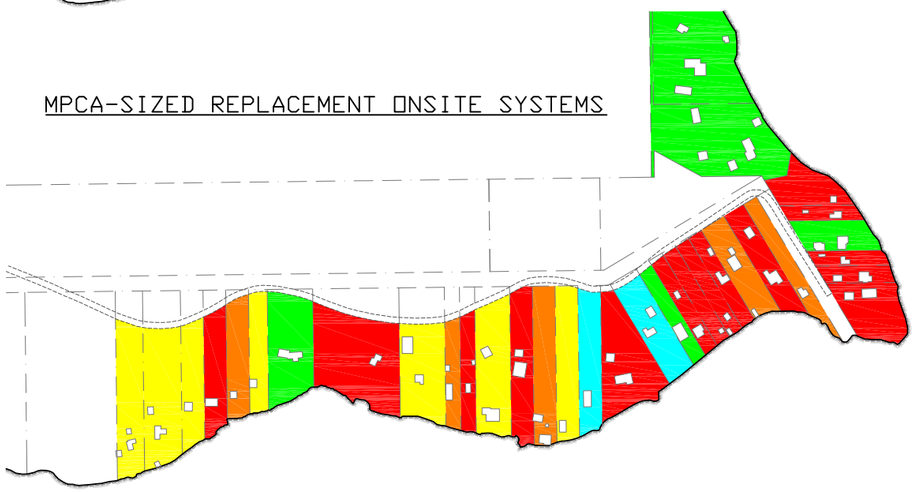
THREE-BEDROOM ONSITE SYSTEM CAPABILITY



COUNTY-SIZED REPLACEMENT ONSITE SYSTEMS



MPCA-SIZED REPLACEMENT ONSITE SYSTEMS



NOTES

1. PROPERTY BOUNDARY AND SHORELINE LOCATIONS SHOWN ARE APPROXIMATE.
2. MAPPING SOURCES ARE MSA PROFESSIONAL SERVICES, ST. LOUIS COUNTY GIS MAPPING, AND FIELD MEASUREMENTS AND OBSERVATIONS.
3. INDICATED CONCLUSIONS REGARDING SYSTEM REPLACEMENT SIZE FEASIBILITY IS BASED ON BEST AVAILABLE INFORMATION AND FIELD OBSERVATIONS.
4. 3-BEDROOM FLOWS ARE BASED ON A PEAK 150 GPD/BEDROOM. 3-BEDROOM REDUCED FLOWS ARE BASED ON AN AVERAGE 100 GPD/BEDROOM.
5. ST. LOUIS COUNTY REGULATIONS REQUIRE SYSTEM SIZING BASED ON A PEAK 150 GPD/BEDROOM, AVERAGE 100 GPD/BEDROOM.
6. MPCA REGULATIONS ALLOW SYSTEM SIZING BASED ON DWELLING TYPE, PEAK FLOWS RANGING FROM 73 GPD/BEDROOM TO 150 GPD/BEDROOM, AVERAGE FLOWS RANGING FROM 49 GPD/BEDROOM TO 100 GPD/BEDROOM.

250 0 500

APPROXIMATE SCALE IN FEET

SUITABLE SYSTEM SIZE LEGEND

- 3-BEDROOM
- 3-BEDROOM (REDUCED FLOW)
- 2-BEDROOM
- 2-BEDROOM (REDUCED FLOW)
- HOLDING TANK

APPRD.	AREA MAP	AS SHOWN	0	ONSITE SYSTEM CAPABILITY DISTRIBUTION
		SCALE	REV.	DESCRIPTION
DATE 08/25/12		BIRCH POINT ROAD SANITARY DISTRICT		FIGURE 1
DRAWN RWW	MATRIX Soils & Systems	PART OF CENTRAL 1/2 OF SECTION 13 T51N, R16W, ST. LOUIS COUNTY, MINNESOTA		
DATE 08/02/12				

ALTERNATIVES EVALUATION

Based the amendment scope of work and results of the on-site system evaluation, the following alternatives were to be evaluated for comparison to the cluster system in the CAR:

- **Alternative 1**. Replace on-site systems, however **no development beyond the existing number of bedrooms.**. For those with holding tanks, waste disposal by hauling to WLSSD. Based on the onsite evaluation, seven (7) properties are currently compliant with code. Thus, replacement of 27 systems is included in this alternative.

- **Alternative 2**. Replace on-site systems to allow for development of all properties to 3-bedroom size. For those with holding tanks, waste disposal by hauling to WLSSD. Based on the onsite evaluation, three (3) properties have 3-bedroom homes currently compliant with code. Thus, replacement of 31 systems is included in this alternative.

- **Alternative 3**. Hybrid system consisting of hauling holding tank waste from present and future holding tanks to a <5,000 gallon per day (gpd) on-site treatment system and all other non-compliant systems being replaced with on-site systems. Seven (7) properties are currently compliant with code. Thus, replacement of 27 systems is included in this alternative. **No development beyond existing dwelling size and number of bedrooms.**

  This option was only to be considered for a permitted flow to the treatment system of less than 5,000 gpd as under this flow, total Nitrogen removal is not required and more significant savings are possible. Under St. Louis County rules, this alternative is not practical as the permitted flow would be over 5,000 gpd. This is due to the fact that more holding tanks are required under St. Louis County rules. Thus, for the purposes of this report, it was assumed that MPCA codes could be used for the hybrid system approval by the County. **Any increases in bedroom number would not allow use of this alternative due to permitted flows being larger than 5,000 gpd.**

Tables for the cost of each of these alternatives were developed from the information in the onsite evaluation. In all cases it was assumed that St. Louis County rules would be followed. The County rules require Type I flows per bedroom to be used for sizing ISTS systems for all dwellings regardless of size. The onsite evaluation report for ISTS' includes a typical estimated replacement cost for different types of ISTS systems and an estimate of annual O&M costs for each type. These costs were used to develop alternative costs. In the case of trucking holding tank wastes from the homes to an on-site system, the hauling cost was estimated to be approximately half that of hauling to WLSSD. The Township might choose instead to buy its own hauling truck and do the hauling. Based on conversations with MPCA, the hybrid system described has not been used in the State of Minnesota.

The original CAR indicated that grinder stations would be used at each household. However, several Town Board members have indicated that grinder stations in a similar system around a nearby lake (Pike Lake) have not had the expected grinder pump equipment life which has

resulted in sooner than expected replacement of pump cores for many of the grinder stations. Thus, during the design phase, a septic tank effluent pump (STEP) system would also be considered. The STEP system replaces the grinder station with a combination tank containing a septic tank compartment and an effluent pump compartment. In general, the STEP option would require replacement of all the existing septic tank, but would not change the pressure sewer design. The benefit of the STEP system is that wastewater solids are not pumped into the pressure sewer or to the treatment system. This reduces clogging potential in the pressure sewer and lowers the load on the treatment system. In our experience the installed costs for STEP versus grinder stations are approximately the same. The STEP system would require the sanitary sub-district to monitor solids levels and pump solids out of the septic compartments on a scheduled basis (approximately every 5 years or $1/5^{th}$ of the households each year).

Detailed cost estimates for each alternative are provided in **Attachment 2** of this letter report. **Table 2** is a summary of the alternative costs versus the costs from the CAR for a cluster system for all 34 homes and allowing development up to 3-bedroom homes.

Table 2
Estimated Alternative Costs

Alternative	Capital Cost	O&M Cost (1)	20-Year Present Worth
Alternative 1 ISTS replacements Existing bedroom capacity	$478,000	$98,000	$1,710,000
Alternative 2 ISTS replacement 3-bedroom capacity	$389,000	$126,000	$1,940,000
Alternative 3: Hybrid System	$764,000	$46,000	$1,340,000
Cluster System Alternative from CAR (Including Total N removal)	$1,330,000	$22,000 (2)	$1,580,000

(1) Based on cost tables in MATRIX Soil & Systems Inc Report. Approximately $197/pumpout for 2,000 gallon tank and $167/pumpout for 1,000 gallon tank with transport to WLSSD.
(2) Higher cost than in original CAR to address potential use of STEP system. Assume $2,000 per year cost for septic compartment pumpout per year.

Alternatives 1 and 2 have lower capital costs but higher O&M costs due to holding tank waste hauling to WLSSD. The present worth of both of these alternatives is higher than the cluster system alternative in the CAR. Alternative 3 has a lower capital cost and is the only alternative

with a lower cost than the cluster system alternative. **Table 3** lists advantages and disadvantages for each alternative.

Table 3
Alternative Advantage and Disadvantage Table

Alternative	Advantages	Disadvantages
Alternative 1 **ISTS replacements** **Existing bedroom capacity**	• No collection system construction.	• Household bedroom size fixed at current size. • Need to devote property to wastewater treatment. • Weekly truck traffic on Birch Point Road.
Alternative 2 **ISTS replacement** **3-bedroom capacity**	• Households can expand to 3-bedroom • No collection system construction. • Smaller property footprint than Alternative 1.	• Majority holding tank system. • Weekly truck traffic on Birch Point Road.
Alternative 3: **Hybrid System**	• No collection system construction.	• Household bedroom size fixed at current size. • Weekly truck traffic on Birch Point Road. • Difficult to operate smaller cluster treatment system due to batch loading by hauling trucks
Cluster System Alternative from CAR **(Including Total N removal)**	• Households can expand to 3-bedrooms. • No hauling trucks in neighborhood. • Grinder station or STEP system and/ pressure lines have small footprint on property. • Homeowner does not have to maintain ISTS system on their property.	• Need to obtain easements from all property owners for collection system. • Need skilled operator for Total N removal system.

USER RATE COMPARISON

User rates were determined in the CAR for the cluster system serving all 34 homes. The monthly user rate was $138/mo/user including a 50% grant on the construction cost portion of the project. The estimated annual revenue requirement for the cluster system was estimated to be $55,000 per year. This was based on a 2% interest rate on a 30-year loan from the MPCA. This revenue requirement is the sum of annual debt service cost for the loan on the construction cost and the annual O&M cost.

An evaluation of **Table 2** shows that the annual O&M costs for Alternatives 1 and 2 are above $55,000/yr. Thus, these alternatives will automatically be above the user rates for a cluster system serving all the homes. A funding or user cost analysis for the on-site systems was not conducted because even if these alternatives were funded with a 100% construction grant to replace all the ISTS systems (i.e. no debt service at all), the operating cost is $240/month for Alternative 1 ($98,000/34/12) and $308/month for Alternative 2 ($126,000/34/12). Thus, there is no benefit in using public grant funding because the operating cost is so high and the grant funding does not apply to the operating cost.

The holding tank waste hauling costs in Alternatives 1 and 2 are estimates. It is possible that residents would lower their water use and thus waste production if there was a direct cost impact. In regards to less waste production per household, the operating costs for either Alternative 1 or 2 would need to be reduced to about $50,000 ($10,000 debt service and $40,000 hauling cost) to be less than the cluster alternative. For the 3-bedroom alternative (Alternative 2) that means the hauling costs have to be less than 1/3 of the annual cost we estimated. Even at an O&M of $50,000 per yr, the monthly cost is $110/month for Alternative 2 versus $126/month for the cluster system. If everyone was restricted to the existing bedrooms and the user target was $100/month (Alternative 1), we would need an operating cost less than $40,000/yr ($10,000 debt service and $30,000 hauling cost). Again the annual cost of hauling would have to be less than 1/3 of the that estimated in this CAR amendment.

The hauling frequency/volume could be adjusted down but the actual usage and annual pumpout cost is dependent individual home usage. For Alternative 2 (3-bedroom alternative) if the hauling rate from holding tanks is more than 12 pumpouts per year for year round residents or 3 per year for seasonal residents, then the cost will be equal to or more than the cluster system. For a 2,000 gallon holding tank this equates to a maximum usage of 66 gallons per day (about two loads of laundry or 15 minutes running a garden hose at full open). It is not considered practical to limit water usage to this low a rate. Therefore, Alternatives 1 and 2 are not considered to be cost effective and are eliminated from further consideration..

The hybrid system has an annual O&M cost estimated to be $46,000/yr. A comparison of Alternative 3 to the cluster system for 34 homes is presented below. The original user rate of $138/mo/user for the cluster system is lower because the assumed interest rate is1.0% (in accordance with the scope of work) versus 2% in the original CAR.

Table 4
Estimated Average Monthly User Charges (MPCA Loan with Grant)(1)

User	Estimated User Rate, $/mo 50% Grant
Average User Rate for Cluster System (including Total N Treatment System)	$140
Alternative 3 Hybrid System	$168

(1) 30-year loan @ 1.0% interest rate

The hybrid system has a higher user rate primarily due to the higher O&M cost. Additional grant does not lower the cost of Alternative 3 as much as the cluster system because the O&M costs are a higher percentage of the total annual cost. The hybrid holding tank hauling charge would need to drop to approximately $23,000/yr to equal the cluster system cost (from $197 to $98 per 2,000 gallon pumpout).

It is important to note that the user rates presented in Table 4 are for a 30-year loan, an interest rate of 1% and the assumption that all 34 properties would be hooked up to the community system. If fewer residents are connected to the system or the loan period term is less, then the user rate listed for the cluster system could be higher.

RECOMMENDED ALTERNATIVE

The individual ISTS alternatives do not provide a lower user rate than the original cluster system. The recommended system for the Birch Point Road system continues to be a pressure sewer collection system with a treatment system and discharge to the subsurface as originally presented in the CAR.

If you have questions or need additional information, please contact me at (612) 548-3125. Thank you.

Sincerely,

MSA Professional Services, Inc.

Carl Scharfe, P.E.
Project Engineer

Enclosures: Attachment 1: On-Site Report
Attachment 2: On-Site Alternative Cost Estimate

cc: Jeff Crosby, St. Louis County
Dan Belden, WLSSD

ATTACHMENT 1

ON-SITE REPORT

July 31, 2012

Mr. Carl Scharfe, PE
MSA Professional Services, Inc.
412 Hayward Avenue North
Oakdale, MN 55128

Re: Community Assessment Report Assistance
Birch Point Road Subordinate Sanitary District, Grand Lake Twp., St. Louis Co., MN

Dear Mr. Scharfe:

The following paragraphs and associated attachments present results and conclusions for the further assessment of conditions associated with onsite wastewater systems in the Birch Point Road Subordinate Sanitary District. A Microsoft Excel spreadsheet used for analysis of the collected information, Microsoft Word file containing the tables presented below, and AutoCAD file with the area mapping have been forwarded via electronic mail.

The Birch Point Road Subordinate Sanitary District is comprised of residential properties along the northwestern shore of Caribou Lake within part of the central ½ of Section 13, Township 51 North, Range 16 West, Grand Lake Township of St. Louis County, Minnesota. Of the properties, 34 have single family dwellings constructed on them, some being used as year-round residences and some being used as cabins, both year-round and seasonally. Because the district is in a rural location, all the properties with dwellings have a wastewater system on site. For onsite wastewater systems around Caribou Lake surveyed in 2003 of which these were a part, 68 percent were observed to not have the conditions necessary to provide a sufficient level of treatment. Due to a lake-wide solution not being forthcoming, property owners organized the subordinate sanitary district through Grand Lake Township in an effort to correct the observed problems in their area. In 2011 a Community Assessment Report (CAR) was completed identifying an off-site cluster-type treatment and dispersal system as the most cost-effective and desired alternative for handling district wastewater, based in part on the onsite system information collected in 2003. Minnesota Pollution Control Agency (MPCA) review of the CAR resulted in the request for more detailed information on onsite system alternatives. MATRIX Soils & Systems was retained to further observe and document site conditions associated with on-site treatment and dispersal, and to provide conclusions regarding feasibility of replacing non-compliant onsite systems with compliant ones.

Methods used to assess feasibility included desktop and field observations. Area meeting lake, property boundary, water supply well, and building set-back distances were identified for each property via digital mapping. Dwelling size (number of bedrooms) was obtained from St. Louis County Assessor information provided by the county Environmental Services Department. Information regarding existing onsite wastewater systems and associated soil conditions was obtained from assessment forms of the 2003 survey. Field observation of property conditions occurred during a site visit conducted July 24th, 2012. Apparent building use, well type, existing onsite wastewater system type and compliance status (for those properties not reviewed in 2003), and area with potential for use in treatment and dispersal of wastewater onsite based on visually observed surface conditions were assessed for all 34 properties with dwellings, recording observations on a site assessment form. Treatment and dispersal site capability was then estimated using the assembled and recorded information to determine the type of system that could be accommodated for existing and potential future property use. Property data,

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e-mail: rwwhitmyer.matrixss@charter.net

results, and conclusions were entered into a computer database for analysis. The attached printout presents the data entered and analysis results. System construction and operation costs were projected from limited contractor contacts.

Observation and analysis results are summarized as follows:

- 59 percent of the dwellings appear to currently have the capability for year-round occupancy, whereas, in 2003 that percentage was 44.
- Existing dwelling capacities based on number of bedrooms is presented in the underlying table.

DWELLING CAPACITY	NUMBER	PERCENT
1 bedroom	11	32
2 bedrooms	9	26
3 bedrooms	14	42

- MPCA (MR 7080.1860) dwelling type based solely on square footage is presented in the underlying table.

DWELLING TYPE	NUMBER	PERCENT
I*	11	32
II†	13	38
III‡	10	30

* > 800 square feet of total living space/bedroom.
† 500-to-800 square feet of total living space/bedroom.
‡ < 500 square feet of total living space/bedroom.

- MPCA type of existing onsite wastewater systems is presented in the underlying table.

SYSTEM TYPE	NUMBER	PERCENT
I*	15	44
II†	3	9
III‡	1	3
IV§	2	6
V‖	1	3
Unknown/Other¶	12	35

* MR 7080.2200 (trenches, beds, or mounds).
† MR 7080.2250 (holding tanks).
‡ MR 7080.2300 (reduced flow Type I systems).
§ MR 7080.2350 (systems using registered treatment and distribution products).
‖ MR 7080.2400 (systems using non-registered treatment products or unconventional/unproven methods for treatment and/or dispersal).
¶ Unknown or other methods of subsurface treatment and dispersal.

- 76 percent of existing systems appear to be non-compliant failing to protect groundwater.

- Bedrooms and dwelling type translate into projected wastewater flow rates through Table IV of MR 7080.1860, a portion of which is recreated in the underlying table.

DWELLING CAPACITY	WASTEWATER FLOW (gpd) BY DWELLING TYPE*		
	I†	II	III
1 or 2 bedrooms	300	225	180
3 bedrooms	450	300	218

* Flow rates are for Type I systems; Type III (reduced flow) systems rates may be ≥ 67 percent of these rates.

† St. Louis County Ordinance 55, Section 22.02.A.3. specifies use of Type I dwelling flow rates.

- 35 percent of the properties do not appear to have conditions that will support even reduced flow systems, i.e. would require a holding tank as the compliant replacement system. This percentage increases to 68 with designating three-bedroom Type I dwellings for all properties, that for which the cluster system has been sized. The underlying table summarizes required system types for existing dwelling use as well as for three-bedroom Type I dwellings. Capability of individual properties is indicated in the attached spreadsheet printout and individual site plans.

SYSTEM TYPE	EXISTING USE*		3-BEDROOM TYPE I USE	
	NUMBER	PERCENT	NUMBER	PERCENT
I	8	24	4	12
II	17	50	23	68
III	6	17	5	14
IV	2	6	1	3
V	1	3	1	3

* Based on St. Louis County minimums. Using MPCA dwelling types increases the number of types I and III to 12 and 8, respectively, and reduces the number of holding tanks (Type II) to 12. Also, replacing shallow wells with deep ones on four of the properties would accordingly decrease the number holding tanks and increase types I and III by two each.

Determining onsite system replacement costs was somewhat problematic in that there are many alternatives to consider: three dwelling types by two use levels by two bedroom sizes by four system types by any number of soil and site characteristic differences. The alternative of most immediate interest is that which would generate costs for direct comparison to those of the cluster system, i.e. systems for three-bedroom Type I dwellings. Yet likely of additional interest are costs associated with the minimum action that will be needed to address correction of observed problems within the district, i.e. the predominant failure-to-protect-groundwater status of over three-quarters of the existing onsite systems. This minimum would be addressing existing use of the properties replacing non-compliant systems with those meeting current St. Louis County regulations. Finally, although site conditions vary within the district, there are typical conditions associated with properties capable of supporting Type I and Type III systems. For Type I capable sites, typical conditions consist of 24 inches of consistently unsaturated permeable soil and 6 percent slopes, whereas, for Type III, capable sites, 12 inches of consistently unsaturated permeable soil and 5 percent slopes are typical. These conditions translate to contour loading rates of 8 gpd/ft and 4 gpd/ft, respectively.

The following table presents projected construction and operation costs for three-bedroom Type I and III onsite wastewater systems as well as the area required for installation – of the

treatment and dispersal component, which in both cases would be a mound. Also included are the projected costs for construction and operation of a holding tank system, with separation into those that would be for systems installed at properties having dwellings used year-round, and those for systems installed at properties with seasonally-used dwellings. Relevant conditions used in the cost projections are presented in the footnotes.

SYSTEM TYPE*	REQUIRED AREA	COSTS	
		CONSTRUCTION†	OPERATION
I	80 ft × 30 ft	$18,000	$ 120‡
II (Year-Round) §	N/A‖	$ 7,200	$8,900
II (Seasonal)¶	N/A	$ 4,700	$2,000
III#	100 ft × 30 ft	$24,000	$ 120‡

* Sized for three-bedroom Type I dwellings.

† Includes estimated sales tax, system design, and construction permitting costs.

‡ Annual operation including electricity, and triennial tank pumping and maintenance visits.

§ 2,000-gallon tank pumped approximately 45 times per year, i.e. average 250 gpd.

‖ Not applicable.

¶ 1,000-gallon tank pumped approximately 12 times per year, i.e. 60 days per year averaging 200 gpd.

Sized for average flows, which are typically 67 percent of peak, in this case 100 gpd/bedroom instead of 150 gpd/bedroom.

Note two-bedroom types I and III mound systems would cost around 15 percent less than three-bedroom systems as tanks and other components would be the same; only cost of the mound would change, i.e. be less. Also, although the dispersal component of Type IV systems is likely to have a smaller footprint, e.g. an at-grade with an approximate footprint of 65 feet by 15 feet in the case of a three-bedroom Type I use, the various treatment products available and associated system configurations make for custom development to meet the needs and desires of a property owner. Although a Type IV system, of which there are two already installed and operating within the district (single pass sand and peat filters), would likely be the choice of a number of the property owners, those owners should be directly involved in selecting the technology used. Construction costs for systems utilizing Type IV technologies are likely to be in the range of 25 percent to 35 percent higher than comparably sized mound systems, annual operation costs approximately three times higher due to the necessity of annual operation visits.

The information presented in this letter report should be sufficient to allow you to update the CAR in a manner acceptable to MPCA. If you have any questions, please call or e-mail. Keep me apprised of the township meeting schedule so I may attend and assist in explanation of this information to district property owners.

Sincerely,

MATRIX Soils & Systems, Inc.

Robert W. Whitmyer, CPSS, PSS, Advanced Designer/Inspector, Service Provider
President

								Dwelling				Existing Onsite System		Future Replacement Onsite System					
First Name	Last Name	Mail	Road Name	City	State	Zip	Plat Parcel Code	2003 Use	2012 Use	Type	Bedrooms	Type	Status	CUPS Depth (in.)	Slope (%)	Type (MPCA Existing Use)	Type (St. Louis Co. Existing Use)	Type (w/ Well Replacemnt)	Year-Round Use	Type (3-bdrm Type I Dwelling)	Available Replacement Area
BERHNT	EID	5957	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00780	S	S	III	3	US	GPF	11	6	II	II	I	Y	NF	N
DANIEL	GLIBBERY	5958	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00620	S	S	II	1	US	GPF	13	3	III	III	UN	Q	NF	N
WILLIAM	ANGST	5959	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00770	YR	S	I	1	II	C	≥ 12	level	II	II	UN	Y	NF	N
MARK/ALLYSON	BERGMAN	5963	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00760	S	YR	II	1	US	GPF	17	5	II	II	III	Y	NF	N
JOHN J.	HOCEVAR	5965	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00740	YR	YR	I	3	IV	C	≥ 12	level	IV	IV	UN	Y	IV	N
THOMAS	SEYMOUR	5969	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00730	S	YR	III	2	US	GPF	≥ 12	6	II	II	UN	Q	NF	N
DOUGLAS E	MALNATI	5971	BIRCH POINT RD	SAGNAW	MN	55779	380-0050-00720	YR	S	III	1	O	GPF	6	5	III	II	UN	Y	NF	N
LYNN	SLORDAL	5977	BIRCH POINT RD	SAGINAW	MN	55779	380-0010-02675	YR	YR	I	3	I	GPF	26	3	I	III	UN	Y	III	Y
WILLIAM	JOPKE	5978	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00610	YR	YR	II	3	I	GPF	17	6	III	II	UN	Y	NF	N
DANIEL	THOMPSON	5979	BIRCH POINT RD	SAGINAW	MN	55779	380-0010-02672	YR	YR	I	3	V	C	12	level	V	V	UN	Y	V	N
GARY	LANE	5980	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00590	S	YR	II	2	I	GPF	16	7	I	III	UN	Y	NF	N
JAMES	FREEMAN	5982	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00580	S	YR	II	2	O	GPF	19	level	II	II	UN	Y	NF	N
DENNIS A	ANDERSON	5984	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00570	S	S	III	1	US	GPF	≥ 14	level	I	II	UN	Y	NF	N
JAMES	DOYLE	5986	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00560	S	S	III	1	O	GPF	9	level	II	II	UN	Y	NF	N
MICHAEL	NASH	5988	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00550	YR	YR	II	3	I	GPF	12	5	II	II	UN	Q	NF	N
RICHARD	RESCH	5900	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00540	S	YR	I	3	I	GPF	≥ 12	5	III	III	UN	Y	III	N
MARK	BOBEN	5992	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00530	YR	YR	III	3	I	GPF	23	8	I	I	UN	Y	I	N
RICHARD	PLYS	5994	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00505	YR	YR	II	3	I	GPF	28	3	II	II	UN	Q	NF	N
JAMES	HODGE	5998	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00490	YR	YR	III	3	I	GPF	11	5	I	I	UN	Y	I	N
JEANNE	PEARSON	6000	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00470	S	S	I	I	O	GPF	6	6	I	I	I	Y	III	Y
CADE	LEDINGHAM	6002	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00450	YR	YR	I	2	IV	C	11	5	IV	IV	UN	Y	NF	N
THOMAS	KURTOVICH	6004	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00440	YR	YR	I	3	III	C	8	10	II	II	UN	Y	NF	N
BRETT	MCLEAN	6010	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00415	S	YR	I	2	I	GPF	12	level	I	I	UN	Y	III	N
MARK	MELANDER	6014	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00410	S	YR	III	3	I	GPF	12	8	II	II	UN	Y	NF	N
JAMES T.	SODEMAN	6016	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00400	YR	YR	II	2	I	GPF	15	level	III	III	UN	Y	NF	N
ERIC	RUSTAD	6020	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00370	YR	YR	I	2	I	GPF	6	level	I	I	UN	Y	III	Y
KIRK	GALLUP	6026	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00311	S	S	III	3	II	C	7	3	II	II	III	Y	NF	Y
CAROL	ANDERSON	6036	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00280	YR	YR	II	3	I	GPF	10	level	III	II	UN	Y	NF	N
GORDON/TAMMI	BEIER	6040	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00270	S	S	II	1	US	GPF	≥ 12	5	I	III	UN	Q	NF	N
MARILYN E	MORRIS	6044	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00256	S	S	II	1	I	GPF	≥ 12	3	III	II	UN	Q	NF	N
ALAN	ADAMS	6048	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00245	S	S	II	2	II	GPF	7	level	II	II	I	Y	NF	N
JIM	SAMARGIA	6050	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00226	S	S	II	1	I	C	60	level	I	I	UN	Q	NF	N
DONNA	FRISK	6054	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00200	S	S	I	1	US	GPF	≥ 60	12	I	I	UN	Y	I	Y
DAVID	ERICKSON	6058	BIRCH POINT RD	SAGINAW	MN	55779	380-0050-00185	S	S	III	2	US	GPF	≥ 27	12	I	I	UN	Y	I	Y

Abreviations: CUPS = Consistently Unsaturated Permeable Soil
S = Seasonal
YR = Year-Round
Dwelling Type I = > 800 sf/bdrm
Dwelling Type II = 500 to 800 sf/bdrm
Dwelling Type III = < 500 sf/bdrm
System Type I = MR (3/11) 7080.2200
System Type II = MR (3/11) 7080.2250
System Type III = MR (3/11) 7080.2300
System Type IV = MR (3/11) 7080.2350
System Type V = MR (3/11) 7080.2400
O = Other
US = Unknown Subsurface
C = Compliant
GPF = Groundwater Protection Failure
UN = Unnecessary
NF = Not Feasible
Y = Yes
Q = Questionable
N = No

	2003	2012
Seasonal Facilities	19	14
Year-Round Facilities	15	20
Total Facilities	34	34

		Replacement		
System Status	Existing	MPCA Existing Use	St. Louis County Existing Use	MPCA 3-bdrm Type I Use
Type I	15	12	8	4
Type II	3	12	17	23
Type III	1	7	6	5
Type IV	2	2	2	1
Type V	1	1	1	1
Unknown Subsurface/Other	12			
Compliant	7			
Groundwater Protection Failure	27			
Not Feasible				23
Replacement Systems w/ Questionable Year-Round Use Capability		7		
Properties w/ Replacement Area		6		

	2003	2012
% Year-Round	44%	59%

	Dwelling Use		
	MPCA Existing	St. Louis County Existing	MPCA 3-bdrm Type I
% Compliant Existing Systems	21%		
% Failed Existing Systems	79%		
% Replacement w/ Standard Systems	35%	24%	12%
% Replacement w/ Alternative Systems	9%	9%	6%
% Replacement w/ Reduced Flow	21%	18%	15%
% Replacement w/ Holding Tanks	35%	50%	68%
% 3-bdrm Type I Replacement Capability			32%
% w/ Questionable Year-Round Use Capability for Replacement Systems	21%		
% w/ Available Replacement Sites & All Systems Compliant			18%

NOTES

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4. EXISTING USE REPLACEMENT WOULD MEET CURRENT ST. LOUIS COUNTY REGULATIONS. FUTURE USE REPLACEMENT WOULD IN ADDITION BE CAPABLE OF ACCOMODATING 3-BEDROOM TYPE I WASTEWATER FLOWS.

SEASONAL 3-BEDROOM TYPE III DWELLING
EXISTING NON-COMPLIANT UNKNOWN SUBSURFACE SYSTEM

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY
(EXISTING & FUTURE USE)

TYPE I MOUND REPLACEMENT FEASIBILITY
(EXISTING USE W/ MOVING WELLS)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

EID PROPERTY
5957 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 1

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

GLIBBERY PROPERTY
5958 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 2

NOTES

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SEASONAL 1-BEDROOM TYPE I DWELLING
EXISTING COMPLIANT TYPE II HOLDING TANK

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY (EXISTING & FUTURE USE)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	ANGST PROPERTY 5959 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779		SHEET 3	

NOTES

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YEAR-ROUND 1-BEDROOM TYPE II DWELLING
EXISTING NON-COMPLIANT UNKNOWN SUBSURFACE SYSTEM

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY (EXISTING & FUTURE USE)

TYPE III MOUND REPLACEMENT FEASIBILITY (EXISTING USE W/ MOVING SOUTHERN NEIGHBOR'S WELL)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	BERGMAN PROPERTY 5963 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 4

NOTES

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YEAR-ROUND 3-BEDROOM TYPE I DWELLING
EXISTING COMPLIANT TYPE IV INTERMITTENT SAND FILTER

TYPE IV INTERMITTENT SAND FILTER REPLACEMENT FEASIBILITY (EXISTING & FUTURE USE)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	HOCEVAR PROPERTY 5965 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 5

YEAR-ROUND 2-BEDROOM TYPE III DWELLING
EXISTING NON-COMPLIANT UNKNOWN SUBSURFACE SYSTEM

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY
(EXISTING & FUTURE USE)

NOTES

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DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

SEYMOR PROPERTY
5969 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 6

SEASONAL 1-BEDROOM TYPE III DWELLING
EXISTING NON-COMPLIANT TYPE II SANITARY PRIVY

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY
(EXISTING & FUTURE USE)

NOTES

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DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

MALNATI PROPERTY
5971 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 7

NOTES

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YEAR-ROUND 3-BEDROOM TYPE I DWELLING
EXISTING NON-COMPLIANT TYPE I MOUND

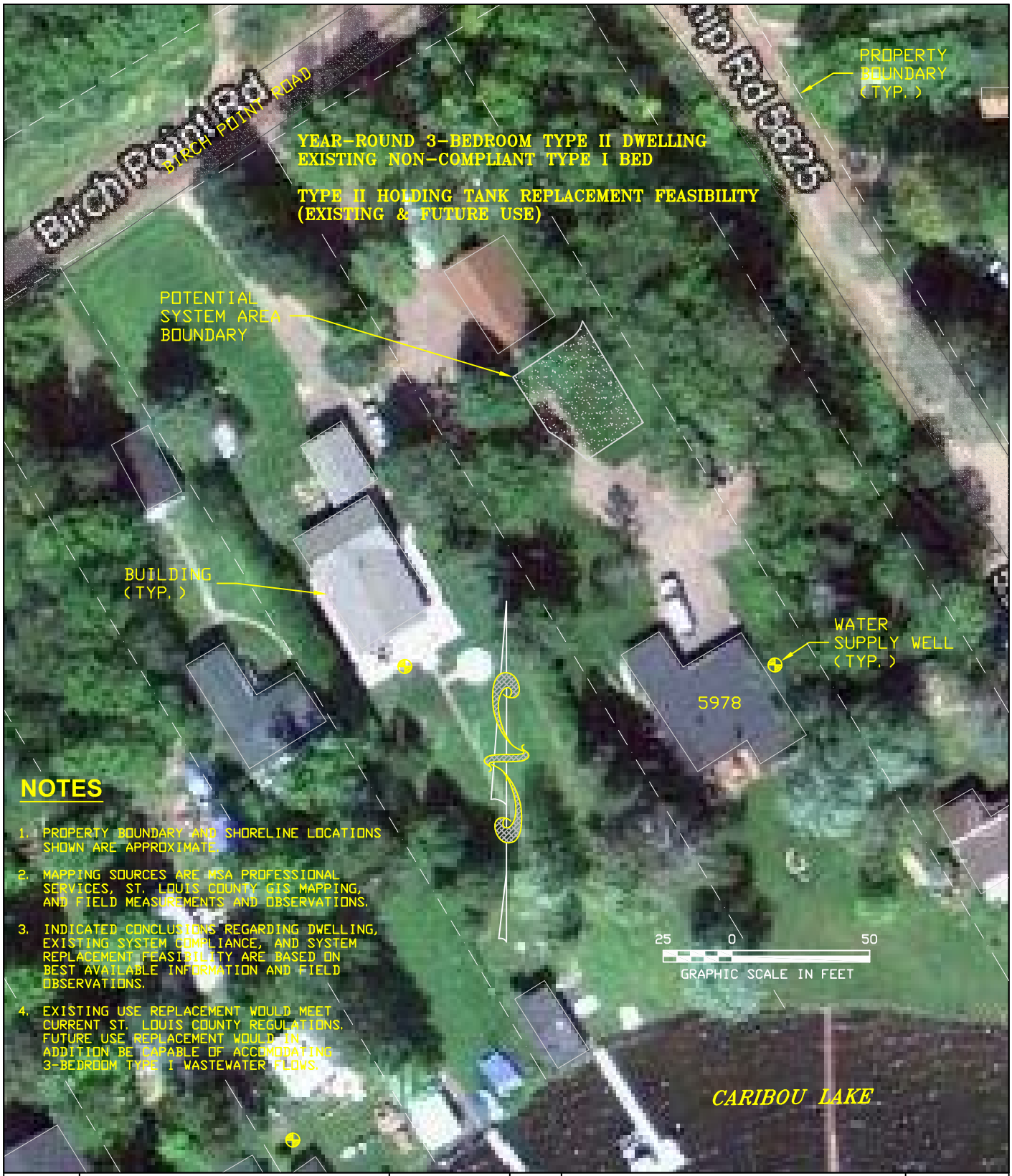
TYPE III MOUND REPLACEMENT FEASIBILITY
(EXISTING & FUTURE USE)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

SLORDAL PROPERTY
5977 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 8



NOTES

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DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	JOPKE PROPERTY 5978 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 9

NOTES

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DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

THOMPSON PROPERTY
5979 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 10

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

LANE PROPERTY
5980 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 11

NOTES

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YEAR-ROUND 2-BEDROOM TYPE II DWELLING
EXISTING NON-COMPLIANT DRYWELL

TYPE II HOLDING TANK REPLACEMENT FEASIBILITY (EXISTING & FUTURE USE)

DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	FREEMAN PROPERTY 5982 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 12

DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

ANDERSON PROPERTY
5984 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

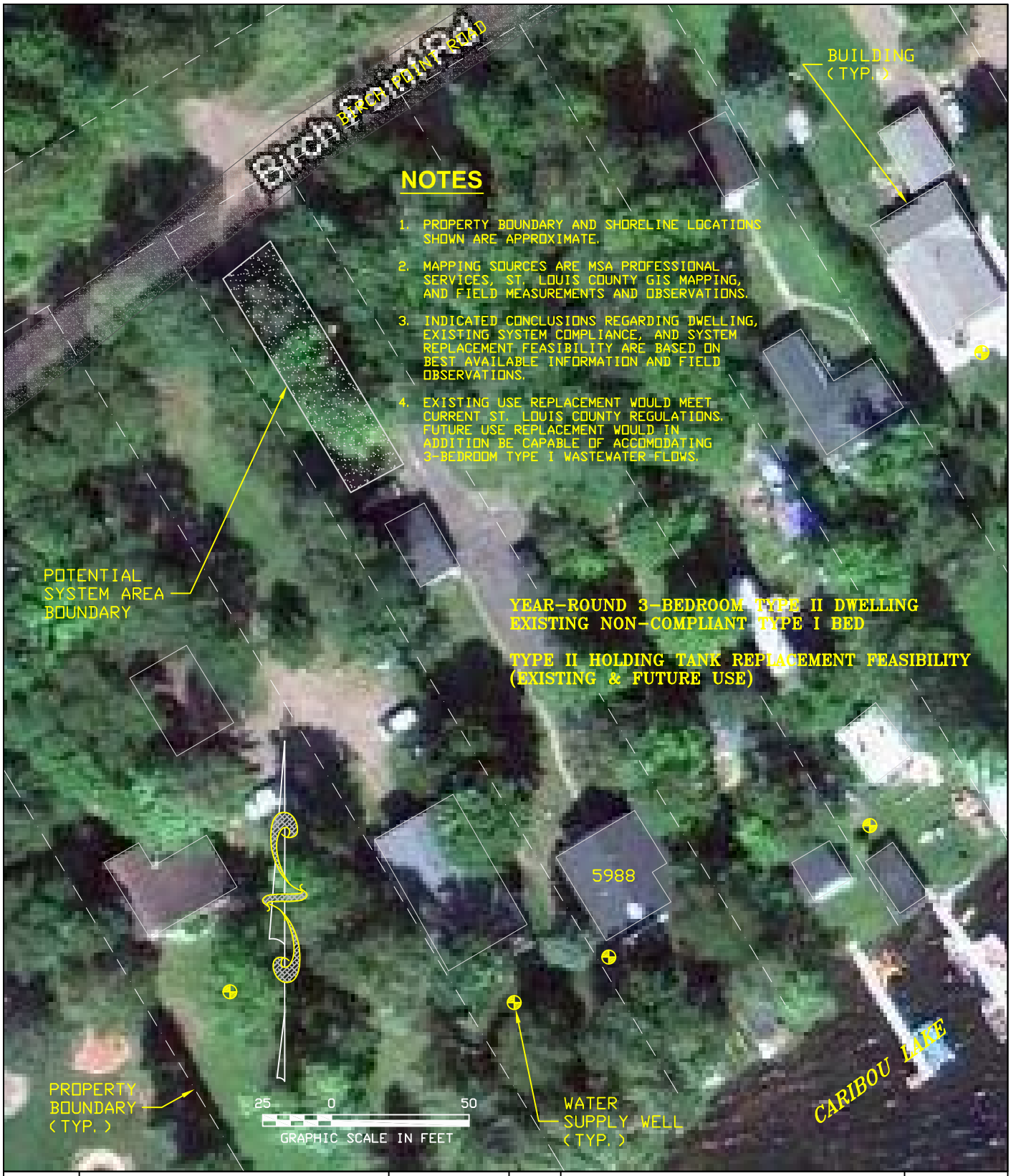
SHEET 13

DRAWN	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

DOYLE PROPERTY
5986 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 14



DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

NASH PROPERTY
5988 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 15

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

RESCH PROPERTY
5990 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 16

DRAWN	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

BOBEN PROPERTY
5992 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 17

NOTES

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DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

PLYS PROPERTY
5994 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 18

DRAWN RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

HODGE PROPERTY
5998 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 19

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

PEARSON PROPERTY
6000 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 20

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

LEDINGHAM PROPERTY
6002 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 21

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

KURTOVICH PROPERTY
6004 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 22

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

MCLEAN PROPERTY
6010 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 23

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

MELANDER PROPERTY
6014 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

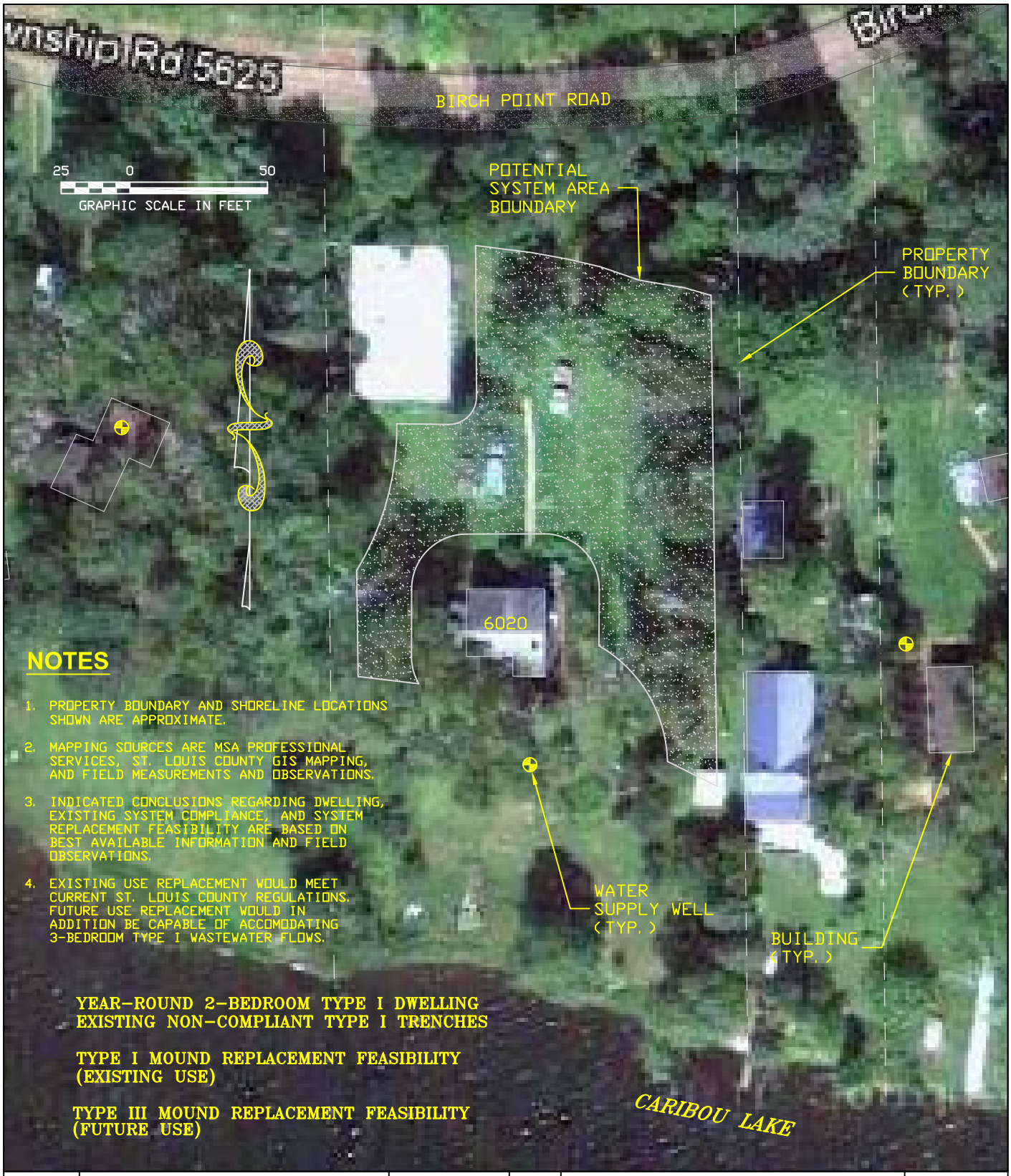
SHEET 24

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

SODEMAN PROPERTY
6016 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 25



NOTES

1. PROPERTY BOUNDARY AND SHORELINE LOCATIONS SHOWN ARE APPROXIMATE.
2. MAPPING SOURCES ARE MSA PROFESSIONAL SERVICES, ST. LOUIS COUNTY GIS MAPPING, AND FIELD MEASUREMENTS AND OBSERVATIONS.
3. INDICATED CONCLUSIONS REGARDING DWELLING, EXISTING SYSTEM COMPLIANCE, AND SYSTEM REPLACEMENT FEASIBILITY ARE BASED ON BEST AVAILABLE INFORMATION AND FIELD OBSERVATIONS.
4. EXISTING USE REPLACEMENT WOULD MEET CURRENT ST. LOUIS COUNTY REGULATIONS. FUTURE USE REPLACEMENT WOULD IN ADDITION BE CAPABLE OF ACCOMODATING 3-BEDROOM TYPE I WASTEWATER FLOWS.

YEAR-ROUND 2-BEDROOM TYPE I DWELLING
EXISTING NON-COMPLIANT TYPE I TRENCHES

TYPE I MOUND REPLACEMENT FEASIBILITY (EXISTING USE)

TYPE III MOUND REPLACEMENT FEASIBILITY (FUTURE USE)

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	RUSTAD PROPERTY 6020 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 26

NOTES

1. PROPERTY BOUNDARY AND SHORELINE LOCATIONS SHOWN ARE APPROXIMATE.
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3. INDICATED CONCLUSIONS REGARDING DWELLING, EXISTING SYSTEM COMPLIANCE, AND SYSTEM REPLACEMENT FEASIBILITY ARE BASED ON BEST AVAILABLE INFORMATION AND FIELD OBSERVATIONS.
4. EXISTING USE REPLACEMENT WOULD MEET CURRENT ST. LOUIS COUNTY REGULATIONS. FUTURE USE REPLACEMENT WOULD IN ADDITION BE CAPABLE OF ACCOMODATING 3-BEDROOM TYPE I WASTEWATER FLOWS.

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE
	MATRIX Soils & Systems	GALLUP PROPERTY 6026 BIRCH POINT ROAD SAGINAW, MINNESOTA 55779			SHEET 27

NOTES

1. PROPERTY BOUNDARY AND SHORELINE LOCATIONS SHOWN ARE APPROXIMATE.
2. MAPPING SOURCES ARE MSA PROFESSIONAL SERVICES, ST. LOUIS COUNTY GIS MAPPING, AND FIELD MEASUREMENTS AND OBSERVATIONS.
3. INDICATED CONCLUSIONS REGARDING DWELLING, EXISTING SYSTEM COMPLIANCE, AND SYSTEM REPLACEMENT FEASIBILITY ARE BASED ON BEST AVAILABLE INFORMATION AND FIELD OBSERVATIONS.
4. EXISTING USE REPLACEMENT WOULD MEET CURRENT ST. LOUIS COUNTY REGULATIONS. FUTURE USE REPLACEMENT WOULD IN ADDITION BE CAPABLE OF ACCOMODATING 3-BEDROOM TYPE I WASTEWATER FLOWS.

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

ANDERSON PROPERTY
6036 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 28

NOTES

1. PROPERTY BOUNDARY AND SHORELINE LOCATIONS SHOWN ARE APPROXIMATE.
2. MAPPING SOURCES ARE MSA PROFESSIONAL SERVICES, ST. LOUIS COUNTY GIS MAPPING, AND FIELD MEASUREMENTS AND OBSERVATIONS.
3. INDICATED CONCLUSIONS REGARDING DWELLING, EXISTING SYSTEM COMPLIANCE, AND SYSTEM REPLACEMENT FEASIBILITY ARE BASED ON BEST AVAILABLE INFORMATION AND FIELD OBSERVATIONS.
4. EXISTING USE REPLACEMENT WOULD MEET CURRENT ST. LOUIS COUNTY REGULATIONS. FUTURE USE REPLACEMENT WOULD IN ADDITION BE CAPABLE OF ACCOMODATING 3-BEDROOM TYPE I WASTEWATER FLOWS.

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

BEIER PROPERTY
6040 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 29

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

MORRIS PROPERTY
6044 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 30

DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

ADAMS PROPERTY
6048 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 31

DRAWN					
RWW	SITE MAP	AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

SAMARGIA PROPERTY
6050 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 32

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

FRISK PROPERTY
6054 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 33

DRAWN		AS SHOWN	0	POTENTIAL SEPTIC SYSTEM AREA	07/31/12
RWW	SITE MAP	SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

ERICKSON PROPERTY
6058 BIRCH POINT ROAD
SAGINAW, MINNESOTA 55779

SHEET 34

ATTACHMENT 2

ON-SITE ALTERNATIVES COST ESTIMATES

Table A-1 Birch Point Road Alternative 1 Costs (under St. Louis County Rules)

						Existing Onsite System		Future Replacement Onsite System		
First Name	Last Name	Mail	Road Name	2012 Use	Bedrooms	Type	Status	Type (St. Louis Co. Existing Use)	Construct Cost	Operation Cost, $/yr
BERHNT	EID	5957	BIRCH POINT RD	S	3	US	GPF	II	$4,700	$2,000
DANIEL	GLIBBERY	5958	BIRCH POINT RD	S	1	US	GPF	III	$21,000	$120
WILLIAM	ANGST	5959	BIRCH POINT RD	S	1	II	C	II		$2,000
MARK/ALLYSON	BERGMAN	5963	BIRCH POINT RD	YR	1	US	GPF	II	$7,200	$8,900
JOHN J.	HOCEVAR	5965	BIRCH POINT RD	YR	3	IV	C	IV		$120
THOMAS	SEYMOUR	5969	BIRCH POINT RD	YR	2	US	GPF	II	$7,200	$8,900
DOUGLAS E	MALNATI	5971	BIRCH POINT RD	S	1	O	GPF	II	$4,700	$2,000
LYNN	SLORDAL	5977	BIRCH POINT RD	YR	3	I	GPF	III	$24,000	$120
WILLIAM	JOPKE	5978	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
DANIEL	THOMPSON	5979	BIRCH POINT RD	YR	3	V	C	V		$120
GARY	LANE	5980	BIRCH POINT RD	YR	2	I	GPF	III	$21,000	$120
JAMES	FREEMAN	5982	BIRCH POINT RD	YR	2	O	GPF	II	$7,200	$8,900
DENNIS A	ANDERSON	5984	BIRCH POINT RD	S	1	US	GPF	II	$4,700	$2,000
JAMES	DOYLE	5986	BIRCH POINT RD	S	1	O	GPF	II	$4,700	$2,000
MICHAEL	NASH	5988	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
RICHARD	RESCH	5900	BIRCH POINT RD	YR	3	I	GPF	III	$24,000	$120
MARK	BOBEN	5992	BIRCH POINT RD	YR	3	I	GPF	I	$18,000	$120
RICHARD	PLYS	5994	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
JAMES	HODGE	5998	BIRCH POINT RD	YR	3	I	GPF	I	$18,000	$120
JEANNE	PEARSON	6000	BIRCH POINT RD	S	I	O	GPF	I	$18,000	$120
CADE	LEDINGHAM	6002	BIRCH POINT RD	YR	2	IV	C	IV		$120
THOMAS	KURTOVICH	6004	BIRCH POINT RD	YR	3	III	C	II		$8,900
BRETT	MCLEAN	6010	BIRCH POINT RD	YR	2	I	GPF	I	$15,000	$120
MARK	MELANDER	6014	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
JAMES T.	SODEMAN	6016	BIRCH POINT RD	YR	2	I	GPF	III	$21,000	$120
ERIC	RUSTAD	6020	BIRCH POINT RD	YR	2	I	GPF	I	$15,000	$120
KIRK	GALLUP	6026	BIRCH POINT RD	S	3	II	C	II		$2,000
CAROL	ANDERSON	6036	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
GORDON/TAMMI	BEIER	6040	BIRCH POINT RD	S	1	US	GPF	III	$21,000	$120
MARILYN E	MORRIS	6044	BIRCH POINT RD	S	1	I	GPF	II	$4,700	$2,000
ALAN	ADAMS	6048	BIRCH POINT RD	S	2	II	GPF	II	$4,700	$2,000
JIM	SAMARGIA	6050	BIRCH POINT RD	S	1	I	C	I		$120
DONNA	FRISK	6054	BIRCH POINT RD	S	1	US	GPF	I	$15,000	$120
DAVID	ERICKSON	6058	BIRCH POINT RD	S	2	US	GPF	I	$15,000	$120

S = Seasonal
YR = Year-Round
Dwelling Type I = > 800 sf/bdrm
Dwelling Type II = 500 to 800 sf/bdrm
Dwelling Type III = < 500 sf/bdrm
System Type I = MR (3/11) 7080.2200
System Type II = MR (3/11) 7080.2250
System Type III = MR (3/11) 7080.2300
System Type IV = MR (3/11) 7080.2350
System Type V = MR (3/11) 7080.2400
O = Other
US = Unknown Subsurface
C = Compliant
GPF = Groundwater Protection Failure
UN = Unnecessary
NF = Not Feasible
Y = Yes
Q = Questionable
N = No

Subtotal	$332,000	$98,140
Contingency (20%)	$66,000	
Subtotal	$398,000	
Engr, Insp. Legal	$80,000	
Total Estimated	**$478,000**	**$98,140**

20 Year Present Worth

	Cost	Present Worth
Initial Capital Cost	$478,000	$478,000
Annual O&M Cost	$98,140	$1,236,000
Total Estimated Present Worth		**$1,714,000**
Discount rate	4.875%	

8/28/2012

Table A-2 Birch Point Road Alternative 2 Costs (under St. Louis County Rules)

						Existing Onsite System		Future Replacement Onsite System		
First Name	Last Name	Mail	Road Name	2012 Use	Bedrooms	Type	Status	Type (3-bdrm Type I Dwelling)	Construct Cost	Operation Cost, $/yr
BERHNT	EID	5957	BIRCH POINT RD	S	3	US	GPF	II	$4,700	$2,000
DANIEL	GLIBBERY	5958	BIRCH POINT RD	S	1	US	GPF	II	$4,700	$120
WILLIAM	ANGST	5959	BIRCH POINT RD	S	1	II	C	II		$2,000
MARK/ALLYSON	BERGMAN	5963	BIRCH POINT RD	YR	1	US	GPF	II	$7,200	$8,900
JOHN J.	HOCEVAR	5965	BIRCH POINT RD	YR	3	IV	C	IV		$120
THOMAS	SEYMOUR	5969	BIRCH POINT RD	YR	2	US	GPF	II	$7,200	$8,900
DOUGLAS E	MALNATI	5971	BIRCH POINT RD	S	1	O	GPF	II	$4,700	$2,000
LYNN	SLORDAL	5977	BIRCH POINT RD	YR	3	I	GPF	III	$24,000	$120
WILLIAM	JOPKE	5978	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
DANIEL	THOMPSON	5979	BIRCH POINT RD	YR	3	V	C	V		$120
GARY	LANE	5980	BIRCH POINT RD	YR	2	I	GPF	II	$7,200	$8,900
JAMES	FREEMAN	5982	BIRCH POINT RD	YR	2	O	GPF	II	$7,200	$8,900
DENNIS A	ANDERSON	5984	BIRCH POINT RD	S	1	US	GPF	II	$4,700	$2,000
JAMES	DOYLE	5986	BIRCH POINT RD	S	1	O	GPF	II	$4,700	$2,000
MICHAEL	NASH	5988	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
RICHARD	RESCH	5900	BIRCH POINT RD	YR	3	I	GPF	III	$24,000	$120
MARK	BOBEN	5992	BIRCH POINT RD	YR	3	I	GPF	I	$18,000	$120
RICHARD	PLYS	5994	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
JAMES	HODGE	5998	BIRCH POINT RD	YR	3	I	GPF	I	$18,000	$120
JEANNE	PEARSON	6000	BIRCH POINT RD	S	I	O	GPF	III	$4,700	$120
CADE	LEDINGHAM	6002	BIRCH POINT RD	YR	2	IV	C	II		$8,900
THOMAS	KURTOVICH	6004	BIRCH POINT RD	YR	3	III	C	II		$8,900
BRETT	MCLEAN	6010	BIRCH POINT RD	YR	2	I	GPF	III	$18,000	$120
MARK	MELANDER	6014	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
JAMES T.	SODEMAN	6016	BIRCH POINT RD	YR	2	I	GPF	II	$7,200	$8,900
ERIC	RUSTAD	6020	BIRCH POINT RD	YR	2	I	GPF	III	$18,000	$120
KIRK	GALLUP	6026	BIRCH POINT RD	S	3	II	C	II		$2,000
CAROL	ANDERSON	6036	BIRCH POINT RD	YR	3	I	GPF	II	$7,200	$8,900
GORDON/TAMMI	BEIER	6040	BIRCH POINT RD	S	1	US	GPF	II	$4,700	$2,000
MARILYN E	MORRIS	6044	BIRCH POINT RD	S	1	I	GPF	II	$4,700	$2,000
ALAN	ADAMS	6048	BIRCH POINT RD	S	2	II	GPF	II	$4,700	$2,000
JIM	SAMARGIA	6050	BIRCH POINT RD	S	1	I	C	III		$120
DONNA	FRISK	6054	BIRCH POINT RD	S	1	US	GPF	I	$18,000	$120
DAVID	ERICKSON	6058	BIRCH POINT RD	S	2	US	GPF	I	$18,000	$120

S = Seasonal
YR = Year-Round
Dwelling Type I = > 800 sf/bdrm
Dwelling Type II = 500 to 800 sf/bdrm
Dwelling Type III = < 500 sf/bdrm
System Type I = MR (3/11) 7080.2200
System Type II = MR (3/11) 7080.2250
System Type III = MR (3/11) 7080.2300
System Type IV = MR (3/11) 7080.2350
System Type V = MR (3/11) 7080.2400
O = Other
US = Unknown Subsurface
C = Compliant
GPF = Groundwater Protection Failure
UN = Unnecessary
NF = Not Feasible
Y = Yes
Q = Questionable
N = No

Subtotal	$270,000	$126,360
Contingency (20%)	$54,000	
Subtotal	$324,000	
Engr, Insp. Legal	$65,000	
Total Estimated	**$389,000**	**$126,360**

20 Year Present Worth

	Cost	Present Worth
Initial Capital Cost	$389,000	$389,000
Annual O&M Cost	$126,360	$1,592,000
Total Estimated Present Worth		**$1,981,000**
Discount rate	4.875%	

Table A-3 Birch Point Road Alternative 3 Costs (under MPCA Rules)

							Existing Onsite System		Future Replacement Onsite System			
First Name	Last Name	Mail	Road Name	2012 Use	Type	Bedrooms	Type	Status	Type (MPCA Existing Use)	Permitted Flow	Construct Cost	Operation Cost, $/yr
BERHNT	EID	5957	BIRCH POINT RD	S	III	3	US	GPF	II	450	$4,700	$1,000
DANIEL	GLIBBERY	5958	BIRCH POINT RD	S	II	1	US	GPF	III		$21,000	$120
WILLIAM	ANGST	5959	BIRCH POINT RD	S	I	1	II	C	II	300		$1,000
MARK/ALLYSON	BERGMAN	5963	BIRCH POINT RD	YR	II	1	US	GPF	II	300	$7,200	$4,500
JOHN J.	HOCEVAR	5965	BIRCH POINT RD	YR	I	3	IV	C	IV			$120
THOMAS	SEYMOUR	5969	BIRCH POINT RD	YR	III	2	US	GPF	II	300	$7,200	$4,500
DOUGLAS E	MALNATI	5971	BIRCH POINT RD	S	III	1	O	GPF	III	300	$21,000	$120
LYNN	SLORDAL	5977	BIRCH POINT RD	YR	I	3	I	GPF	I		$18,000	$120
WILLIAM	JOPKE	5978	BIRCH POINT RD	YR	II	3	I	GPF	III	300	$21,000	$120
DANIEL	THOMPSON	5979	BIRCH POINT RD	YR	I	3	V	C	V			$120
GARY	LANE	5980	BIRCH POINT RD	YR	II	2	I	GPF	I		$15,000	$120
JAMES	FREEMAN	5982	BIRCH POINT RD	YR	II	2	O	GPF	II	300	$7,200	$4,500
DENNIS A	ANDERSON	5984	BIRCH POINT RD	S	III	1	US	GPF	I	300	$15,000	$120
JAMES	DOYLE	5986	BIRCH POINT RD	S	III	1	O	GPF	II	300	$4,700	$1,000
MICHAEL	NASH	5988	BIRCH POINT RD	YR	II	3	I	GPF	II	450	$7,200	$4,500
RICHARD	RESCH	5900	BIRCH POINT RD	YR	I	3	I	GPF	III		$24,000	$120
MARK	BOBEN	5992	BIRCH POINT RD	YR	III	3	I	GPF	I		$18,000	$120
RICHARD	PLYS	5994	BIRCH POINT RD	YR	II	3	I	GPF	II	450	$7,200	$1,000
JAMES	HODGE	5998	BIRCH POINT RD	YR	III	3	I	GPF	I		$18,000	$120
JEANNE	PEARSON	6000	BIRCH POINT RD	S	I	I	O	GPF	I		$15,000	$120
CADE	LEDINGHAM	6002	BIRCH POINT RD	YR	I	2	IV	C	IV			$120
THOMAS	KURTOVICH	6004	BIRCH POINT RD	YR	I	3	III	C	II	450		$4,500
BRETT	MCLEAN	6010	BIRCH POINT RD	YR	I	2	I	GPF	I		$15,000	$120
MARK	MELANDER	6014	BIRCH POINT RD	YR	III	3	I	GPF	II	450	$7,200	$4,500
JAMES T.	SODEMAN	6016	BIRCH POINT RD	YR	II	2	I	GPF	III		$21,000	$120
ERIC	RUSTAD	6020	BIRCH POINT RD	YR	I	2	I	GPF	I		$15,000	$120
KIRK	GALLUP	6026	BIRCH POINT RD	S	III	3	II	C	II	450		$1,000
CAROL	ANDERSON	6036	BIRCH POINT RD	YR	II	3	I	GPF	III	450	$24,000	$120
GORDON/TAMMI	BEIER	6040	BIRCH POINT RD	S	II	1	US	GPF	I		$15,000	$120
MARILYN E	MORRIS	6044	BIRCH POINT RD	S	II	1	I	GPF	III	300	$21,000	$120
ALAN	ADAMS	6048	BIRCH POINT RD	S	II	2	II	GPF	II	300	$4,700	$1,000
JIM	SAMARGIA	6050	BIRCH POINT RD	S	II	1	I	C	I			$120
DONNA	FRISK	6054	BIRCH POINT RD	S	I	1	US	GPF	I		$15,000	$120
DAVID	ERICKSON	6058	BIRCH POINT RD	S	III	2	US	GPF	I		$15,000	$120

S = Seasonal
YR = Year-Round
Dwelling Type I = > 800 sf/bdrm
Dwelling Type II = 500 to 800 sf/bdrm
Dwelling Type III = < 500 sf/bdrm
System Type I = MR (3/11) 7080.2200
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System Type III = MR (3/11) 7080.2300
System Type IV = MR (3/11) 7080.2350
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US = Unknown Subsurface
C = Compliant
GPF = Groundwater Protection Failure
UN = Unnecessary
NF = Not Feasible
Y = Yes
Q = Questionable
N = No

St. Louis County Rules	**6150**
MPCA rules	4500

ISTS Capital Cost	$384,300	$36,000
FAST unit cost for 5000 gpd	$280,000	$10,000
Total Construct Cost	$664,300	
Engineering	$100,000	
Total Capital Cost	$764,000	$46,000

20 Year Present Worth

	Cost	Present Worth
Initial Capital Cost	$764,000	$764,000
Annual O&M Cost	$46,000	$579,000
Total Estimated Present Worth		**$1,343,000**
Discount rate	4.875%	