



**Minnesota Pollution
Control Agency**

520 Lafayette Road North
St. Paul, MN 55155-4194

Notice of Availability of an Environmental Assessment Worksheet (EAW)

Holden Farms Inc.

Doc Type: Public Notice

Public Comment Information

EAW Public comment period begins: January 2, 2017

EAW Public comment period ends: February 1, 2017

Notice published in the EQB Monitor: January 2, 2017

Facility Specific Information

Facility name and location:

Holden Farms Inc., Sites 1 and 2
Site 1: Winona County
St. Charles Township
Northwest Quarter Section 5
Township 106 North, Range 10 West
Site 2: Winona County
St. Charles Township
Northeast Quarter Section 14
Township 106 North, Range 10 West

Facility contact:

Nick Holden
Holden Farms Inc.
12346 Hall Avenue
Northfield, MN 55057
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MPCA Contact Information

MPCA EAW contact person:

Nancy Drach, Planner Principal
Resource Management and Assistance Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155
Phone: 651-757-2856
Fax: 651-297-2343

MPCA Permit contact person:

Mark P. Gernes, MPCA Feedlot Staff
East Feedlot Unit, Watershed Division
Minnesota Pollution Control Agency
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Rochester, MN 55904
Phone: 507-206-2643
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General Information

The Minnesota Pollution Control Agency (MPCA) is distributing this Environmental Assessment Worksheet (EAW) for a 30-day review and comment period pursuant to the Environmental Quality Board (EQB) rules. The MPCA uses the EAW and any comments received to evaluate the potential for significant environmental effects from the project and decide on the need for an Environmental Impact Statement (EIS).

The MPCA is holding a public information meeting to provide a brief overview on the project along with environmental and permitting review and comment procedures. The MPCA's public information meeting will be on January 12, 2017 from 7:00 to 8:30 p.m. at the St. Charles Community Center, 830 Whitewater Avenue, St. Charles, Minnesota 55972.

An electronic version of the EAW is available on the MPCA Environmental Review webpage at <http://www.pca.state.mn.us/oxpg691>. If you would like a copy of the EAW or NPDES/SDS Permit or have any questions on the EAW or NPDES/SDS Permit, contact the appropriate person(s) listed above.

Description of Proposed Project

Site 1 The Proposer currently operates a swine feedlot in Section 5, St. Charles Township, Winona County. Site 1 has three total confinement, power ventilated barns, each with a 8-foot (ft) concrete liquid storage manure area (LMSA) below each barn, and one well for livestock watering. The three barns house up to 3,200 swine (960 animal units, or AUs) between 55 and 300 pounds (lbs).

p-ear2-124a

The Proposer is proposing to construct a new farrowing barn with a 2-ft deep concrete LMSA. The Proposer will also construct a mortality compost building and an additional livestock watering well. After completion of construction of the new barn, Site 1 will have the capacity to house up to 3,580 swine (1,432 AUs) over 300 lbs, 150 swine between 55 and 300 lbs (45 AUs), and 420 swine (21 AUs) under 55 lbs.

Site 2 The Proposer also operates a swine feedlot in Section 14, St. Charles Township, Winona County. Site 2 has one total confinement, power ventilated barn that houses up to 632 swine (252.8 AUs) over 300 lbs, and 900 swine (45 AUs) under 55 lbs, and a livestock watering well. The Proposer is proposing to construct a new total confinement, power ventilated farrowing gestation barn with a 10-ft deep concrete LMSA under the barn. The Proposer will also construct a mortality compost building and an additional livestock watering well. After completion of construction of the new barn, Site 2 will have the capacity house up to 3570 swine (1428 AUs) over 300 lbs, 150 swine (45 AUs) between 55 and 300 lbs, and 420 swine (21 AUs) under 55 lbs.

Written comments on the EAW must be received by the MPCA EAW contact person within the comment period listed above. For information on how to comment on the Feedlot Permit, contact the MPCA Permit contact person listed above.

NOTE: All comment letters are public documents and will be part of the official public record for this project.

Need for an EIS

The MPCA Commissioner will make a final decision on the need for an EIS after the end of the comment period.

Alternative EAW Form for Animal Feedlots

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form is authorized for use only for the preparation of Environmental Assessment Worksheets (EAWs) for animal feedlots. Project proposers should consult the guidance *Guidelines for Alternative EAW Form for Animal Feedlots* (also available at the Minnesota Environmental Quality Board (EQB) website <http://www.eqb.state.mn.us/review.html> or by calling 651-296-6300) regarding how to supply information needed by the Responsible Government Unit (RGU) to complete the worksheet form.

Note to reviewers: The Environmental Assessment Worksheet (EAW) provides information about a project that may have the potential for significant environmental effects. This EAW was prepared by the Minnesota Pollution Control Agency (MPCA), acting as the Responsible Governmental Unit (RGU), to determine whether an Environmental Impact Statement (EIS) should be prepared. The project proposer supplied reasonably accessible data for, but did not complete the final worksheet. Comments on the EAW must be submitted to the MPCA during the 30-day comment period which begins with notice of the availability of the EAW in the *Minnesota Environmental Quality Board (EQB) Monitor*. Comments on the EAW should address the accuracy and completeness of information, potential impacts that are reasonably expected to occur that warrant further investigation, and the need for an EIS. A copy of the EAW may be obtained from the MPCA by calling 651-757-2101. An electronic version of the completed EAW is available at the MPCA website <http://www.pca.state.mn.us/news/eaw/index.html>.

1. Basic Project Information.

A. Feedlot Name: Holden Farms Inc.

Feedlot

B. Proposer: Holden Farms Inc.

C. RGU: Minnesota Pollution Control Agency

Technical

Contact Person Alan D. Larsen, PE

Contact

Person Nancy Drach

and Title Professional Engineer,
Anez Consulting, Inc.

and Title Project Manager

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Willmar, MN 56201

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D. Reason for EAW Preparation: (check one)

EIS	Mandatory	Citizen	RGU	Proposer
Scoping	EAW	Petition	Discretion	Volunteered
<u> </u>	<u> </u>	<u>X</u>	<u> </u>	<u> </u>

If EAW or EIS is mandatory, give EQB rule category subpart number and name:

Minn R. 4410.4300, subp. 29A

E. Project Location:	County	<u>Winona</u>	City/Twp	<u>St. Charles</u>
Site 1	<u>1/4</u>	<u>NW</u>	<u>1/4</u>	Section <u>5</u> Township <u>106N</u> Range <u>10W</u>
Site 2	<u>1/4</u>	<u>NE</u>	<u>1/4</u>	Section <u>14</u> Township <u>106N</u> Range <u>10W</u>
Watershed (name and 4-digit code):		Site 1 Upper Mississippi-Black-Root (0704)		
		Site 2 Upper Mississippi-Black-Root (0704)		

F. Attach each of the following to the EAW:

Attachment A	Project Location Map
Attachment B	U.S.G.S. Topographical Map, Winona County Map
Attachment C	Project Site Plan
Attachment D	Neighboring Residences, Water Supply Wells, Sensitive Features, One Mile Radius
Attachment E	Cumulative Impacts – Water, Wells Map
Attachment F	Air Quality Modeling Analysis
Attachment G	Minnesota Archaeological Inventory and Historic Structures Inventory Results
Attachment H	Natural Heritage Information System Search Report
Attachment I	St. Charles Township Zoning Districts
Attachment J	MNDNR Well Construction Preliminary Assessments
Attachment K	Karst Evaluation for Project Sites 1 and 2

The National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation Permit (Feedlot Permit) application and associated documents, including the Animal Mortality Plan, the Emergency Response Plan, and the Manure Management Plan (MMP) are available for review by contacting Mark P. Gernes of the MPCA's Rochester office at mark.p.gernes@state.mn.us

G. Project summary of 50 words or less to be published in the *EQB Monitor*.

Holden Farms Inc. (Proposer) is proposing to expand two existing swine feedlots at two sites Site 1 and Site 2 (Project):

Site 1 The Proposer currently operates a swine feedlot in Section 5, St. Charles Township, Winona County. Site 1 has three total confinement, power ventilated barns, each with a 8-foot (ft) concrete liquid storage manure area (LMSA) below each barn, and one well for livestock watering. The three barns house up to 3,200 swine (960 animal units, or AUs) between 55 and 300 pounds (lbs). The Proposer is proposing to construct a new farrowing barn with a 2-ft deep concrete LMSA. The Proposer will also construct a mortality compost building and an additional livestock watering well. After completion of construction of the new barn, Site 1 will have the capacity to house up to 3,580 swine (1,432 AUs) over 300 lbs, 150 swine between 55 and 300 lbs (45 AUs), and 420 swine (21 AUs) under 55 lbs.

Site 2 The Proposer also operates a swine feedlot in Section 14, St. Charles Township, Winona County. Site 2 has one total confinement, power ventilated barn that houses up to 632 swine (252.8 AUs) over 300 lbs, and 900 swine (45 AUs) under 55 lbs, and a livestock watering well. The Proposer is proposing to construct a new total confinement, power ventilated farrowing gestation barn with a 10-ft deep concrete LMSA under the barn. The Proposer will also construct a mortality compost building and an additional livestock watering well. After completion of construction of the new barn, Site 2 will have

the capacity house up to 3570 swine (1428 AUs) over 300 lbs, 150 swine (45 AUs) between 55 and 300 lbs, and 420 swine (21 AUs) under 55 lbs.

H. Please check all boxes that apply and fill in requested data:

Site 1

Animal Type	Existing	After Project	Total Change in Number After Project	Type of Confinement
<input checked="" type="checkbox"/> Finishing hogs (between 55 and 300 pounds, or lbs)	3200 (960 AU)	150 (45 AU)	-150 (-915 AU)	Total
<input checked="" type="checkbox"/> Sows (over 300 lbs)	0	3580 (1,432 AU)	+3580 (+1,432 AU)	Total
<input checked="" type="checkbox"/> Nursery pigs (below 55 lbs)	0	420 (21 AU)	+420 (+21 AU)	Total
<input type="checkbox"/> Dairy cows				
<input type="checkbox"/> Beef cattle				
<input type="checkbox"/> Turkeys				
<input type="checkbox"/> Layer hens				
<input type="checkbox"/> Chickens				
<input type="checkbox"/> Pullets				
<input type="checkbox"/> Other (Please identify species)				
TOTAL	3200 (960 AU)	1,498 AU	+538 AU	

Site 2

Animal Type	Existing	After Project	Change in Number After Project	Type of Confinement
<input checked="" type="checkbox"/> Finishing hogs (between 55 and 300 lbs)	0	150 (45 AU)	+ 150 (+45 AU)	Total
<input checked="" type="checkbox"/> Sows (over 300 lbs)	632 (252.8 AU)	3570 (1428 AU)	+ 2938 (AU)	Total
<input checked="" type="checkbox"/> Nursery pigs (below 55 lbs)	900 (45 AU)	420 (21 AU)	-470 (-21 AU)	Total
<input type="checkbox"/> Dairy cows				
<input type="checkbox"/> Beef cattle				
<input type="checkbox"/> Turkeys				
<input type="checkbox"/> Layer hens				
<input type="checkbox"/> Chickens				
<input type="checkbox"/> Pullets				
<input type="checkbox"/> Other (Please identify species)				
Total	297.8 AU)	1,494 AU	+1,196 AU	

I. Project magnitude data.

Site 1

Total acreage of farm: 154
 Number of animal units proposed in this project: 538
 Total animal unit capacity at this location after project construction: 1498
 Acreage required for manure application: 527 ac/yr

Site 2

Total acreage of farm:	12.8	
Number of animal units proposed in this project:	1196.2	
Total animal unit capacity at this location after project construction:		1494
Acreage required for manure application:	525 ac/yr	

J. Describe construction methods and timing.

Site 1: The Proposer currently operates a swine feedlot in Section 5, St. Charles Township, Winona County. The Proposer is currently permitted for three total confinement, power ventilated barns: one 41-foot x 248-foot barn, and two 81-foot x 352 foot barns. All three barns have an 8-foot (ft) concrete liquid storage manure area (LMSA) located below the barn. The Proposer also has one well for livestock watering. The Proposer's Site 1 is currently registered up to 3,200 swine (960 animal units, or AUs) between 55 and 300 pounds (lbs). The Proposer is proposing to construct one new 128-foot x 364-foot total confinement power ventilated barn with a 2-foot deep concrete LMSA, a 20-foot x 60-foot mortality compost building with a 30-foot concrete apron, a new livestock well, and a stormwater detention area. After completion of construction of the new barn, the Proposer's Site 1 will be registered to house up to 3,580 swine (1,432 AUs) over 300 pounds (lbs), 150 swine between 55 and 300 lbs (45 AUs), and 420 swine (21 AUs) under 55 lbs.

Site 2: Site 2 The Proposer also operates a swine feedlot in Section 14, St. Charles Township, Winona County. The Proposer is currently permitted for one 118-foot x 349-foot total confinement, power ventilated barn. The Proposer also has one well for livestock water. The Proposer's Site 2 is currently registered for up to 632 (252.8 AUs) swine over 300 lbs, and 900 (45 AUs) under 55 lbs. The Proposer is proposing to construct a new 162-foot x 520-foot total confinement, power ventilated barn with a 10-ft deep concrete LMSA under the barn, with a below-ground perimeter drain tile around the LMSA. The Proposer is also constructing a 20-foot x 60-foot mortality compost building, an additional livestock watering well, and a stormwater detention area. After completion of construction of the new barn, the Proposer's Site 2 will be registered to house up to 3570 swine (1428 AUs) over 300 lbs, 150 swine (45 AUs) between 55 and 300 lbs, and 420 swine (21 AUs) under 55 lbs.

Construction Timing (both sites)

The Proposer plans to begin construction at both Sites 1 and 2 in the spring of 2017, beginning with the installation of stormwater erosion prevention and sediment control best management practices (BMPs), including silt fence and top soil stripping and stockpiling. The Proposer will transport and place for fill soils excavated from the location of the proposed barns. The Proposer will place the perimeter drain tile at the construction limits of the reinforced concrete LMSA for the proposed barn on Site 2 below footing elevation. The Proposer is using the perimeter drain tile to relieve any seasonal saturation and limit any hydrostatic pressure on the concrete LMSA walls. This will also help the Proposer dewater the Project excavation area if necessary due to the presence of perched groundwater or following precipitation events. The Proposer has designed the perimeter drain tile to discharge to the surface up gradient from the stormwater detention pond, allowing the Proposer to observe that the tile is operational and identify any seepage from the pit if a leak would occur.

The Proposer will install the concrete LMSAs, perimeter drain tile, driveways, and utilities at the same time. The Proposer's construction will include placement of the concrete for the LMSA floors, building and column footings and the compost building slab after placement of specified reinforcing steel and concrete forms. The Proposer will follow the wall and column construction with placement of precast beams and slats, after the design engineer has approved the wall and column construction. The Proposer will follow construction of the two swine barns and compost buildings and installation of

equipment and final grading with installation of permanent stormwater treatment methods. The Proposer will provide stormwater drainage via vegetated swales for infiltration. The vegetated swales will direct stormwater away from each site through final grading and permanent vegetative cover.

The Proposer expects to complete construction in the fall of 2017. The Proposer's actual construction dates are dependent on completion of the environmental review process, issuance of the Feedlot from the MPCA, issuance of the Minnesota Department of Natural Resources' (MNDNR) individual water appropriations permits as well as Winona County permits/approvals.

K. Past and future stages.

Is this project an expansion or addition to an existing feedlot? ☒ Yes ☐ No

Are future expansions of this feedlot planned or likely? ☐ Yes ☒ No

If either question is answered yes, briefly describe the existing feedlot (species, number of animals and animal units, and type of operation) and any past environmental review or the anticipated expansion.

The Proposer's Project consists of expanding two existing swine feedlots:

Site 1. The Proposer is currently permitted for one 41-foot x 248-foot total confinement, power ventilated barn with an 8-foot deep reinforced, poured-in-place concrete LMSA below the barn, and two 81-foot x 352-foot total confinement, power ventilated barns each with an 8-foot deep reinforced, poured-in-place concrete LMSA below the barns. The Proposer's Site 1 is currently registered to house up to a total of 3,200 swine each weighing between 55 to 300 pounds (960 AUs) in the three barns. There has been no previous environmental review completed for Site 1.

Site 2. The Proposer is currently permitted for one 118-foot x 349-foot total confinement, power ventilated barn with an 8-foot deep reinforced, poured-in-place concrete LMSA below the barn. The Proposer's Site 2 is currently registered to house up to a total of 632 swine each weighing over 300 pounds and 900 swine each weighing under 55 pounds (297.8 AUs) in the barn. There has been no previous environmental review completed for Site 2.

The Proposer does not plan any further expansion of either site.

2. Land uses and noteworthy resources in proximity to the site.

A. Adjacent land uses. Describe the uses of adjacent lands and give the distances and directions to nearby residences, schools, daycare facilities, senior citizen housing, places of worship, and other places accessible to the public (including roads) within one mile of the feedlot and within or adjacent to the boundaries of the manure application sites.

The Project and all associated manure application sites are located in Winona County on land that is agricultural and rural in nature.

Project Site 1

There are a total of 20 residences within 1 mile of Site 1, including a newly constructed home with an unverified well. Trout Run Creek is approximately 1,600 feet northwest of Site 1. An unnamed tributary of Trout Run Creek lies west of Site 1 at a separation distance of 1,600 feet or greater.

Winona County setback rules require Site 1 be at least 1,000 feet from neighboring residences, ½ mile from incorporated city limits, schools, platted subdivisions, public parkland and churches, and 250 feet from a nonfarm neighbor property line. The nearest neighbor is 1,500 feet north of Site 1. Site 1 is approximately 1.9 miles north of the nearest incorporated city limits. St. Charles High School is 3 miles south of Site 1. The closest public parkland is Whitewater State Park, 1-mile north of Site 1. Berea Moravian Church is 2.66 miles northeast of Site 1. Site 1 is approximately 1,000 feet from any property line.

Attachments D and E, developed from a compilation and cross-check of currently available county, state, and federal mapping systems, show the location of the 20 neighbors within 1 mile of Site 1. All residences are in Winona County:

- Non-farm residence located 0.93 miles northeast (D4)
- Non-farm residence located 1.0 miles northeast (D5)
- Non-farm residence located 0.48 miles northeast (D6)
- Non-farm residence located 0.29 miles north (D7)
- Farm residence located 0.79 miles northwest (D8)
- Non-Farm residence located 0.57 miles northwest (constructed late 2015/early 2016)
- Non-farm residence located 1.0 mile northwest (D10)
- Non-farm residence located 0.70 miles northwest (D11)
- Non-farm residence located 0.76 miles northwest (D12)
- Non-farm residence located 0.83 miles southwest (D14)
- Non-farm residence located 0.73 miles west (D15)
- Farm residence located 0.62 miles southwest (D16)
- Farm residence located 0.85 miles southwest (D17)
- Non-farm residence located 0.67 miles south (D18)
- Non-farm residence located 0.64 miles south (D19)
- Farm residence located 0.87 miles southeast (D20)
- Farm residence located 0.73 miles east (D21)
- Non-farm residence located 0.98 miles southeast (D29)
- Non-farm residence located 0.93 miles southeast (D30)
- Non-farm residence located 0.78 miles southeast (D31)

Project Site 2

There are a total of 11 residences within 1 mile of Site 2. The South Fork Whitewater River is 1 or more miles from Site 2. An unnamed intermittent stream lies 700 feet or greater from Site 2.

Winona County setback rules require Site 2 at least 1,000 feet from neighboring residences, 0.5 mile from incorporated city limits, schools, platted subdivisions, public parkland and churches, and 250 feet from a nonfarm neighbor property line. The nearest neighbor is 560 feet east of Site 2. Site 2 is approximately 2.66 miles northeast from the nearest incorporated city limits. St. Charles High School is 3.66 miles southwest of Site 2. The closest public parkland is Whispering Hills Park, approximately 3 miles southwest of Site 2. St. Charles Borromeo Catholic Church is 2.66 miles southwest of Site 2. Site 2 is approximately 415 feet from a nonfarm neighbor property line.

Attachments D and E, developed from a cross check of currently available county, state and federal mapping systems, show the location of the neighbors within 1 mile of the Site 2. All residences are in Winona County:

- Farm residence located 0.6 miles northeast (D2)
- Non-farm residence located 0.65 miles north (D3)
- Farm residence located 0.64 miles north (D4)

- Non-farm residence located 0.58 miles northwest (D5)
- Farm residence located 0.98 miles southwest (D15)
- Non-farm residence located 0.28 miles southwest (D16)
- Farm residence located 0.78 miles south (D17)
- Non-farm residence located 0.11 miles east (D18)
- Non-farm residence located 0.81 miles southeast (D19)
- Non-farm residence located 0.98 miles southeast (D24)
- Farm residence located 0.98 miles south (D26)

The Proposer plans to use a total of 31 Manure Applications Sites for the Project (15 for Site 1 and 16 for Site 2). The Proposer is required to, and is completing an additional review of the MDH Minnesota Well Index to ensure all MMP information, including unverified wells, is accurate for the purposes of providing information on applicable manure application setbacks.

Manure Application Sites for Site 1

All 15 of the Site 1 manure application sites are within 4 miles of Site 1 with 1 manure application site surrounding Site 1. All 15 sites manure application sites are located in St. Charles and Elba townships within Winona County. The majority of the sites are currently cultivated in a row-crop rotation (i.e. corn, soybeans) with a few currently in alfalfa production.

Both Attachments A and E show the locations of the following 15 manure application sites for Site 1.

Manure Application Site 1: 124-acre site in the north half of Section 28, Elba Township, Winona County, 2 miles northeast of Site 1 and bordered by Berea Drive to the north and Winona County Road 39 to the east. The site surrounds a residence (D39) in the northeast corner of the Site 1. There is also a residence (D40) east of Site 1 on the other side of Winona County Road 39. A Minnesota Biological Survey (MBS) listed site of outstanding biodiversity significance lies 300 feet west and south of the site. A MBS-listed site of moderate biodiversity significance is approximately 1,500 feet north and west of the site. The outer boundary of Whitewater State Park is 300 feet west of this site.

Manure Application Site 3: 79-acre site consisting of a 7- and a 72-acre parcel in the northwest quarter of Section 27, Elba Township, 2.5 miles northeast of the Site 1 and bordered by Winona County Road 24 to the north. There is a residence (D42) on the north side of this site. An unnamed intermittent stream lies between the two parcels of this site.

Manure Application Site 4: 79-acre site in the west half of the northeast quarter of Section 27 of Elba Township, 2.8 miles northeast of the Site 1 and bordered by County Road 24 to the north. Two MBS listed sites of high biodiversity significance are approximately 2,000 feet east of this site.

Manure Application Site 7: 44-acre site in the southeast quarter of the northeast quarter of Section 32, Elba Township, 0.85 miles northeast of Site 1 and bordered by Site 8 to the south. This site surrounds a residence (D5) in the southeast corner of this site. The outer boundary of Whitewater State Park lies 50 feet to the northwest of this site. Trout Run Creek is 420 feet on the west side of this site. An unnamed intermittent stream is 100 feet south of this site.

Manure Application Site 8: 55-acre site in the southeast quarter of the southeast quarter of Section 32, Elba Township, 0.55 miles northeast of the Site 1 and bordered by Geib Road to the east and Persons Drive to the south. A residence (D5) is northeast of this site. An unnamed intermittent stream is on and adjacent to the north end of this site.

Manure Application Site 9: 109-acre site in the west half of Section 33, Elba Township, 0.8 miles northeast of the Site 1 and bordered by Geib road to the west and Winona County Road 39 to the south. This site surrounds two residences, (D5) to the west and (D4) to the south. There is also a residence (D3) northeast of this site. Published sources indicate that there is a karst feature 100 feet north of this site.

Manure Application Site 10: 77-acre site in the east half of the southwest quarter of Section 33, Elba Township, 1-mile northeast of Site 1 and bordered by Winona County Road 39 to the south. There is a residence (D2) southeast of this site. An unnamed intermittent stream is on and adjacent to this site.

Manure Application Site 11: 137-acre site in the northwest quarter of Section 5, St. Charles Township that will surround Site 1 and bordered by Persons Drive to the north. Trout Run Creek is 375 feet west of this site.

Manure Application Site 12: 146-acre site in the northeast quarter of Section 5, St. Charles Township, 0.25 miles east of Site 1 and bordered by Persons Drive to the north and Winona County Road 39 to the west. This site surrounds a feedlot residence (D21) in the southeast corner. An unnamed intermittent stream is west of this site.

Manure Application Site 13: 149-acre site in the southwest quarter of Section 5, St. Charles Township, 0.3 miles south of the Site 1 and bordered by Winona County Road 39 to the south. The site surrounds a residence (D19) to the south and there is a residence (D18) southwest of this site. Unnamed intermittent streams are on the northeast part of this site and adjacent to the west side of this site.

Manure Application Site 14: 143-acre site located in the southeast quarter of Section 5, St. Charles Township, 0.4 miles southeast of the Project bordered by Winona County Road 39 to the south and east. This site surrounds a feedlot residence (D20) in the southeast corner. Three residences (D29-D31) are south of the site on the other side of Winona County Road 39.

Manure Application Site 15: 281-acre site consisting of a 252-, a 5-, and a 24-acre parcel in the west half of Section 4, St. Charles Township, 0.8 miles east of Site 1 and bordered by Winona County Road 39 to the north and west and Winona County Road 119 to the south. This site surrounds a residence (D23) in the south portion of this site. An unnamed intermittent stream is on and adjacent at the southeast of this site. The South Fork Whitewater River is 475 feet south of this site.

Manure Application Site 16: 216-acre site in the east half of Section 4, St. Charles Township, 1.2 miles east of Site 1 and bordered by Winona County Road 39 and Border Line Drive to the north and Winona County Road 39 to the west. The site surrounds a residence (D25) in the central portion of this site and there is a residence (D44) northeast of this site. An unnamed intermittent stream is 100 feet southwest of this site. The South Fork Whitewater River is 475 feet south of this site.

Manure Application Site 17: 118-acre site in the central portion of Section 3, St. Charles Township, 2 miles east of Site 1 and bordered by Border Line Drive to the north. There is a residence (D43) north of the site on the other side of Border Line Drive. An unnamed intermittent stream is adjacent on the east side of this site. The South Fork Whitewater River is 465 feet south of this site.

Manure Application Site 19: 143-acre site in the north half of Section 8, St. Charles Township, 0.65 miles south of Site 2 and bordered by Winona County Road 39 to the north. The site surrounds a residence (D31) in the northeast corner of this site, and there is a residence (D19) north of this site

across Winona County Road 39. An unnamed intermittent stream is on the south edge of this site and on the northeast part of this site.

Manure Application Sites for Site 2

All 16 of the Site 2 manure application sites are within 2 miles of Site 2, with one manure application site surrounding Site 2. All 16 sites are in Winona County. The manure application sites are in St. Charles Township in Winona County. The majority of the manure application sites are currently cultivated in a row-crop rotation (i.e. corn, soybeans) with a few currently in alfalfa production.

Both Attachments A and E show the locations of the following Site 2 manure application sites.

Manure Application Site 25: 6-acre site consisting of a 2- and a 4-acre parcel in the southwest quarter of the northwest quarter of Section 11, St. Charles Township, Winona County, 0.9 miles northwest of the Site 2 and bordered by Winona County Road 115 to the south and Winona County Road 37 to the west. A gravel pit divides this site from north to south. An unnamed intermittent stream is between the parcels of this site.

Manure Application Site 29: 236-acre site in the southeast quarter of Section 10 and the west half of the southwest quarter of Section 11, St. Charles Township, 0.6 miles northwest of Site 2 and bordered by Winona County Road 37 to the west and north and by Winona County Road 115 to the north. This site surrounds a residence (D7) in the northwest corner, and there is a residence (D8) west of this site on the other side of Winona County Road 115. An unnamed intermittent stream is on the northeast portion of this site.

Manure Application Site 30: 185-acre site in the south half of Section 11, St. Charles Township, 1,000 feet north of Site 2 and bordered by Winona County Road 115 to the north and east. This site surrounds a residence (D5) in the northeast corner of the site and there are two residences (D3 and D4) northeast of this site on the other side of Winona County Road 115. Unnamed intermittent streams are on the southwest and the southeast portions of this site.

Manure Application Site 31: 87-acre site in the southwest quarter of Section 12, St. Charles Township, located 800 feet northeast of Site 2, bordered by Summit Drive to the north and Winona County Road 115 to the west. There is one feedlot residence (D2) in the northeast corner of this site. An unnamed intermittent stream is on the west part of this site.

Manure Application Site 32: 163-acre site in the southeast quarter of Section 12, St. Charles Township, 0.6 miles northeast of Site 2 and bordered by Summit Drive to the north and (Utica Line Road) St. Charles Township 10 to the east. There is a feedlot residence (D1) north of this site.

Manure Application Site 33: 45-acre site in the northwest quarter of the northwest quarter of Section 14, St. Charles Township, 0.6 miles west of Site 2 and bordered by Site 34 to the east and Site 29 to the north. An unnamed intermittent stream is on the southeast part of this site.

Manure Application Site 34: 148-acre site in the north half of Section 14 and the south half of Section 11, St. Charles Township, will surround Site 2 and is bordered by Winona County Road 115 to the east. This site surrounds the Site 2 residence. An unnamed intermittent stream is on the southwest part of this site.

Manure Application Site 35: 154-acre site in the northwest quarter of Section 13, St. Charles Township, 440 feet east of Site 2 and bordered by Winona County Road 115 to the West. This site

surrounds a residence (D118) on the west side. An unnamed intermittent stream is through the middle part of this site.

Manure Application Site 36: 192-acre site in the northeast quarter of Section 13, St. Charles Township, 0.7 miles east of the Project and is bordered by Utica Line Drive to the east. This site surrounds a feedlot residence (D20) in the southeast corner. An unnamed intermittent stream is on the southern part of this site. The City of Utica's (Utica) Drinking Water Source Management Area (DWSMA) boundary is across Utica Line Road to the southeast.

Manure Application Site 37: 146-acre site consisting of a 16- and 130-acre parcel in the central portion of the east half of Section 15, St. Charles Township, 0.9 miles southwest of Site 2 and bordered by Winona County Road 37 on the west. There are three residences (D11-D13) northwest of this site, with one of them being on the other side of Winona County Road 37. Unnamed intermittent streams are between the parcels and on the northeast of the 130-acre parcel of this site.

Manure Application Site 38: 134-acre site in the south half of the north half of Section 14, St. Charles Township, 220 feet south of Site 2 and bordered by Winona County Road 115 to the east. This site surrounds a residence (D16) on the south side. An unnamed intermittent stream is on the west part of this site.

Manure Application Site 39: 195-acre site in the south half of Section 14, St. Charles Township, 0.3 miles south of Site 2 and bordered by Winona County Road 115 to the east. This site surrounds a feedlot residence (D17) on the south side and there is a residence (D16) north of this site. An unnamed intermittent stream is adjacent to the west part of this site.

Manure Application Site 40: 59-acre site in the southwest quarter of the southwest quarter of Section 14, St. Charles Township, 0.71 miles southwest of Site 2 and bordered by sites 37 and 41 on the west. There is a feedlot residence (D15) in the southeast corner of this site. An unnamed intermittent stream is adjacent east of this site.

Manure Application Site 41: 166-acre site in the southeast quarter of Section 15 and the northeast quarter of section 22, St. Charles Township, 1 mile southwest of Site 2 and bordered by Winona County Road 37 to the west and Minnesota State Highway 14 to the south. There is a residence (D32) in the southwest corner of this site. Published sources indicate that there is a karst feature lying in the northeastern portion of this site.

Manure Application Site 42: 70-acre site in the north half of the northwest quarter of Section 24, St. Charles Township, 0.82 miles southeast of Site 2 and bordered by Minnesota State Highway 14 on the south Winona County Road 115 to the west, and Utica Drive to the north. This site surrounds a residence (D24). Published sources indicate that there is a karst feature 100 feet north of this site. Utica's DWSMA boundary is across State Highway 14 to the southeast.

Manure Application Site 43: 161-acre site in the southeast quarter of Section 23, St. Charles Township, 1.2 miles south of Site 2 and bordered by Robinson Road to the east, Sand Hill Drive to the south, and CP Rail Systems to the north. There is a residence (D25) northeast of the site on the other side of Robinson Road. There is also a residence southwest of the site on the other side of (Sand Hill Drive) St. Charles Township 4. A MBS-listed site of biological significance lies approximately 300 feet east of the site. Published sources indicate that there is a karst feature lying in the center portion of the site. An unnamed intermittent stream is adjacent to the west of the site. The Utica's DWSMA boundary lies adjacent to the site on the east and the south.

B. Compatibility with plans and land use regulations. Is the project subject to any of the following adopted plans or ordinances? Check all that apply:

- ☒ local comprehensive plan
- ☒ land use plan or ordinance
- ☐ shoreland zoning ordinance
- ☐ flood plain ordinance
- ☐ wild or scenic river land use district ordinance
- ☐ local wellhead protection plan

Is there anything about the proposed feedlot that is not consistent with any provision of any ordinance or plan checked? ☐ Yes ☒ No.

If yes, describe the inconsistency and how it will be resolved.

The Proposer will not locate the Project in an area planned or zoned for future land uses that are incompatible with a feedlot.

Are there any lands in proximity to the feedlot that are officially planned for or zoned for future uses that might be incompatible with a feedlot (such as residential development)? ☐ Yes ☒ No

If yes, describe the potentially affected use and its location relative to the feedlot, its anticipated development schedule, and any plans to avoid or minimize potential conflicts with the feedlot.

Not applicable.

C. Nearby resources. Are any of the following resources on or in proximity to the feedlot, manure storage areas, or within or adjacent to the boundaries of the manure application sites?

- Drinking Water Supply Management Areas designated by the Minnesota Department of Health?
☒ Yes ☐ No
- Public water supply wells (within two miles)? ☒ Yes ☐ No
- Archaeological, historical or architectural resources? ☒ Yes ☐ No
- Designated public parks, recreation areas or trails? ☒ Yes ☐ No
- Lakes or Wildlife Management Areas? ☒ Yes ☐ No
- State-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities? ☒ 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.

Attachment D shows sensitive features within one mile of Sites 1 and 2. Attachment E also includes a map showing resources around Sites 1 and 2.

The public water supply well information described below is based on information readily available to citizens, and may include information included in the Minnesota Department of Health's (MDH) Minnesota Well Index, along with other local information sources as available. The Minnesota Well

Index log information is based on well log data provided by licensed well drillers. In 1974, the Minnesota Legislature passed the Minnesota Water Well Construction Code, requiring the submittal of well log data by licensed well drillers. While the County Well Index does not represent all wells in Minnesota, as it only reflects submitted well log information, it is the single most complete listing of state wells in Minnesota.

It is reasonable to assume all residences within the Project areas have a well or share access to a neighbor's well. The information shown in Attachments D and E contains only MDH-verified wells found in the Minnesota Well Index. However, the Proposer has identified additional unverified, primarily private, wells through its continuing preparation of both the the draft Water Appropriations Permit application, and Manure Management Plans for setbacks.

Site 1

Public Water Supply Wells

The Proposer has submitted information indicating there are 10 public water supply wells within 2 miles of Site 1 and/or the manure application sites for Site 1.

Berea Moravian Church Well

The Berea Moravian Church Well, a water supply well, is 1,070 feet north of manure application site 1 for Site 1, across Berea Drive in the southeast quarter of Section 21 of Elba Township. This well is 550 feet deep. The MDH information indicates this well is not susceptible to contamination because it meets current construction standards and does not present a pathway for contamination to readily enter the groundwater water supply. MDH considers the bedrock aquifer to exhibit a high sensitivity to contamination because of the local geological setting. The source water protection plan for the well consists of an inner wellhead management zone defined by a 200-foot radius around each well that supplies drinking water. MDH has identified four potential contaminant sources of concern for the Bear Moravian church well:

- An absorption area of a soil dispersal system with an average flow of 10,000 gallons or less
- Grave or mausoleum
- Septic tank
- A watertight sewage treatment device.

The Proposer must follow an MPCA-approved Manure Management Plan (MMP) and submit an annual report to the MPCA on manure production, land application, and any discharges. This includes required setbacks for land application of manure from wells. The Proposer indicates there are no manure application sites within 200 feet of the Berea Moravian Church Well. The MPCA-approved MMP is an integral and enforceable part of the Feedlot Permit.

Whitewater State Park Wells

There are six water supply wells associated with the Whitewater State Park and campgrounds. All six of the wells are in section 20 of Elba Township with the nearest well approximately 3,443 feet northwest of manure land application site 1. Wells identified with unique well numbers (#) 164906, 219076, 219107, 507586 meet current standards for construction and maintenance and MPCA. MDH believes because they meet current standards they do not contribute to the susceptibility of the source water to contamination. MDH considers wells with unique well #219217 and 219221 as potentially vulnerable to contamination because there is insufficient information to document well construction. MDH considers the bedrock aquifer and one glacial deposits aquifer exhibit a high sensitivity to contamination because of the local geological setting. MDH considers the source of drinking water as susceptible because one or more wells exhibit a high sensitivity.

The following list summarizes the types and sources of potential contamination present in the inner wellhead management zone for the Whitewater State Park and campgrounds and the potential drinking water contaminants related to them:

- Absorption area of a sewage soil dispersal system, average flow 10,000 gallons/day or less
- Absorption area of a soil dispersal system serving several family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)
- Cistern or reservoir, buried, non-pressurized water supply
- Floor drain, grate, or trough connected to a buried sewer
- Household solid waste disposal area, single residence
- Liquid petroleum tank
- Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)
- Privy, non-portable
- Petroleum storage tank, above ground, less than 1,100 gallons
- Sewer buried, approved, air tested
- Septic tank
- Sewage treatment device, watertight
- Operating well
- Wastewater treatment unit tanks, vessels and components (Package plant)

The MDH has information indicating that routine monitoring for this water supply has detected one or more contaminants regulated under the federal Safe Drinking Water Act for this type of public water system. However, the information also indicates water supplied to users meets state and federal standards for drinking water quality. The source water protection plan for the Whitewater State Park wells consists of an inner wellhead management zone defined by a 200-foot radius around each well that supplies drinking water. The Proposer's information shows there are no manure land application sites within that 200-foot radius, thus minimizing risk to the wells.

The Proposer must follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

Lazy D Campground Well 1

Well 1, for Lazy D Campground is 8,750 feet north of manure application site 1 for Site 1, across Berea Drive, in the northwest quarter of Section 16 of Elba Township. The MDH Well Log Report does not list aquifer information and has listed the depth of the well as "0" feet. The MDH has classified this well as a public supply/non-community-transient well.

MDH considers Lazy D Campground's existing Well 1 susceptible to contamination because it does not meet current well construction standards or no information about well construction is available, regardless of aquifer sensitivity. MDH considers aquifer sensitivity high in this well area because either insufficient geologic information is available or existing information indicates the presence of vulnerable geologic conditions. The source water protection plan for the Lazy D Campground Well consists of an inner wellhead management zone defined by a 200-foot radius around each well that supplies drinking water. MDH has identified five potential contaminant sources of concern in the area of this well:

- Absorption area of a soil dispersal system average flow of 10,000 gallons or less
- Household solid waste disposal area-single residence
- Septic tank
- Ordinary high water level of a river
- Swimming pool-in ground.

The MDH has not detected any of the contaminants regulated under the federal Safe Drinking Water Act in the source water during required monitoring for this type of public water system.

The Proposer must follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. This includes proper manure application setbacks from wells. The Proposer's information shows there are no manure application sites within 200 feet of this well, thus minimizing risk of impacts to this well. The approved MMP is an integral and enforceable part of the Feedlot Permit.

The City of St. Charles Public Wells

The city of St. Charles (St. Charles) operates three water supply wells. The closest St. Charles well lies approximately 8,693 feet southwest of manure application site 19 in the northwest quarter of section 8 of St. Charles Township. All three of St. Charles' wells are approximately 667-736 feet in depth. MDH does not believe these three wells are susceptible to contamination. The wells meet current construction standards and MDH believes these wells do not present a pathway for contamination to enter the water supply. MDH considers the bedrock aquifer in the areas of these wells to exhibit a high sensitivity to contamination because of the local geological setting. MDH considers these source waters to be susceptible because of the tritium content of well water in bedrock. These wells are within the St. Charles DWSMA and MDH has listed these wells as "Vulnerable" to contamination.

The Proposer's information shows there are no manure land application sites within St. Charles' DWSMA. St. Charles does not have a Wellhead Protection Plan for this DWSMA.

MDH has information indicating that routine monitoring for this water supply has detected one or more of the contaminants regulated under the federal Safe Drinking Water Act in the source water for this type of public water supply system. However, the MDH information indicates the water supplied to users meets state and federal drinking water standards for potability.

The Proposer is required to follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

St. Charles Equipment Well Unique Well #262071

The St. Charles Equipment Well with unique well #262071 lies approximately 9,527 feet east of manure application site 19 in the northwest quarter of section 24 of St. Charles Township. A source water assessment report was not found for this well. The MDH Well Log Report does not list aquifer information for this well and the listed depth is "0" feet. The well is classified as a public supply/non-community-transient well.

The Proposer is required to follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

Site 2

Public Water Supply Wells

The Proposer has submitted MDH information showing there are three public water supply wells within 2 miles of Site 2 and/or the manure application sites for Site 2.

The City of Utica Public Wells

The city of Utica (Utica) obtains its water supply from one public water supply well that lies approximately 3,115 feet east of manure application site 42 in the northwest quarter of section 24 of St. Charles Township. The Utica's well is approximately 420 feet in depth. The MDH data shows this water well meets current standards for construction and maintenance, and as a result, MDH believes these factors do not increase the susceptibility of the source water to contamination. MDH also considers bedrock aquifer sensitivity for wells. The MDH considers the aquifer to exhibit a high sensitivity to contamination because of the local geological setting. The MDH also considers source water susceptibility, i.e. the likelihood that a contaminant will reach the source of drinking water. The MDH considers the source of drinking water to exhibit a high susceptibility to contamination because of the local geological setting. The MDH has information indicating that routine monitoring for this water supply has detected one or more of the contaminants regulated under the federal Safe Drinking Water Act in the source water for this public water supply system

Utica's well is within the Utica DWSMA. The Utica DWSMA does not have a Wellhead Protection Plan. The Proposer information shows there are no manure land application sites within this DWSMA. See Attachments D and E. The Proposer must follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

School Well Unique Well #219167

The School Well with unique well #219167 lies approximately 1,483 feet west of manure application site 43 for Site 2 in the southeast quarter of section 23 of St. Charles Township. This well is approximately 110 feet in depth and is in the St. Peter-Prairie Du Chien Aquifer. The MDH has classified this well as a public supply/non-community well. The Proposer was unable to get a source water assessment report for this well.

The Proposer must follow the MPCA-approved MMP and submit an annual report to the MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

St. Charles Equipment (also known as SEMA Equipment Inc.) Unique Well # 262071

Unique well #262071 lies approximately 9,059 feet west of manure application site 41 for Project Site 2 in the northeast quarter of section 22 of St. Charles Township. The Proposer was unable to get a source water assessment report for this well. The MDH Well Log Report does not list aquifer information and has listed the depth of this well as "0" feet. The MDH has classified this well as a public supply/non-community-transient well. MDH information on this well indicates this well as potentially vulnerable to contamination because there is insufficient information to document well construction. In addition, the MDH considers this well to be susceptible because of the nitrate content of the well water. The MPDA information indicates that routing monitoring of this water supply has detected one or more contaminants regulated under the federal Safe Drinking Water Act for this type of public water system. However, the MDH information also indicates the water supplied to users meets state and federal standards for drinking water quality.

The Proposer is required to follow the MPCA-approved MMP and submit an annual report to the

MPCA on manure production, land application, and any discharges. The approved MMP is an integral and enforceable part of the Feedlot Permit.

Archaeological, Historical or Architectural Resources

The Proposer requested and received the Minnesota State Historic Preservation Office's (MSHPO) search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the Project areas. MSHPO's search identified a number of sites containing historically significant structures within the general Project areas. The MSHPO search identified sites including a farmhouse, a parsonage, numerous bridges, and Whitewater State Park. These resource are not located on or near the Project sites or manure application sites.

Attachment G includes a complete list and location of these sites.

Designated public parks, recreation areas or trails

Whitewater State Park

Whitewater State Park lies next to three manure application sites located in the north halves of Sections 28, 23 and 33 in St. Charles Township. Minnesota established Whitewater State Park in 1919. Whitewater State Park encompasses limestone bluffs, uplands, and ravines along the middle fork of the Whitewater River. Whitewater State Park's statutory boundary includes approximately 2,452 acres. The State of Minnesota owns and MNDNR manages 1,678 of the 2,452 acres. Of that amount, MNDNR Division of Parks and Trails manages 1,373 acres as trails within Whitewater State Park. The MNDNR Division of Fish and Wildlife manages the remaining 305 acres as part of the Whitewater Wildlife Management Area (WWMA). The Minnesota Department of Transportation (MnDOT) owns and manages an additional 10 acres within the Whitewater State Park boundaries as part of the Trunk Highway 74 corridor.

WWMA – Upper South Branch Unit

The WWMA is in southeastern Minnesota, in portions of Winona, Wabasha, and Olmsted counties. The WWMA is next to two manure application sites located in the north half of Section 12 in St. Charles Township. The steep hillsides are covered with mixed hardwoods like maple, basswood, oak, and walnut sprinkled with numerous bluff prairies where open glades face south and southwest. The valley floors next to the trout streams contain floodplain species such as cottonwood, willow, and silver maple. Seventeen natural and man-made wetlands dapple the valley. The ridges are a mixture of agricultural fields, old retired fields for nesting cover, and flat mesic prairies, rich in hundreds of species of plant and animals.

MBS Sites of Biodiversity Significance

The Proposer's consultant is licensed to use the MNDNR Natural Heritage Information System (NHIS) database, and completed a search for rare plant or animal species or other significant natural features known to occur: 1) within an approximate 1-mile radius of the Project, or 2) within or next to the boundaries of cropland parcels designated to receive Project-produced manure.

Attachment H – NHIS Report including a sensitive features map that identifies these areas.

The consultant's NHIS database search identified four sites the MBS has classified as Sites of Biodiversity Significance near the Project area (see Attachment H). Sites of Biodiversity Significance have varying levels of native biodiversity, Below – Moderate – High, and Outstanding, and are ranked based on the relative significance of this biodiversity at a statewide level.

A Below rank reflects a lack of rare species and natural features, or does not meet MBS standards for a ranking of Outstanding, High, or Moderate. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space. The consultant's search identified two sites classified as "Below" within the Project search area. The first site, St. Charles 9, is next to manure application acres in the northwest quarter of Section 9 and the northeast quarter of Section 8 in St. Charles Township. The second site, Utica Prairie, is next to manure application acres in the southeast quarter of Section 23 and the northwest quarter of Section 24.

Sites ranked Moderate contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes. The consultant's search identified no sites classified as "Moderate" within the Project search areas.

Sites ranked High contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes. The consultant's search identified no sites classified as "High" within the Project search areas.

Sites ranked Outstanding contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes. The consultant's search identified two sites classified as "Outstanding" within the Project search areas. The first site, Trout Run Valley, is next to manure application acres in the northwest quarter of Section 33 and the northwest quarter of Section 28 in Elba Township. The second site, St. Charles 1, is next to manure application acres in the north half of Section 12 in St. Charles Township.

Rare Species

The consultant's NHIS database search identified four animal species and four native plant communities known to occur within an approximate 1-mile radius of the Project sites or manure application sites. The following species or habitats listed are only those that the MNDNR determined *may* be affected by the Project.

Timber Rattlesnake

In 1984, the MNDNR designated the timber rattlesnake as a special concern species in Minnesota. Timber rattlesnakes occupy forested bluffs, south-facing rock outcrops, and bluff prairies, particularly in the Mississippi River valley. Bluff prairies located on steep, south or west-facing hillsides, with rock outcroppings and ledges, are essential habitat components because over-wintering dens are often located in these areas. Surrounding forests, prairies, and agricultural lands are summer feeding grounds. Because of declining populations, the MNDNR reclassified the timber rattlesnake as threatened in 1996.

Louisiana waterthrush

The Louisiana waterthrush is almost exclusively found in mature riparian forests. Typical habitat consists of steep-sided valleys with swiftly flowing streams that have rocky stream beds and riffles. Given its limited distribution in the state and its association with mature forests, the MNDNR listed the Louisiana waterthrush as a special concern species in Minnesota in 1984.

Acadian Flycatcher

The Acadian flycatcher breeds in deciduous forests of the eastern United States and southern Canada. It occurs primarily in mature forests, often near small streams. The Acadian Flycatcher is area-sensitive because it is found only in relatively large habitat patches. The MNDNR listed the Acadian flycatcher

as a special concern species in 1996 because of the rarity of the Acadian flycatcher's preferred habitat of large blocks of mature deciduous forest, and its irregular breeding occurrence in Minnesota.

Bluff Vertigo

The bluff vertigo is a rare landsnail found in a small number of sites in southeastern Minnesota, northeastern Iowa, central Missouri, and recently Illinois. The bluff vertigo occurs on forested, limestone or dolomite cliffs and outcrops, generally on steep, moist, shaded, and cool north-facing slopes. Land use activities that could compact the talus soil of landsnail habitat and crush the snails themselves, including grazing, hiking, and use of heavy equipment for timber harvest or vegetation clearing, should be carefully managed. Application of pesticides, herbicides, and fertilizers can alter the flora in landsnail habitat and may be toxic to the snails. The MNDNR classified the bluff vertigo as a threatened species in 1996 because of the rarity of this species.

Native Plant Communities

The consultant's NHIS database search found the following Native Plant Communities occur within 1 mile of Project Sites 1 and 2 and the associated manure application sites:

Site 1

Oak - Shagbark Hickory Woodland
White Pine - Oak - Sugar Maple Forest
Sugar Maple - Basswood - (Bitternut Hickory) Forest
Sugar Maple - Basswood - Red Oak - (Blue Beech) Forest

Site 2

Elm - Basswood - Black Ash - (Blue Beech) Forest
White Pine - Oak - Sugar Maple Forest
Black Ash - Sugar Maple - Basswood - (Blue Beech) Seepage Swamp
Mesic Prairie (Southern)

Other Unique Resources

Designated Trout Streams

The valleys of southeastern Minnesota are home to more than 700 miles of designated trout streams fed by the cold water of natural springs. The streams of southeastern Minnesota are different from streams in other parts of the state. Most rise from springs and thus are cool in summer. The limestone and alluvial soils in drainages make the streams hard, nonacidic, alkaline, and productive.

These trout streams are sensitive to land use practices related to agriculture and require special attention to ensure they remain healthy and productive. Fence-to-fence grain farming on the uplands and pasturing of the river bottoms contribute to land erosion and sedimentation of the streambeds. This fine sediment covers the gravel runs and riffles that trout need to spawn and invertebrates need to survive. The clearing of shoreline trees takes away the underwater root wads and fallen trees in which trout find cover from current and predators.

The MNDNR has designated two streams in the vicinity of the Project Sites 1 and 2 and associated manure application sites as trout streams. A portion of Trout Run Creek, lying within section 29 of Elba Township, is identified in MNDNR rules (Minn. R. 6264.0050, subp. 4) as a designated Trout Stream. This river segment lies 2,100 feet west of manure application site 1 in the north half of section 28, 3,200 feet northwest of manure application site 7 in the east half of section 32 and 1.4 miles north of Site 1.

The MNDNR rules (Minn. R. 6264.0050, subp. 4) have designated a portion of South Branch Whitewater River, lying within section 1 of St. Charles Township, as a trout stream. This river segment flows within 2,640 feet north of manure application sites 31 and 32 in the south half of section 12, and 1.1 miles north of Project Site 2.

Attachment E identifies the two trout streams.

Archaeological, Historical or Architectural Resources

The Proposer's Project does not change existing land use at either Site 1 or Site 2. The Proposer will construct the Project on Proposer-owned existing feedlot properties. The MSHPO-identified structures are not located on either Sites 1 or 2, so construction of the Project will not impact these structures. The Proposer is not planning additional construction beyond this Project. The Proposer's Project-generated manure, and the land application of this manure, does not change land use on the manure application sites. The manure application sites are farmed and already receive manure, so the continued manure application at these same sites will not impact the existing structures.

Designated Parks, MBS Sites of Biodiversity Significance and Native Plant Communities

This Proposer does not plan to change existing land use. The Proposer will construct the Project on Proposer-owned properties currently used for feedlot operations. The Proposer plans no other construction as part of the Project. The Proposer's MMP requires monitoring of manure application rates at all manure application sites to ensure nutrient input does not exceed the ability for crop nutrient uptake. This monitoring will mitigate the potential for degradation of these natural areas from runoff or excessive nitrogen loading. The Proposer's MMP requires maintenance of required manure application setbacks from all surface waters, maintenance of tile intakes, and incorporation of manure into the soil within 24 hours of application. The Proposer does not anticipate the construction and operation of the Project or land application of Project-generated manure generated will affect these resources because of the locations of Project Sites 1 and 2 and manure land application sites from these resources.

Rare Species and Other Unique Features

To protect the listed rare species, the Proposer's MMP requires BMPs for manure application. The Proposer will inject or immediately incorporate manure into the soil during application reducing the possibility of surface runoff due to rainfall. The Proposer's MMP requires ensure land application of all manure at agronomic rates to minimize nutrient buildup in the soil. The Proposer's MMP requires land application of manure must follow all MPCA-required setbacks from sensitive features. Additionally, the Proposer will require implementation of additional BMPs specified in Appendix A of the NPDES Construction Stormwater (CSW) General Permit during the Project construction phase. The Proposer will, therefore, prevent erosion and control sediment from leaving the Project construction sites and flowing into sensitive areas.

3. Geologic and soil conditions.

A.

Site 1

Approximate depth (in feet) to:	Feedlot	Manure Storage Area	Manure Application Sites
Ground Water (minimum)	>7	>7	0->7
(average)	>7	>7	>6
Bedrock (minimum)	23	23	6
(average)	28	28	27

Site 2

Approximate depth (in feet) to:	Feedlot	Manure Storage Area	Manure Application Sites
Ground Water (minimum)	>7	>7	0->7
(average)	>7	>7	>6
Bedrock (minimum)	15	15	7
(average)	18	18	17

B.

Site 1

NRCS Soil	Feedlot	Manure Storage Area	Manure Application Sites
Classifications (if known)	401B	401B	401B,285B,103C,103B,401C

The soils at Site 1 consist of silt loam with the land application acreage being comprised of loam and silt loam.

Site 2

NRCS Soil	Feedlot	Manure Storage Area	Manure Application Sites
Classifications (if known)	322C2, 285B	322C2,285B	285B,285C,285A,401B,1955A

The soils at Site 2 consist of silt loam with the land application acreage being comprised of loam and silt loam.

C. Indicate with a yes or *no* whether any of the following geologic site hazards to ground water are present at the feedlot, manure storage area, or manure application sites.

Site 1

	Feedlot	Manure Storage Area	Manure Application Sites
Karst features (sinkhole, cave, resurgent spring, disappearing spring, karst window, blind valley, or dry valley)	No	No	No
Exposed bedrock	No	No	No
Soils developed in bedrock (as shown on soils maps)	No	No	No

Site 2

	Feedlot	Manure Storage Area	Manure Application Sites
Karst features (sinkhole, cave, resurgent spring, disappearing spring, karst window, blind valley, or dry valley)	No	No	Yes
Exposed bedrock	No	No	No
Soils developed in bedrock (as shown on soils maps)	No	No	No

For items answered yes (in C), describe the features, show them on a map, and discuss proposed design and mitigation measures to avoid or minimize potential impacts.

Karst Features

The Proposer submitted geographical data from the MNDNR Geology and Geophysics Department identifying the following karst features in the area of the Project:

1. A sinkhole (D0392) in the northwest quarter of Section 33 of Elba Township, next to manure application site 9 and approximately 1.3 miles northeast of Site 1.
2. A sinkhole (D0641) in the southwest quarter of Section 13 in St. Charles Township, near the north edge of manure application site 42.
3. A sinkhole (D0470) in the southeast quarter of Section 15, in the middle of manure application site 41 and approximately 1.3 miles southwest of Site 2.
4. A sinkhole (D0391) in the southeast quarter of Section 23, in the middle of manure application site 43 and approximately 1.5 miles south of the site.

Minn. R. 7020.2005, subp. 1, states that a new animal feedlot or manure storage area must not be constructed within 300 feet of a sinkhole. The MPCA Feedlot Program requires a karst inventory survey whenever a liquid manure is being proposed in a karst-susceptible area. The Proposer has prepared and included the karst inventory surveys within the MPCA-required "Plans and Specifications for Concrete LMSA in Winona County" as part of the Feedlot Permit Applications for Sites 1 and 2. See also Attachment K. The Proposer has designed the proposed LMSAs for Sites 1 and 2 in accordance with MPCA Feedlot Program requirements for LMSAs in karst susceptible areas.

Further, Minn. R. 7020.2225, subp. 8, states that manure must not be applied to land within 50 feet of a sinkhole and that manure that is applied to land that slopes toward a sinkhole and is less than 300 feet from that sinkhole must be incorporated within 24 hours.

The Proposer will ensure through the MMP that manure land application meets required setbacks from all sensitive features, including sinkholes, and will ensure manure is incorporated into the soil within 24 hours of application. The Proposer does not anticipate the Project or land application of manure to affect these karst features due to their separation distance from Project Sites 1 and 2, and the MMP requirements for land application of the manure land application.

Attachment E includes maps showing the location of the karst features for Sites 1 and 2 and the manure land application sites.

4. Water Use, Tiling and Drainage, and Physical Alterations.

- A. Will the project involve installation or abandonment of any water wells, appropriation of any ground or surface water (including dewatering), or connection to any public water supply?

☒ Yes ☐ No

If yes, as applicable, give location and purpose of any new wells; the source, duration, quantity and purpose of any appropriations or public supply connections; and unique well numbers and the Department of Natural Resources (DNR) appropriation permit numbers, if available. Identify any existing and new wells on the site map. If there are no wells known on-site, explain methodology used to determine that none are present.

The Proposer's two Project sites (Site 1 and Site 2) each have an existing well already registered with the MNDNR. (Well #659836, and Well #698937, respectively). The Proposer has MNDNR water appropriation permit coverage, through the MNDNR's Animal Feedlots and Livestock Operations General Permit (MNDNR Feedlot Water Permit) to operate the existing well at Site 1. The Proposer's pump use at the Site 2 existing well is low enough to be below the MNDNR requirement to have a water appropriations permit (10,000 gallons per day or 1,000,000 gallons per year). The Proposer will need to drill and operate an additional well at both Sites 1 and 2 to have enough water for livestock use after completion of the Project.

The MNDNR requires proposers to complete and submit a MNDNR preliminary well assessment request when they are proposing to drill a well that will be used to withdraw more than 10,000 gallons of water per day or 1,000,000 gallons per year. The MNDNR is required by law (Minn. S 103G.265) to manage water resources to ensure an adequate supply to meet long-range seasonal requirements for domestic agriculture, fish and wildlife, recreational, power, navigation, and quality control resources. Thus, the MNDNR reviews well drilling proposals to evaluate potential concerns of constructing a new well or well on resources such as a rare animal species, lakes or rivers, a designated trout stream.

The Proposer has applied for, and received a MNDNR preliminary well assessment for the Proposer's well drilling proposals at Sites 1 and 2. On August 23, the Proposer received MNDNR's preliminary approval to drill wells at both Sites 1 and 2. See Attachment J for copies of the MNDNR well construction assessments and preliminary approvals. MDNR's preliminary approval to construct a well is information that can be used by the Proposer to decide whether to proceed in constructing a well, but does not act as a notification to the Minnesota Department of Health (MDH), nor is it a MDNR water use permit. The Proposer intends to register the well with the MDH following well construction, and permit use of the well through the MDNR.

The MDNR requires a water appropriation permit for all users withdrawing more than 10,000 gallons of water per day or one million gallons per year. The purpose of the MDNR Water Appropriation Permit program is to ensure the Proposer manages water resources so that adequate supply is available for long-range seasonal requirements for domestic, agricultural, fish and wildlife, recreational, power, navigational, and quality control. This permit program balances competing management objectives, including both the development and protection of water resources. Minn. Stat. § 103G.261 establishes domestic water use as the highest priority of the state's water when supplies are limited. If a well interference arises, the MDNR has a standard procedure for investigating the matter. If identified that a commercial operator is causing the problem, the operator must correct it.

The MDNR is the permitting authority for appropriating waters of the state in Minnesota. The MDNR Water Appropriations Permit allows for a reasonable use of water provided that the use does not negatively impact surrounding wells or other water resources. Receipt of a Well Construction Preliminary Assessment does not constitute an authorization or guarantee permit approval by the Project Proposer. Following the completion of the environmental review, the Project Proposer may pursue the water appropriation permitting process with MDNR. Unauthorized pumping or use of the

well or other water resource is subject to enforcement under Minn. Stat. 103. Upon completion of a permit review period, a permit for water appropriation may be limited, amended, or denied in accordance with applicable laws and rules for the protection of the public interests and the sustainability of Minnesota's water resources.

The MNDNR's preliminary approval to construct a well is not an approval to use or pump the wells, and unauthorized pumping or use of a well or other water resource is subject to enforcement action. In order for the Proposer to use/pump the new wells at each site, the Proposer must also obtain MNDNR Feedlot Water Permit coverage for both Sites. MNDNR's approval to construct a well does not guarantee a proposer will receive MNDNR Feedlot Water Permit coverage to use/pump well(s). If MNDNR finds potential impacts when reviewing a well drilling proposal through its well construction preliminary assessment, the MNDNR may require additional information and monitoring requirements before deciding to approve, deny, reduce, and/or modify a proposer's requested water use

Site 1

The Proposer's existing well at Site 1 is Unique Well # 659836. The Proposer's existing well is already covered under MNDNR's Feedlot Water Permit coverage for the amount of 5,000,000 gallons per year. The Proposer projects the water usage at Site 1, after completion of construction, will be approximately 7,000,000 gallons per year. Because this projected amount is over the limit for MNDNR's General Permit coverage (5,000,000 gallons per year), the Proposer will be required to apply for and obtain an MNDNR Individual Water Appropriation Permit for Site 1.

MNDNR's well construction preliminary assessment checklist for Site 1 indicates MNDNR has checked a number of factors that may be impacted by a well at Site 1. Because of this, when the Proposer submits the application for the MNDNR Individual Water Appropriation Permit for Site 1, the MNDNR may require additional testing, monitoring, and any other information it believes it needs to make a decision on permitting the new Site 1 well.

Site 2

The existing well at Site 2 is Unique Well #698937. To date, the Proposer has not been required by MNDNR to obtain coverage under the MNDNR Feedlot Water Permit for Unique Well #698937, as the Proposer has been pumping water under the MNDNR's permit threshold of 10,000 gallons per day or 1,000,000 gallons per year. The Proposer plans to drill a second well on Site 2. The Proposer projects the total water usage at Site 2, after completion of construction of the Project at Site 2, will be approximately 7,000,000 gallons per year. Because this projected amount is over the limit for MNDNR's General Permit coverage (5,000,000 gallons per year), the Proposer will be required to apply for and obtain an MNDNR Individual Water Appropriation Permit for Site 2.

MNDNR's well construction preliminary assessment checklist for Site 2 indicates MNDNR has checked a number of factors that may be impacted by installing and operating a new well at Site 1. Because of this, when the Proposer submits the application for the MNDNR Individual Water Appropriation Permit for Site 2, the MNDNR may require additional testing, monitoring, and any other information it believes it needs to make a decision permitting the new Site 2 well.

MNDNR has the authority to investigate and require additional testing if there are complaints of well interference. If MNDNR finds a well is causing interference for other users, the MNDNR can require changes at that well (lowering the pump in the well, installing a new pump, or even require the operator of the well to construct a new water supply well).

B. Will the project involve installation of drain tiling, tile inlets or outlets? ☒ Yes ☐ No

If yes, describe.

Site 1

A perimeter drain tile is not required for the concrete LMSA under the new barn due to the final grading away from the barn to surface water drainage at or below the bottom of the concrete LMSA.

Site 2

The Proposer will install 5-inch high-density polyethylene perimeter drain tile around the base of the Project LMSA subgrade concrete pit to control hydrostatic pressure on the outside of concrete pit walls caused by fluctuations in seasonal saturation. The Proposer will install the new drain tile below the floor elevation of the concrete pits and will discharge to the surface and infiltrate or be managed as part of the stormwater treatment system.

The Proposer will use the Operation and Maintenance Plan submitted as part of the NPDES Feedlot General Permit application. The Proposer's Operation and Maintenance Plan is integral to and enforceable through the NPDES Feedlot General Permit and must meet the requirements of Minn. R. 7020.2100. The Proposer's Operation and Maintenance Plan must include perimeter tile-specific requirements for the Proposer to follow including:

- The Proposer must conduct weekly monitoring of the perimeter drain tile for water flow and signs of discoloration or odor.
- The Proposer will maintain records of all inspections as part of the operation and maintenance for the concrete LMSA.

C. 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 proposed mitigation measures to avoid or minimize impacts.

Not applicable.

5. Manure management.

A. Check the box or boxes below which best describe the manure management system proposed for this feedlot.

- ☐ Stockpiling for land application
- ☒ Containment storage under barns for land application
- ☐ Containment storage outside of barns for land application
- ☐ Dry litter pack on barn floors for eventual land application
- ☐ Composting system
- ☐ Treatment of manure to remove solids and/or to recover energy
- ☐ Other (please describe)

B. Manure collection, handling, and storage.

Quantities of manure generated:

Site 1 12,722 gallons per day by species 1 _____ by species 2
(4,643,530 gallons annually)

Site 2 12,687 gallons per day by species 1 _____ by species 2
(4,630,755 gallons annually)

Frequency and duration of manure removal: number of days per cycle:

Site 1 2 times per year / 10 days each

Site 2 2 times per year / 10 days each

Total days per year Up to 20 days per site

Give a brief description of how manures will be collected, handled (including methods of removal), and stored at this feedlot:

The Proposer collects and stores manure beneath the barns in LMSAs. Manure drops into the LMSAs through slatted floors and stored in liquid form.

Site 1 will have a total LMSA storage capacity of approximately 3,846,822 gallons, providing 9 months of manure storage.

Site 2 will have a total LMSA storage capacity of approximately 7,284,247 gallons, providing more than 12 months of manure storage.

The Proposer will hire a Commercial Animal Waste Technical (CAWT) licensed by the MDA, to land apply manure application primarily at the manure application sites in the fall after harvest and in the spring prior to planting. The CAWT will apply the manure via direct injection or by broadcast application and incorporate into the soil within 24 hours. The CAWT will operate the manure tow hose/drag line or tank application system. The CAWT will calibrate the tank application system by using a flow meter and then adjusting the speed of the manure application equipment to achieve the planned rate of manure application.

C. Manure utilization.

Physical state of manure to be applied: ☒ liquid ☐ solid ☐ other - describe:

D. Manure application.

1. Describe application technology, technique, frequency, time of year and locations.

The Proposer will hire the CAWT to land apply the transferred manure at the manure application sites in the fall after harvest and in the spring prior to planting. The length of time for manure application is typically 10 days or less per site. The CAWT will apply the manure via direct injection or by broadcast application and incorporate into the soil within 24 hours. The CAWT will operate the tow hose/drag line or tank application system. The CAWT will calibrate the tank application system by using a flow meter and then adjusting the speed of the manure application equipment to achieve the planned rate

of manure application.

The Proposer will sell and transfer all manure generated at Sites 1 and 2 to third parties who have entered into agreements with the Proposer.

For Site 1, the Proposer believes approximately 527 acres are required for land application of the manure per year, dependent upon crop and nutrient needs.

For Site 2, the Proposer believes approximately 525 acres are required for land application of the manure per year, dependent upon crop and nutrient needs.

The Proposer has obtained land application agreements for all manure generated by the Project. The Proposer will transport manure using accepted industry methods to prevent manure spilling onto public roadways. If spillage occurs, the Proposer must remove and properly dispose of the manure in accordance with Minn. R. 7020.2010, Transportation of Manure. Prior to or at the time of manure ownership transfer, the Proposer is required to provide the cropland owner/operator with information on the state requirements for manure application, as well as the most current manure nutrient analysis. The CAWT works with the third parties to determine the manure application rates. The cropland owner/operator is required to follow the Proposer's MMP as applicable under 7020.2225 Land Application of Manure, or local requirements, whichever is the more stringent. Attachment A contains a map showing the location of the 31 manure application sites. All 31 manure application sites for both Sites 1 and 2 are in Winona County.

2. Describe the agronomic rates of application (per acre) to be used and whether the rates are based on nitrogen or phosphorus. Will there be a nutrient management plan?

☒ Yes ☐ No

The Proposer submitted a MMP for transferred ownership of manure with the Feedlot Permit applications for Sites 1 and 2. The Proposer has updated the MMP to reflect that the Proposer owns a manure application site that is rented out by a farmer. The MPCA considers the Proposer as having control over this manure application site. After MPCA staff reviews and approves the MMP, the MMP becomes an integral and enforceable part of the MPCA Feedlot Permit. Minn. R. 7020.2225 Land Application of Manure, outlines the requirements for appropriate manure testing, land application of manure, requirements, restrictions, prohibitions, recordkeeping as well as what must be included in MMPs.

As noted, the Proposer must regularly review and update the MMP to ensure any newly constructed wells, including those not yet verified by MDH, are identified and recorded so that accurate information is provided for manure application.

The MMP requires the licensed CAWT to ensure the manure application occurs at agronomic rates based on: the previous crop harvested, the available nutrients, and the crop to be grown. The MMP also specifies the requirements to change from nitrogen to phosphorus-based application rates, if needed in the future.

Nitrogen is the limiting nutrient in calculating the manure application rate. Land application of manure is based on logistics and nitrogen, phosphorus, and/or potassium soil test levels. Fields requiring the most nitrogen, phosphorus, or potassium receive the manure first. Other factors include current field conditions, crops grown, yield goal, organic matter content, previous manure credits and other legume credits. Nutrient rates are determined by utilizing the University of Minnesota Extension Service bulletin, "Fertilizer Recommendations for Agronomic Crops in

Minnesota.¹

The Proposer is responsible for providing the cropland owner/operator with the requirements for soil testing, manure application rate limits, seasonal restrictions, manure application setbacks, manure application record keeping, and spill reporting. Cropland owner/operators are required to meet all manure application requirements per Minn. R. 7020.2225, Land Application of Manure, or local requirements, whichever is more stringent.

3. Discuss the capacity of the sites to handle the volume and composition of manure. Identify any improvements necessary.

Site 1

The Proposer estimates total manure generation after construction at Site 1 will be 12,722 gallons per day (approximately 4,643,530 gallons annually). The short term storage volume of the proposed pull-plug farrow barn is 403,403 gallons, while the existing barns on Site 1 have storage of 3,401,595 gallons. This equates to a manure storage capacity of 9 months at Site 1. The Proposer's MMP estimates that land application of all the manure requires 527 acres of cropland. The Proposer has ensured there are a total of 1,872 acres of cropland available, meaning sufficient acreage is available for land application of manure.

Site 2

The Proposer estimates total manure generation at 12,687 gallons per day (approximately 4,630,755 gallons annually). The storage volume of the proposed breeding and gestation barn is 5,266,635 gallons, while the existing barn on Site 2 has a storage of 2,012,823 gallons. This equates to a manure storage capacity of greater than 12 months. The Proposer's MMP estimates land application of all manure generated yearly at Site 2 requires 525 acres of cropland. The Proposer has ensured there are a total of 2,145 acres of cropland available, meaning sufficient acreage is available for land application of all manure.

4. Describe any required setbacks for land application systems.

The MPCA feedlot staff has reviewed and preliminarily approved the MMP for the Project.

The ownership transfer of all manure will occur and the owners must comply with land application setbacks set forth by Minn. R. 7020 and/or local ordinances, whichever is more stringent, and as contained in the Proposer's MMP. Table 1 identifies MPCA setbacks as found in Minn. R. 7020.2225, subp. 6 through 8. Winona County's required setbacks for land application of manure are in Table 2.

¹ The University of Minnesota Extension "Fertilizer Recommendations for Agronomic Crops in Minnesota" bulletin. Retrieved July 2016. <http://www.extension.umn.edu/agriculture/nutrient-management/nutrient-lime-guidelines/fertilizer-recommendations-for-agronomic-crops-in-minnesota/>

Table 1: MPCA Land Application Setback Distances (in feet)

Feature	Winter	Non-Winter With Immediate Incorporation (<24 hours)		Non-Winter Not incorporated within 24 hours	
		With P Mgmt.	No P Mgmt.	With Vegetated Buffer	Inadequate Vegetated Buffer
Lake, Stream	300	25	300	100	300
Intermittent Stream* DNR protected wetlands** Drainage ditch w/o quarry*	300	25	300	50	300
Open Tile Intake	300	0	0	300	300
Well, Mine, or Quarry	50	50	50	50	50
Sinkhole with no Diversion	Downslope -50 Upslope -300	50	50	Downslope - 50 Upslope - 300	Downslope - 50 Upslope - 300

* Intermittent streams and ditches pertain to those identified on United State Geological Survey (USGS) quadrangle maps, excluding drainage ditches with berms that protect from runoff into the ditch and segments of intermittent streams which are grassed waterways. USGS quadrangle maps can be found at County Soil and Water Conservation District Offices, or can be viewed on the internet at <http://www.terraserver.microsoft.com> [January 28, 2005].

** Wetland setbacks pertain to all protected wetlands identified on MNDNR protected waters and wetlands maps (these maps are often located in County Soil and Water Conservation District offices and typically include all wetlands over 10 acres).

Table 2: Winona County Required Setbacks for Land Application of Manure

Sensitive Areas	Winter Setbacks	A. Non-Surface Application	B. Winter-Incorp. + P mgmt.	C. Setbacks Incorp. No P mgmt	Other Requirements
Streams/inter. Streams	300'	*300'	50'	*300'	
Lakes & Wetlands	300'	*300'	50'	*300'	
Open tile intakes	**300'	**300'	0'	0'	
Steeply sloping land					Permit may be needed
Road ditches					No application into ditch
Frequently flooded soils					Consider in mgmt. plan
High phosphorus soils					Permit may be needed No P build-up at some sites
High water table soils					Consider in mgmt. plan
Wells/wellhead protection	50'	50'	50'	50'	Permit may be needed
Sinkholes (without berms or diversions)	50' down 300' up	50' down 300' up	50'	50'	
Coarse-textured soils					Consider in mgmt. plan
Shallow soils over bedrock					Consider in mgmt. plan
Mines and Quarries	50'	50'	50'	50'	

A = Surface application with NO incorporation with 24 hours

B = Injection or incorporation within 24 hours AND phosphorus management***

C = Injection or incorporation within 24 hours with NO phosphorus management***

- = No specific requirements

*Setbacks can be reduced from 300' to either 100' (lakes and perennial streams) or 50' (wetlands, drainage ditches, and intermittent streams). If permanent vegetative buffers that are at least 100 and 50 feet wide are planted along the waters.

**The 300' open tile intake setback for non-incorporated surface application of solid manure was exempted until 2005.

E. Other methods of manure utilization. If the project will utilize manure other than by land application, please describe the methods.

None

6. Air/odor emissions.

A. Identify the major sources of air or odor emissions from this feedlot.

Sources of odor at both Project Sites 1 and 2 include animals, ventilation systems, animal and manure contact surfaces (especially floors), manure collection pits, dead animal storage, composting, and disposal areas. Manure application sites and trucks hauling the manure for land application are also sources of odor.

B. Describe any proposed feedlot design features or air or odor emission mitigation measures to be implemented to avoid or minimize potential adverse impacts and discuss their anticipated effectiveness.

The Proposer has designed both Sites 1 and 2 of the Project to minimize potential adverse odor/air emissions impacts. The Proposer has designed the proposed barns for Sites 1 and 2 by orienting the barns to allow the free-flow of prevailing winds. The total confinement barn design mitigates odors and emissions by eliminating exposure of sources to the atmosphere.

The Proposer may or will use the following additional air mitigation operation measures:

Both Sites 1 and 2

- The Proposer may employ a dust suppressant to control dust generated by truck traffic, should dust become a problem.
- The Proposer will only agitate stored manure immediately prior to the removal of manure for land application. On a regular basis, pit ventilation cleaning and servicing will occur to reduce dust accumulation and discharge.
- The Proposer will maintain clean, dry floors, eliminate the buildup of manure, and clean up any spilled feed. Standard good housekeeping practices include washing and disinfection of the interior of the farrowing rooms at the end of each cycle, paying special attention to the ventilation fans.
- The Proposer will implement Minnesota Board of Animal Health (MBAH) and MPCA-recommended BMPs at the animal mortality compost buildings such as: utilizing sufficient carbon source (12-inch minimum cover over carcass); maintaining adequate temperature; and keeping compost material inside proper bunkers.

During manure application

- The CAWT will inject all manure immediately or incorporate manure within 24 hours to minimize the release of odors.
- The CAWT will limit the number of application days as much as possible depending on weather, safety, availability size of equipment, and availability of personnel to operate equipment.
- The CAWT will use good manure sanitation practices such as properly operating manure equipment to reduce/eliminate spillage.
- The CAWT will observe all required setback requirements from nearby residences for all manure applications.

The Proposer is committed to being a good neighbor and will evaluate weather conditions prior to land application to minimize impacts on neighbors and the public. The Proposer will consult with the MPCA feedlot staff and/or the Winona County Feedlot Officer to identify any changes and update the MMP as needed to reduce odors in the event of complaints.

- C. *Answer this item only if no feedlot design features or mitigations were proposed in item 6.B.***
Provide a summary of the results of an air emissions modeling study designed to compare predicted emissions at the property boundaries with state standards, health risk values, or odor threshold concentrations. The modeling must incorporate an appropriate background concentration for hydrogen sulfide to account for potential cumulative air quality impacts.

Based on MPCA's approval August 29, 2016, for air modeling protocols, the Proposer completed air dispersion modeling analyses for the Project on both Sites 1 and 2 using AERMOD for a 5-year period using historic weather data to predict the air emissions impact from each Site on hydrogen sulfide, ammonia, and odor intensities at each site's property lines and 71 of the nearest neighbors (38 for Site 1, 33 for Site 2). Attachment F is the Proposer's report. The following findings present results of the quantitative assessment of air quality impacts associated with the Project, as well as 17 existing feedlots (9 for Site 1, 8 for Site 2) within a 9 square-mile grid surrounding each Project site.

After completion of the air modelling, the Proposer identified one newly-constructed home approximately 0.58 mile northwest of Site 1. However, the identification does not change the results of the modelling itself as the new residence is a) not a new or expanded feedlot, and b) is not the nearest receptor to Site 1.

The Proposer also identified two unverified wells southwest of Site 2, but has already included the sites themselves within the air modelling for Site 2.

Site 1

The Proposer's analysis for Site 1 was conducted to estimate hydrogen sulfide, ammonia, and odor intensities at the Site 1 property lines as well as 38 of Site 1's nearest neighbors. The following findings present results of the quantitative assessment of air quality impacts associated with Site 1, as well as contributions from nine existing feedlots within a nine square-mile grid surrounding Site 1.

Hydrogen Sulfide

The modeling results predict Site 1 of the Project will comply with the 30 parts per billion (ppb) hydrogen sulfide Minnesota ambient air quality (MAAQ) standard. Under the MAAQ standard, the third exceedance of the MAAQ within any 5-day period is a violation. Modeled compliance is demonstrated when the high-third-high (H3H) concentration (added to background) for any 5-day period at each property-line receptor is less than the 30 ppb MAAQ standard. AERMOD predicted a maximum H3H property-line hydrogen sulfide concentration of 10.74 ppb at Site 1. When a

background concentration of 17 ppb added to the AERMOD predictions, the H₂S hydrogen sulfide concentration is 27.40 ppb at Site 1, which is below the ambient standard of 30 ppb. Thus, no violation of the 30-ppb ambient hydrogen sulfide standard was modeled for Site 1 of the Project.

The AERMOD results indicated that, after construction, Site 1 of the Project will not create exceedances of the sub chronic (13-week) hydrogen sulfide inhalation Human Risk Value (iHRV) at the neighboring residences. The estimated maximum monthly hydrogen sulfide concentration for a neighboring residence is 1.75 µg/m³. When a background concentration of 1.00 µg/m³ is added to the AERMOD estimate, the maximum monthly hydrogen sulfide concentration for a neighboring residence is 2.75 µg/m³, which is below the sub chronic hydrogen sulfide iHRV of 10 µg/m³.

Ammonia

The modeling suggests that after construction, Site 1 of the Project will not create exceedances of the acute ammonia iHRV. AERMOD predicted a maximum hourly property-line concentration of 651.69 µg/m³ for Site 1. When a background concentration of 148 µg/m³ is added to the AERMOD prediction, the maximum property-line ammonia concentration is 799.69 µg/m³ at Site 1, which is below the acute ammonia iHRV of 3,200 µg/m³.

The AERMOD results indicate that after construction, Site 1 of the Project will not create exceedances of the chronic ammonia iHRV at the neighboring residences. The estimated maximum 1-year time-averaged ammonia concentration for a neighboring residence is 19.20 µg/m³ for Site 1. When a background ammonia concentration of 5.72 µg/m³ is added to the AERMOD estimate, the maximum annual ammonia concentration for a neighboring residence is 24.92 µg/m³, which is below the chronic ammonia iHRV of 80 µg/m³.

Odor

Based on the air dispersion modeling analysis, AERMOD modeling results indicate that after construction, Site 1 of the Project will not contribute to frequent odor concentrations (OU/m³) above an odor intensity of 72 OU/m³, defined as a “faint odor” at the Site 1 property line. The modelled maximum hourly odor intensity was 145.25 OU/m³ on Site 1 north boundary line. The frequency at which odor concentrations will occur above an odor intensity of 72 OU/m³ is less than 1% of the time.

The modeling results also indicate Site 1 of the Project will not contribute to odor concentrations above an odor intensity of 72 OU/m³, defined as a “faint odor” at nearby non-feedlot residences.

Site 2

The Proposer conducted the analysis to estimate hydrogen sulfide, ammonia, and odor intensities at Site 2's property lines as well as 33 of Site 2's nearest neighbors. The following findings present results of the quantitative assessment of air quality impacts associated with Site 2 of the Project, as well as contributions from 8 existing feedlots within a 9-square mile grid surrounding Site 1.

Proposed Project Air Quality Summary with Background Concentrations – Site 1

Property Boundary	Hydrogen Sulfide Results (ppb) ¹	Acute Ammonia Results (µg/m ³) ²	Odor Results (OU)
North	27.40	692.84	145.25
South	26.96	799.69	127.02
East	22.44	799.69	66.48
West	24.53	602.58	73.12

Hydrogen Sulfide

The modeling results predict Site 2 of the Project will comply with the 30 ppb hydrogen sulfide MAAQ standard. Under the MAAQ standard, the third exceedance of the MAAQ within any 5-day period is a violation. Modeled compliance is demonstrated when the H₂S concentration added to background for any 5-day period at each property-line receptor is less than the 30 ppb MAAQ standard. AERMOD predicted a maximum H₂S property-line hydrogen sulfide concentration of 12.69 ppb at Site 2. When a background concentration of 17 ppb added to the AERMOD predictions, the H₂S hydrogen sulfide concentration is 29.69 ppb for Site 2, which is below the ambient standard of 30 ppb. Thus, no violation of the 30-ppb ambient hydrogen sulfide standard was modeled for Site 2 of the Project.

The AERMOD results indicated that, after construction, Site 2 of the Project will not create exceedances of the sub chronic (13-week) hydrogen sulfide iHRV at the neighboring residences. The estimated maximum monthly hydrogen sulfide concentration for a neighboring residence is 0.22 µg/m³ for Site 2. When a background concentration of 1.00 µg/m³ is added to the AERMOD estimate, the maximum monthly hydrogen sulfide concentration for a neighboring residence is 1.22 µg/m³ for Site 2, which is below the sub chronic hydrogen sulfide iHRV of 10 µg/m³.

Ammonia

The modeling results also suggest that, after construction, Site 2 of the Project will not create exceedances of the acute ammonia iHRV. AERMOD predicted a maximum hourly property-line ammonia concentration of 765.78 µg/m³ for Site 2. When a background concentration of 148 µg/m³ is added to the AERMOD prediction, the maximum property-line ammonia concentration 913.78 µg/m³ for Site 2, which is below the acute ammonia iHRV of 3,200 µg/m³.

The AERMOD results indicate that after construction, Site 2 of the Project will not create exceedances of the chronic ammonia iHRV at the neighboring residences. The estimated maximum one-year time-averaged ammonia concentration for a neighboring residence is 8.40 µg/m³ for Site 2. When a background ammonia concentration of 5.72 µg/m³ is added to the AERMOD estimate, the maximum annual ammonia concentration for a neighboring residence is 14.12 µg/m³ for Site 2, which is below the chronic ammonia iHRV of 80 µg/m³.

Odor

Based on the air dispersion modeling analysis, AERMOD modeling results indicate Site 2 of the Project will not contribute to frequent odor concentrations above an odor intensity of 72 OU/m³, defined as a "faint odor" at the property line. The modeled maximum hourly odor intensity was 160.79 OU/m³ on the north boundary line of Site 2. The frequency at which odor concentrations will occur above an odor intensity of 72 OU/m³ is less than 1% of the time for Site 2.

The modeling results also indicate the Project will not contribute to odor concentrations above an odor intensity of 72 OU/m³, defined as a "faint odor" at nearby non-feedlot residences.

Proposed Project Air Quality Summary with Background Concentrations – Site 2

Property Boundary	Hydrogen Sulfide Results ¹ (ppb)	Acute Ammonia Results ² (µg/m ³)	Odor Results (OU) ³
North	27.63	913.78	160.79
South	26.59	564.66	126.98
East	22.37	579.78	68.88
West	29.40	797.07	139.05

¹ State ambient hydrogen sulfide air quality standard: 30 ppb half-hour average

² Acute inhalation health risk value (iHRV) for ammonia: one-hour average of 3,200 µg/m³

³ Odor impact assessment based on odor units. Most people consider a value of 72 OU to be a faint odor (for swine)

ppb = parts per billion

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

D. *Describe any plans to notify neighbors of operational events (such as manure storage agitation and pumpout) that may result in higher-than-usual levels of air or odor emissions.*

The Proposer does not plan to notify neighbors before operational events such as manure storage, agitation, pump out, or application.

The Proposer will notify the County Feedlot Officer prior to operational events such as manure agitation and land application. The Proposer will evaluate weather conditions before manure application to minimize impacts on neighbors and the public.

The Proposer will implement the air emission plan included in the Feedlot Permit application in the event that an odor event occurs. The air emission plan is an enforceable provision of the Feedlot Permit.

E. *Noise and dust. Describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts.*

The Proposer's construction activities at Sites 1 and 2 will include stockpiling and stabilization of any removed top soil. When appropriate, the Proposer will re-use soil, including final grading, seeding, etc. per an erosion and sediment control plan.

The Proposer indicates truck traffic along roads entering and leaving both Sites 1 and 2 will generate some noise, but does not anticipate noise impacts because of the distance of both Sites from nearby residences. The Proposer believes separation distance is the primary mitigating factor in reducing the potential for adverse noise impacts from this Project as the nearest neighbors are 0.3 miles north of Site 1 and 0.1 mile east of Site 2. Access to Site 1 is by gravel road (TWP No. 16) and access to Site 2 is by an all-weather asphalt-paved road (Co. Rd. No. 115).

The Proposer may employ a dust suppressant to control dust generated by truck traffic on gravel roads if necessary during manure land application events. The Proposer will respond to all dust and noise complaints in a timely manner.

7. Dead Animal Disposal.

Describe the quantities of dead animals anticipated, the method for storing and disposing of carcasses, and frequency of disposal.

Site 1

The Proposer has completed and will follow the Animal Mortality Plan, prepared as a part of the Feedlot Permit application. The Proposer expects to use composting as the primary method of disposal, and rendering when composting is not available. The Proposer will remove mortalities from barns as discovered and move to the mortality compost building. The Proposer will follow the MBAH rules for disposal of all animal mortalities. The Proposer will compost dead animals at Site 1 in a 6-bay, 20-foot by 60-foot mortality compost building to dispose of carcasses. The disposal and compost building area will have a concrete apron, concrete floor, side bays and a steel roof, and will be located east of the total

confinement barns. When composting is unavailable, the Proposer will hire a rendering company to pick up and convey the dead animals to the rendering company site. The Proposer estimates the annual mortality rate at Site 1 is 6% or approximately 300 head of swine.

Site 2

The Proposer has completed and will follow the Animal Mortality Plan, prepared as a part of the Feedlot Permit application. The Proposer expects to use composting as the primary method of disposal and rendering when composting is not available. The Proposer will remove mortalities from the barns as discovered. The Proposer will follow the MBAH rules for disposal of all animal mortalities. The Proposer will compost dead animals at the Site 2 in a 6-bay, 20-foot by 60-foot mortality compost building to dispose of carcasses. The disposal and compost building area will have a concrete apron, concrete floor and side bays and a steel roof, and will be located north of the total confinement barns. When composting is unavailable, the Proposer will hire a rendering company to pick up and convey the dead animals to the rendering company site. The Proposer estimates the annual mortality rate at Site 1 is 6% or approximately 300 head of swine.

8. Surface Water Runoff.

Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff.

The Proposer's construction of roofed buildings and driveways at Sites 1 and 2 will increase surface water runoff at both Sites 1 and 2. The NPDES CSW General Permit requires projects that create over 1 or more acres of impervious surface must retain the water quality volume of 1-inch of runoff from the new impervious surfaces created by the Project be retained on site by infiltration or other volume reduction practices and not discharged to surface waters. This stormwater treatment requirement applies to this Project. However, since the barns on both Sites are total confinement, the runoff will not come in contact with livestock or manure. The Proposer has prepared a Stormwater Pollution Prevention Plan (SWPPP) for both Sites 1 and 2 that meets the requirements of the NPDES CSW General Permit for erosion prevention and sediment control during feedlot construction.

Site 1 – stormwater treatment

The existing impervious surface at Site 1 is 3.40 acres and includes the existing total confinement barns and the gravel drive area surrounding the barns. The Proposer's construction of the proposed farrowing barn will result in an increase in new impervious area and includes the proposed barn, the mortality compost building with concrete apron, and the additional gravel drive. Due to the increase in new impervious surface area, the Proposer will construct permanent stormwater detention areas that will control the velocity of the runoff at which the sediment contained in the runoff will be allowed to settle before the treated stormwater leaves Site 1. Due to topography, the Proposer will construct two vegetated swale areas, one to the northwest and one to the northeast.

Site 2 – stormwater treatment

The existing impervious surface of Site 2 is 1.68 acres and includes the existing total confinement barn and the gravel drive area east of the barn. The Proposer's construction of the proposed breeding and gestation barn at Site 2 will result in an increase in new impervious area and including the proposed barn, the mortality compost building and the additional gravel drive. Due to the increase in new impervious surface area, the Proposer will construct permanent stormwater detention areas (vegetated swale areas) that will control the velocity of the runoff at which the sediment contained in the runoff will be allowed to settle before the treated stormwater leaves the site.

Manure Application Sites

The MPCA does not expect significant potential impacts to surface water resources from the Project's land application of manure activities. As discussed in Item 5 of the EAW, land application of manure occurs at agronomic rates. The Proposer determines the agronomic rate based on the type of crop grown, the soil type, and the soil fertility. This will assure there is no excess nutrient build up in the soil. Further, injection of all land-applied manure occurs at the time of application.

All Project manure application areas are within three sub-watersheds of the Whitewater River Watershed (0704000303); the Middle Fork Whitewater River, the Upper South Fork Whitewater River and the Lower South Fork Whitewater River. Previous landowners have farmed land in the watersheds for several decades. The Proposer expects stormwater runoff characteristics from the Project manure application areas to remain the same and under certain circumstances, improve because of the land application activities regulated under the NPDES Feedlot General Permit. The improvements would occur through developing better soil tilth from organic fertilizer and the uniform practice of incorporating manure over the acres identified in the MMP.

The Proposer expects no change in stormwater runoff characteristics (physically and chemically) from the Project manure application sites.

9. Traffic and Public Infrastructure Impacts.

A. Estimate the number of heavy truck trips generated per week and describes their routing over local roads. Describe any road improvements to be made.

Both Sites 1 and 2

- The Proposer is contracting to have feed delivered to both Sites 1 and 2 by semi-truck three times per week at each site, an increase from one to two trucks currently.
- The Proposer is contracting to have breeding gilts delivered to each site by semi-truck one time per month.
- The Proposer is contracting to have weaned pigs removed from each site by semi-truck two times per week.
- Both Sites 1 and 2 will each employ a total of nine full-time animal care technicians providing care and maintenance of livestock and the facility, an increase of three employees at Site 1 and an increase of 6 employees at Site 2.
- The addition of the composting mortality structures on each site will eliminate one rendering truck each week per site.

Trucks will access Site 1 by gravel road (Persons Drive) and access Site 2 by an all-weather asphalt-paved road (Co. Rd. No. 115). The Proposer reviewed traffic counts from MnDOT Office of Transportation Data and Analysis: Traffic Volume Program 2013 AADT (Average Annual Daily Traffic) (MnDOT Data). Based on this review, the Proposer believes the Project will have little to no impact to traffic volumes. The Proposer indicates the MnDOT Data shows Winona Co. Rd. No. 115 has an AADT of 240 or 1,680 vehicles per week. The Project will add an average of 1.5 vehicles per day at Site 1 and 4.6 vehicles per day at Site 2 to the traffic volume. Because of the very small increase in truck traffic, the Proposer does not expect any adverse impacts to the use of the roads. The Proposer believes the small increase will not require road improvements, and there are no planned improvements due to the Project.

- B. Will new or expanded utilities, roads, other infrastructure, or public services be required to serve the project? ☒ Yes ☐ No

If yes, please describe.

Site 1 and 2 each have an existing well. The Proposer has applied for a Preliminary Well Construction Assessment to construct an additional well at each site. These assessments were completed and confirmation letters were received on August 23, 2016. These letters are included in Attachment J. After completion of the environmental review process, the Proposer will pursue MNDNR approval to operate and pump water from the new wells.

The Proposer already has telephone service and an electrical service with a standby electrical generator at both Sites 1 and 2.

The existing state and county road infrastructure will not require any improvements.

10. Permits and approvals required. Mark required permits and give status of application:

Unit of government	Type of Application	Status
<input checked="" type="checkbox"/> MPCA	Feedlot Permit	Application submitted
<input checked="" type="checkbox"/> MPCA	NPDES CSW General Permit requirements incorporated into NPDES Feedlot General Permit	Part of NPDES Feedlot General Application
<input type="checkbox"/> MPCA	Notification/Status Change for Underground Storage Tanks	
<input type="checkbox"/> County	Minnesota Feedlot Permit	
<input checked="" type="checkbox"/> County/twp/city	Conditional use or other land use permit	To be submitted
<input checked="" type="checkbox"/> MNDNR	Well Construction Preliminary Assessment	Approved, with conditions
<input checked="" type="checkbox"/> MNDNR	Water Appropriation	To be submitted
<input type="checkbox"/> Other*		

*(List any other approvals required along with the unit of government, type of approval needed, and status of approval process.)

11. Other potential environmental impacts, including cumulative impacts. If the project may cause any adverse environmental impacts not addressed by items 1 to 10, identify and discuss them here, along with any proposed mitigation. This includes any cumulative impacts caused by the project in combination with other existing, proposed, and reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Examples of cumulative impacts to consider include air quality, stormwater volume or quality, and surface water quality. (*Cumulative impacts may be discussed here or under the appropriate item(s) elsewhere on this form.*)

The MPCA is required to inquire whether a project, which may not individually have the potential to cause significant environmental effects, could have a significant effect when considered along with other projects. This type of impact is known as a cumulative potential effect. In order to assess the Project's "cumulative potential effects of related or anticipated future projects", the MPCA conducted an analysis that addressed other projects or operations in the context to potential direct or indirect impacts of the Project that: (1) are already in existence or planned for the future; (2) are located in the surrounding area; and (3) might reasonably be expected to affect the same natural resources. The following is a review of the MPCA's analysis conducted to determine if the Project would contribute to an adverse cumulative potential effect.

Surface Water Quality

Site 1 and the associated manure application acres fall within three minor watersheds of the Whitewater River Watershed (0704000303): the Middle Fork Whitewater River (56% of the watershed), the Upper South Fork Whitewater River (30% of the watershed) and the Lower South Fork Whitewater River (14% of the watershed). Site 2 and the associated manure application acres all fall in the Lower South Fork Whitewater River minor watershed. The Whitewater River watershed, approximately 205,000 acres in area, consists of approximately 58% cropland, 8% pastureland, 13% woodland, 14% wetland and designated wildlife management areas, and 7% other land.

The MPCA's Feedlot Permit has incorporated by reference the requirements of the Minnesota CSW General Permit (MNR100001) in effect at the time of the issuance, or modification, of coverage under the Feedlot Permit. The Proposer must follow the Minnesota CSW General Permit that apply to construction of the Project at Sites 1 and 2.

Impaired Waters and Total Maximum Daily Loads (TMDLs)

The Federal Clean Water Act (CWA) (33 U.S.C. § 303(d)) (1972) requires that each state develop a plan to identify and restore any waterbody that is deemed impaired by state regulations. The U.S. Environmental Protection Agency (EPA) requires a TMDL as a result of the federal CWA. A TMDL identifies the pollutant that is causing the impairment and how much of that pollutant can enter the waterbody and still meet water quality standards.

The Middle Fork Whitewater River flows within 2,100 feet of manure application site 1 and within 2.2 miles of Site 1. The MPCA has classified the reach lying between the west line of Section 35, Township 107N, Range 11W to the North Fork Whitewater River as impaired by the 2014 Section 303(d) CWA impaired waters list for fecal coliform, nitrates and turbidity. This river segment is included in the Mississippi River – Winona Watershed Pollutant Reduction Project TMDL Study for Nutrients, Sediment and Bacteria Report of January 2016. The MPCA has not completed TMDLs for nitrates or turbidity.

A portion of the Upper South Fork Whitewater River flows within 465 feet of manure application site 17 and within 475 feet of manure application site 16. It also flows 1.3 miles southeast of Site 1 and 1.1 miles northeast of Site 2. The MPCA has classified the reach lying between St. Charles Township Road No. 7 and the east line of Section 2, Township 106N, Range 10W as Impaired in the 2012 Section 303(d) CWA impaired waters list for fecal coliform and turbidity. This river segment is included in the Mississippi River – Winona Watershed Pollutant Reduction Project TMDL Study for Nutrients, Sediment and Bacteria Report of January 2016. The MPCA has not completed a TMDL for turbidity.

Trout Streams

These trout streams are sensitive to land use practices related to agriculture and require special attention to ensure they remain healthy and productive. Fence-to-fence grain farming on the uplands and pasturing of the river bottoms contribute to land erosion and sedimentation of the streambeds. This fine sediment covers the gravel runs and riffles that trout need to spawn and invertebrates need to survive. The clearing of shoreline trees takes away the underwater root wads and fallen trees in which trout find cover from current and predators.

Specifically, there are two MNDNR-designated trout streams in the vicinity of Sites 1 and 2 and/or manure application sites. MNDNR has designated a portion of Trout Run Creek, lying within section 29 of Elba Township as a trout stream. This river segment lies 2,100 feet (0.4 mile) west of manure application site 1 in the north half of section 28, 3,200 feet (0.6 mile) northwest of manure application site 7 in the east half of section 32 and 1.4 miles north of Site 1.

The MNDNR has designated a portion of South Branch Whitewater River, lying within section 1 of St. Charles Township, as a trout stream (Minn. R. 6264.0050, subp. 4). This river segment flows within 2,640 feet (0.5 miles) north of manure application sites 31 and 32 in the south half of section 12, and 1.1 miles north of Site 2.

The MPCA believes the activities related to the surface water impairments in the Whitewater River watershed originate from a combination of permitted (e.g., municipal wastewater treatment facilities and NPDES feedlots) and non-permitted (e.g., individual SSTs, livestock manure and stormwater runoff) sources. Land application of livestock manure has the potential to impact surface water resources if conducted improperly or without regard to agronomic rate of application.

The Proposer has submitted the MMP as part of the Feedlot Permit application. After MPCA review and approval, the MMP becomes an integral and enforceable part of the Feedlot Permit. The MMP requires the manure is applied at agronomic manure application rates. The Proposer will transfer ownership of the manure generated by the Project to operators of the cropland receiving the manure. Prior to or at the time of manure ownership transfer, the Proposer is required to provide the cropland operator with information on the state requirements for soil testing, manure application rate limits, seasonal restrictions, manure application setbacks, manure application record keeping, and spill reporting, as well as the most current manure nutrient analysis. The cropland owner/operator is required to follow the Proposer's MMP as applicable under 7020.2225 Land Application of Manure, or local requirements, whichever is the more stringent.

The Proposer will use Minnesota Extension Service and MPCA-approved BMPs to minimize the contribution of the Project, including Sites 1 and 2 as well as the manure land application sites, to cumulative effects on surface water resources. As required by Minnesota feedlot rules, the Proposer will use several measures to ensure water resources are not impacted. These include, but are not limited to: 1) regular soil and manure testing to specify the manure nutrient application rates; 2) application of all manure with nitrogen used as the limiting nutrient when calculating application rates; 3) soil sampling of manure application sites with analysis for phosphorus concentrations once every four years to prevent buildup; 4) maintaining required setbacks from all surface waters and sensitive features and 5) injecting or immediately incorporating all manure into the soil or within 24 hours maximum. Injecting or incorporating manure assimilates it into the soil profile and ties up a large portion of the nutrients in the organic portion of the soil, thereby decreasing mobilization of the nutrients by wind and/or water, which could otherwise add to the impairments. Injection or incorporation of the manure also increases the organic matter in the soil, making it less likely to erode and add sediment to the impaired waters.

The MPCA anticipates the Project will not contribute to the existing water quality issues. The Project will minimize its potential impact to surface water quality through land application activities discussed in Item 5 of the EAW, including storage in an engineered concrete structure, fall land application, injection of the manure and observation of setback distances, as well as the use of an agronomic rate for land application. The MPCA will include these practices in the Proposer's Feedlot Permit, which requires a "no discharge" standard.

The Proposer's construction and operation of the Project at Sites 1 and 2, if conducted in accordance with requirements, will reduce or eliminate its potential to affect surface impairments within the minor watersheds of the Whitewater River watershed. The land application practices include application of manure at agronomic rates. The Proposer will ensure required setback distances from surface waters, tile intakes and other sensitive features are maintained when manure is land applied. These practices are in the Feedlot Permit, which requires a producer to operate a facility under a "no discharge" standard. As a

result, the MPCA believes that the Project will not contribute to an adverse cumulative potential effect on surface-water quality.

If a spill or release occurs, the Proposer is required to take remedial actions. These requirements are in the Emergency Response Plan and are enforceable conditions of the Feedlot Permit.

Groundwater Impacts

Groundwater Appropriation

The Proposer indicates that construction of a new well on each site is required for the primary source of water. The well will extract water from a bedrock aquifer, which provides water to existing production wells in the area.

The Proposer's review of the MPCA's report "Ground Water Contamination Susceptibility in Minnesota" (MPCA 1989), local source water assessments, Project soils and well logs of nearby wells indicates the Project lies in an area with high susceptibility to contamination because of the local geological setting and the presence of vulnerable geologic conditions. Sandstone, limestone, dolomite, and shale of Paleozoic and Precambrian age underlie the southeast corner of Minnesota. These rocks are largely sandstones of high hydraulic conductivity, limestones, and dolomites. The carbonate rocks have high secondary hydraulic conductance and transmit water readily.

Stratification logs of nearby wells, listed in the MDH Minnesota Well Index indicate topsoil and clay, followed by multiple layers of limestone and sandstone to a depth of approximately 400 feet. The soil investigations performed on Site 1 indicate layers of topsoil above varying clay layers until the borings terminated at 21 feet below the surface. The soil investigation performed on Site 2 indicated a layer of topsoil above varying clay layers before encountering layers of glacial and residual sand and weathered sandstone at depths ranging from 21 to 25 feet below the surface.

The MDNR Water Appropriations Permit Program regulates groundwater appropriations. The purpose of the MDNR permit program is to manage water resources so that adequate supply is provided for domestic, agricultural, fish and wildlife, recreational, power, navigational, and quality control. The permit program balances competing management objectives, including both development and the protection of water resources. Minn. Stat. § 103G.261 establishes domestic use as the highest priority when water supplies are limited, and, when well interference occurs, the MDNR follows a standardized procedure of investigation. The Proposer will need to correct any problems MDNR investigation determines they are causing. The MDNR will require the Proposer to assess the potential impacts during the water appropriation permit review process.

The Proposer requested, and MNDNR completed, a MNDNR Well Construction Preliminary Assessment on February 12, 2016. The MNDNR has preliminarily approved the construction of the wells at both Sites 1 and 2. The Proposer must apply for and receive MNDNR individual water appropriation permits for both Sites 1 and 2.

Groundwater Quality

Feedlot operations and land application activities can adversely affect groundwater resources at or near the surface or are accessible through conduits and fractures commonly associated with karst topography. The 1989 Minnesota Groundwater Protection Act authorized the MNDNR to map geographic areas defined by natural features where there is risk to groundwater from activities conducted at or near the land surface. The MPCA reviewed information compiled by the MNDNR to determine whether the Project has the potential for significant environmental effects, including cumulative effects. The MPCA

considered the soil types and depth to bedrock as factors in the review to determine groundwater sensitivity and pollutant impacts. The MPCA reviewed the Ground Water Contamination Susceptibility in Minnesota report (Report) to estimate the potential for groundwater pollution from the Project. The Report uses a matrix for determining a Sensitivity Rating of the Water Table ranging from Very High to Very Low on aquifer material, recharge potential, soil materials, and vadose zone materials.

After review of the published information related to pollution sensitivity potential, the Project Sites, including manure application sites, are located in an area designated as having a high risk to groundwater pollution. The Proposer will ensure land application practices employed reduce the risk to groundwater quality (see Item 5 of the EAW).

The Proposer will further protect groundwater by following the requirements of Minn. R. ch. 7020, including the completion of required Karst Surveys for the construction of the manure barns and LMSAs, and implementing them through the MPCA-approved MMP for the land application of manure. These rules protect groundwater from both cumulative and individual feedlot impacts. The MPCA reviewed and approved proposed design plans and construction specifications for the manure storage pits and the MMP for the land application of manure, which are enforceable conditions of the NPDES Feedlot General Permit.

Air Quality Impacts

The Proposer used the AERMOD dispersion model to predict potential emissions of hydrogen sulfide, ammonia, and selected odorous gases from the Project. See Attachment F. The air quality modeling evaluation predicted concentrations of the selected gases at the Project property lines and nearest neighbors. The model estimated pollutant concentrations from the Project, along with an ambient hydrogen sulfide and ammonia background concentration to account for any nearby air emission sources. A background concentration is the amount of pollutants already in the air from other sources and then used to address cumulative air impacts. Hydrogen sulfide and ammonia may be present from the agitation and pump-out of a neighboring feedlot, or the pumping of a municipal wastewater treatment facility. Air emissions from other emission sources may affect the compliance status of the proposed facility, or affect downwind human and environmental receptors. The Proposer used monitoring data from other Minnesota feedlot facilities to derive a background level for hydrogen sulfide. AERMOD adds the monitored background hydrogen sulfide concentration to the predicted modeled emission. Based on the results of the modeling, the MPCA does not expect significant air quality impacts from Site 1 or Site 2 of the Project including adverse cumulative potential effects.

Land Use

The land identified for the purpose of this Project includes 1 and 2 and the cropland identified as potential manure application acreage and has the MPCA has reviewed in context with other existing or proposed projects within the watershed. The Proposer identified karst features (sinkholes) in four areas, near Sites 1 and 2, and in or near four manure application sites. The Proposer's Sites 1 and 2 are outside the minimum distance (300 feet) required from a sinkhole. The Proposer has identified minimum required setback distances for land application of manure in the MPCA-approved MMP, and will ensure these minimum required setback distances are maintained when the CAWT land applies the manure.

Wildlife Habitat

There is a competing issue in rural landscapes to maintain a balance between agricultural demands and preserving natural resources. In this case, the Proposer's Project is in areas currently used for agricultural production. Previous landowners have used all affected acres, including the proposed manure application sites for agricultural purposes for more than 20 years. The Proposer's Project will not displace or disrupt any wildlife habitat and as a result, will not contribute to an adverse cumulative potential effect related to habitat fragmentation and loss.

Row Crop Agriculture

The Proposer has designed the Project to use existing row crop feedstock, rather than cultivate fallow or marginal land to meet crop use needs. There is no indication that any other projects in the area will be converting fallow or marginal cropland into row crop production within the Project area. The Project will not modify land use and will not contribute to an adverse cumulative potential effect related to row crop agriculture. The MPCA does not expect the Project's use of existing row crop agriculture cropland to create an additional adverse impact to environmental quality.

Traffic

The Proposer's cumulative potential effects analysis for traffic included an evaluation of the direct contribution of new traffic through the development and operation of the Project in context to the existing traffic load. The analysis provided in Item 9.A shows a slight increase of traffic from the Project on county roads. However, the Proposer's information about the slight increase in additional traffic will not require road improvements and is not likely to cause an adverse cumulative potential effect.

12. Summary of issues. 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.

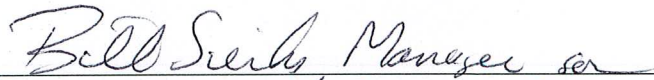
None.

RGU CERTIFICATION.

I hereby certify that:

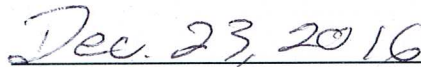
- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as "phased actions," pursuant to Minn. R. 4410.0200, subp. 60, 4410.1000, subp. 4, and 4410.4300, subp. 1.
- Copies of this EAW are being sent to the entire EQB distribution list.

Name and Title of Signer:



Dan R. Card, P.E., Supervisor, Environmental Review Unit
St. Paul Office
Resource Assistance and Management Division

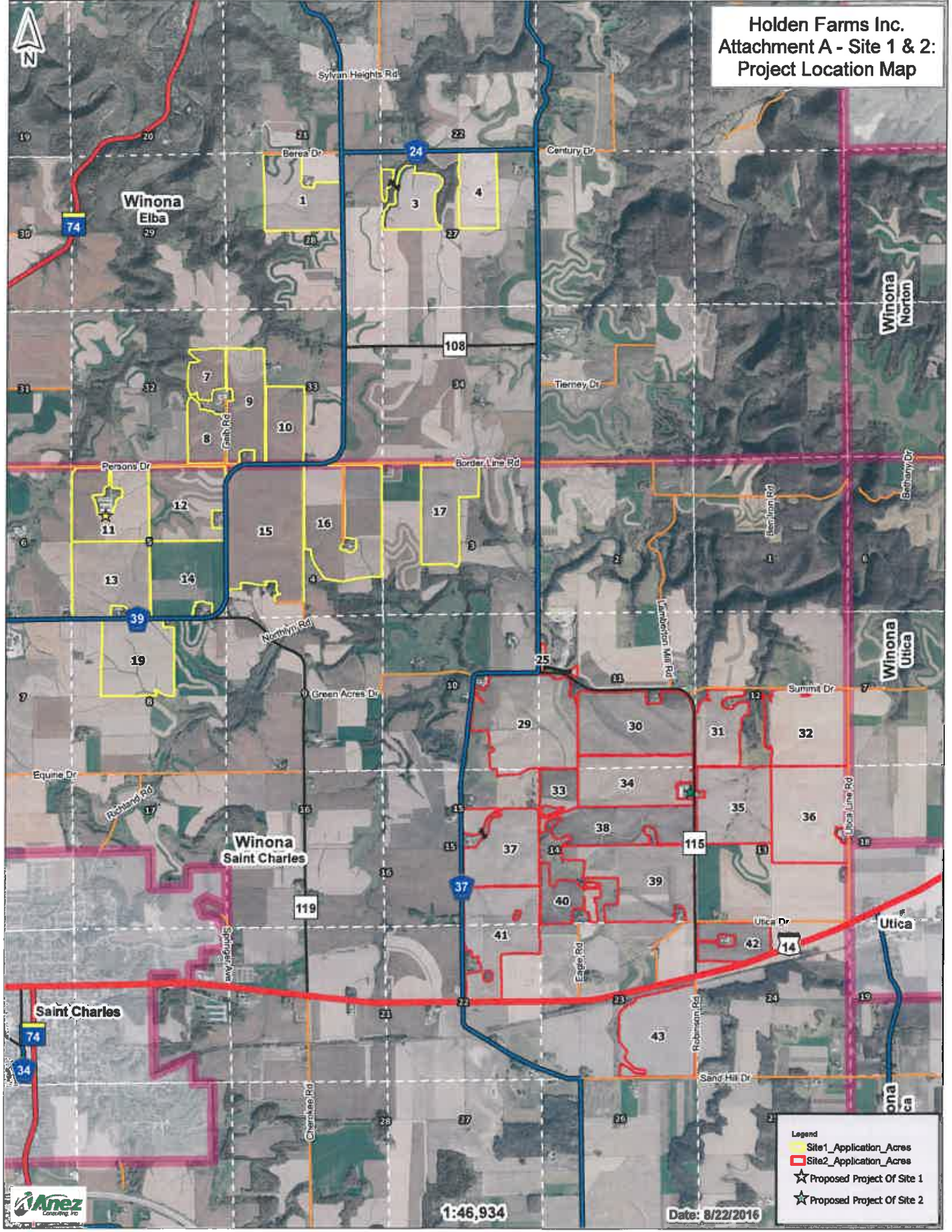
Date:



The format for the alternative Environmental Assessment Worksheet form has been approved by the Chair of the Environmental Quality Board pursuant to Minn. R. 4410.1300 for use for animal feedlot projects. For additional information contact: Environmental Quality Board, 520 Lafayette Road, St. Paul, Minnesota, 55155-4194, 651-296-6300, or at their website <http://www.eqb.state.mn.us/review.html>.

ATTACHMENT A
Project Location Map

Holden Farms Inc.
Attachment A - Site 1 & 2:
Project Location Map



- Legend
- Site1_Application_Acres
 - Site2_Application_Acres
 - ★ Proposed Project Of Site 1
 - ★ Proposed Project Of Site 2

1:46,934

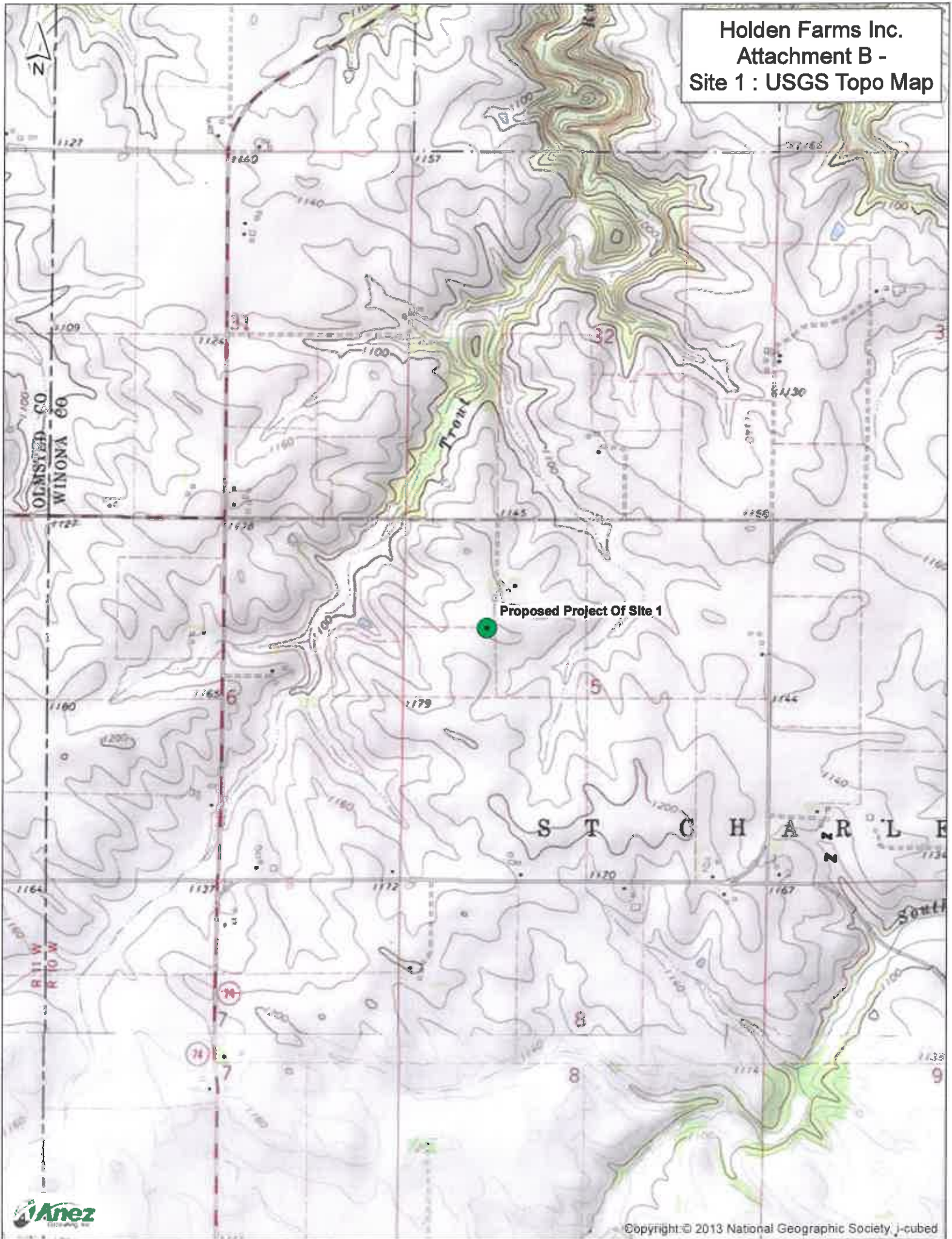
Date: 8/22/2016

ATTACHMENT B

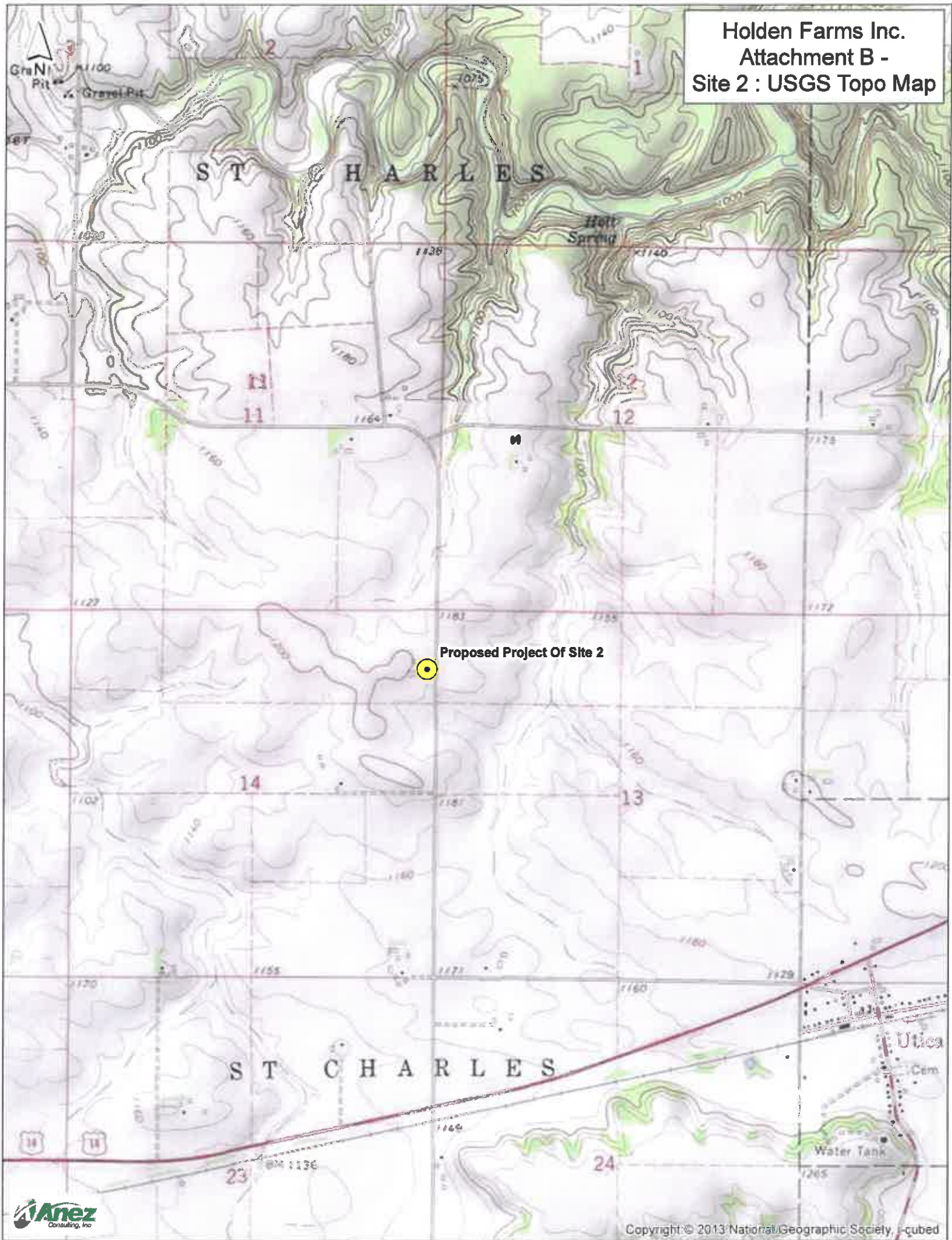
U.S.G.S Topographical Maps

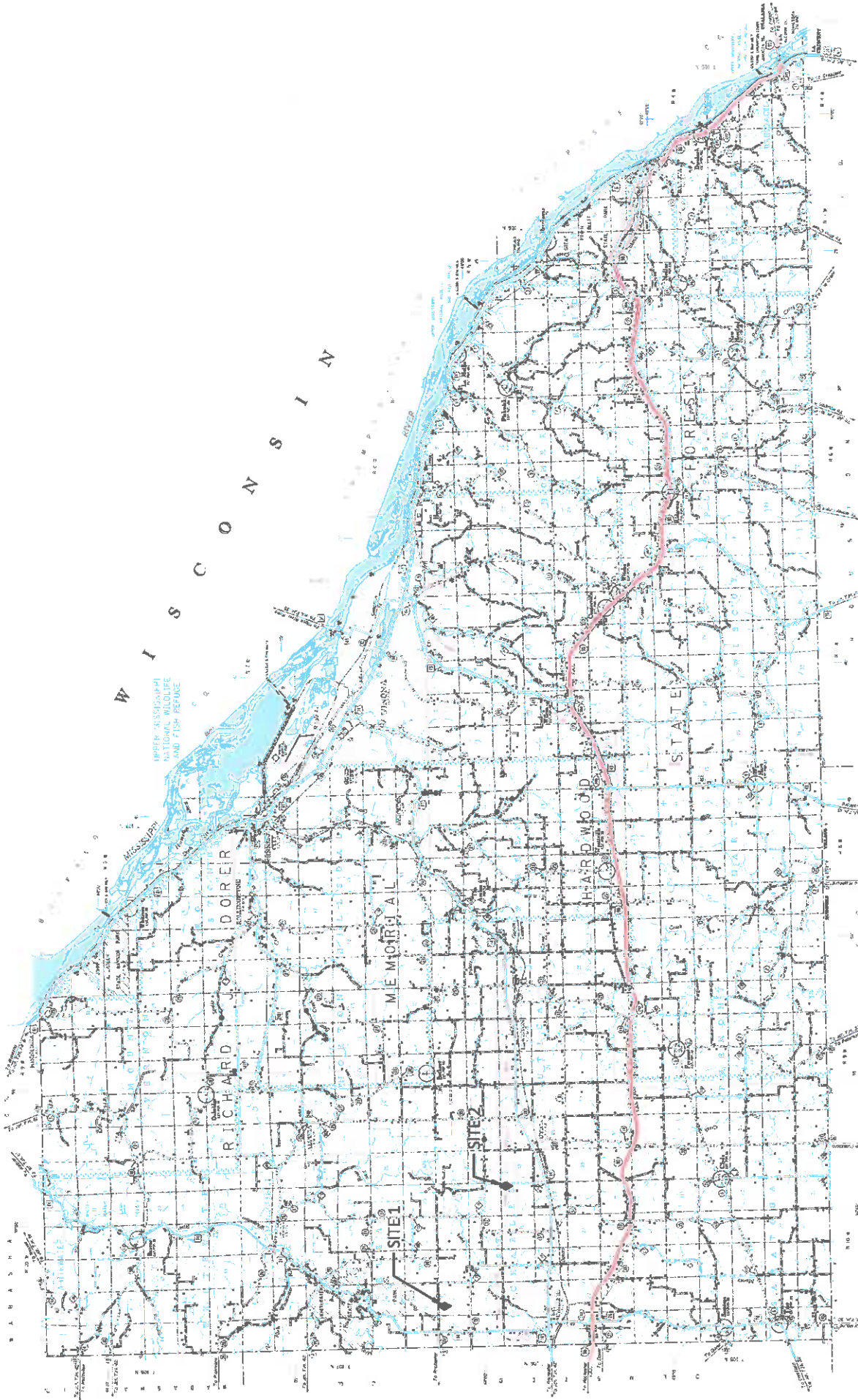
Winona County Map

Holden Farms Inc.
Attachment B -
Site 1 : USGS Topo Map



**Holden Farms Inc.
Attachment B -
Site 2 : USGS Topo Map**





HOLDEN FARMS, INC.
PROJECT LOCATION
WINONA COUNTY MAP
ST. CHARLES TOWNSHIP
WINONA COUNTY, MN.

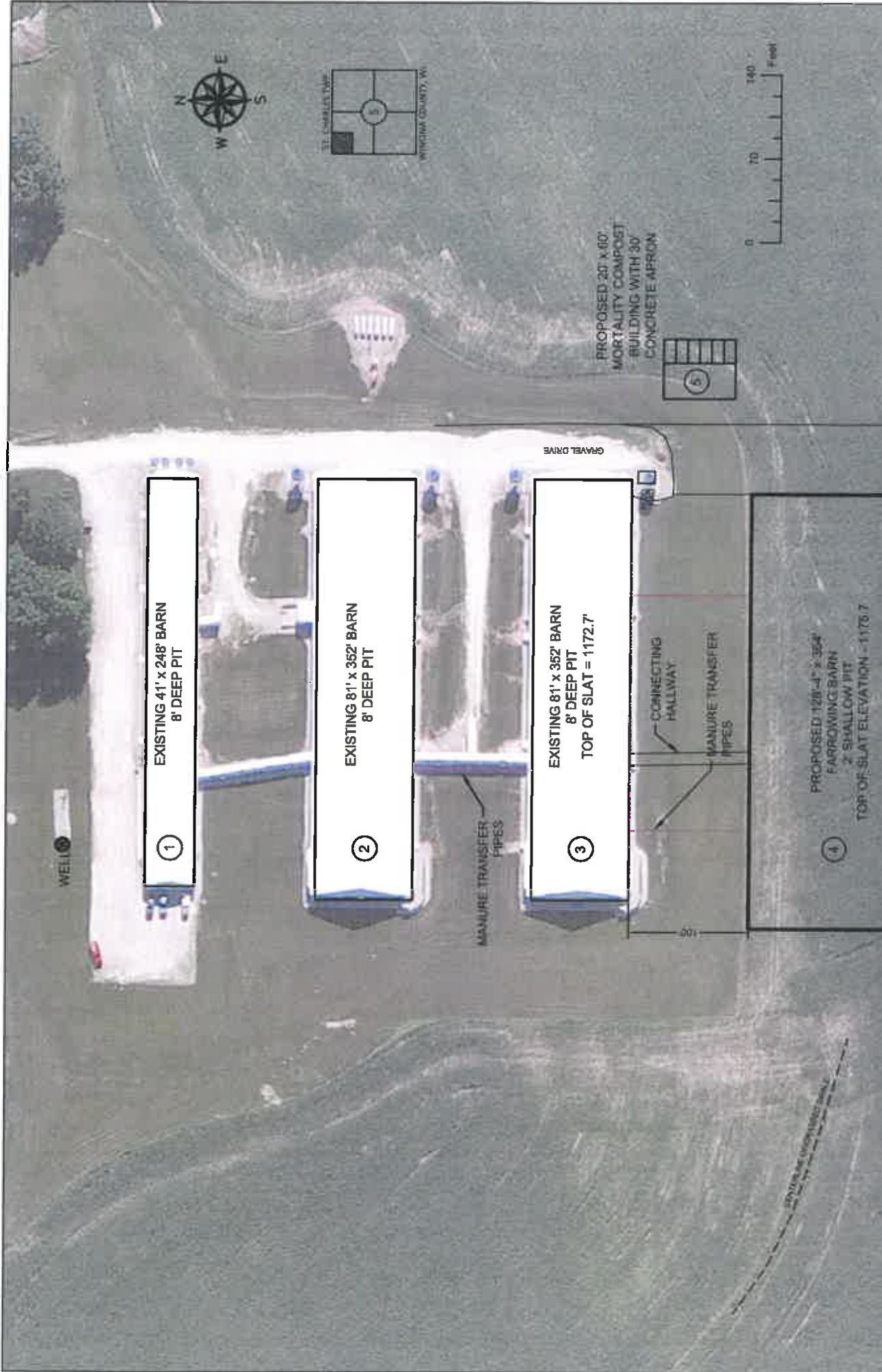
Scale 1" = 22,500'	Date 08/31/2016
Project Number	Sheet Number C1




1700 Technology Drive NE
Suite 130
Willmar, MN 56201
(320) 235-1970

ATTACHMENT C

Project Site Plans






1700 Technology Drive NE
Suite 130
Willmar, MN 56201
(320) 235-1970

HOLDEN FARMS, INC.
SITE 1
SITE PLAN
SEC. 5, TWP. 106, R. 10
WINONA COUNTY, MN.

Date	Sheet Number
08/31/2016	S1



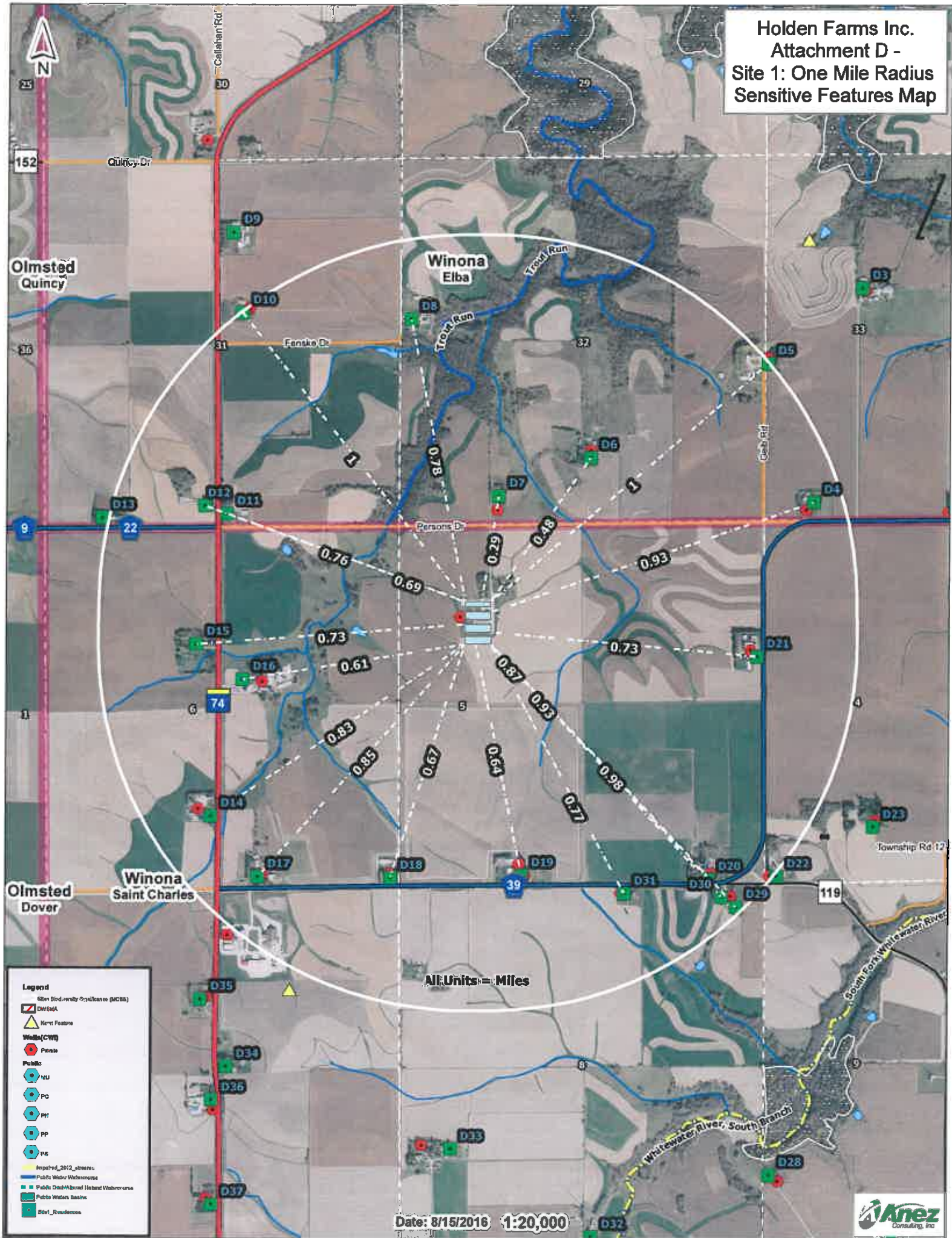
1
EXISTING 118' x 349'
BARN WITH 8' DEEP PIT
TOP OF SLAT = 1189.0'

		HOLDEN FARMS, INC. SITE 2 SITE PLAN	
1700 Technology Drive NE Suite 130 Willmar, MN 56201 (320) 235-1970		SEC. 14, TWP. 106, R. 10 WINONA COUNTY, MN.	
Scale 1" = 80'	Project Number	Date 08/31/2016	Sheet Number S2

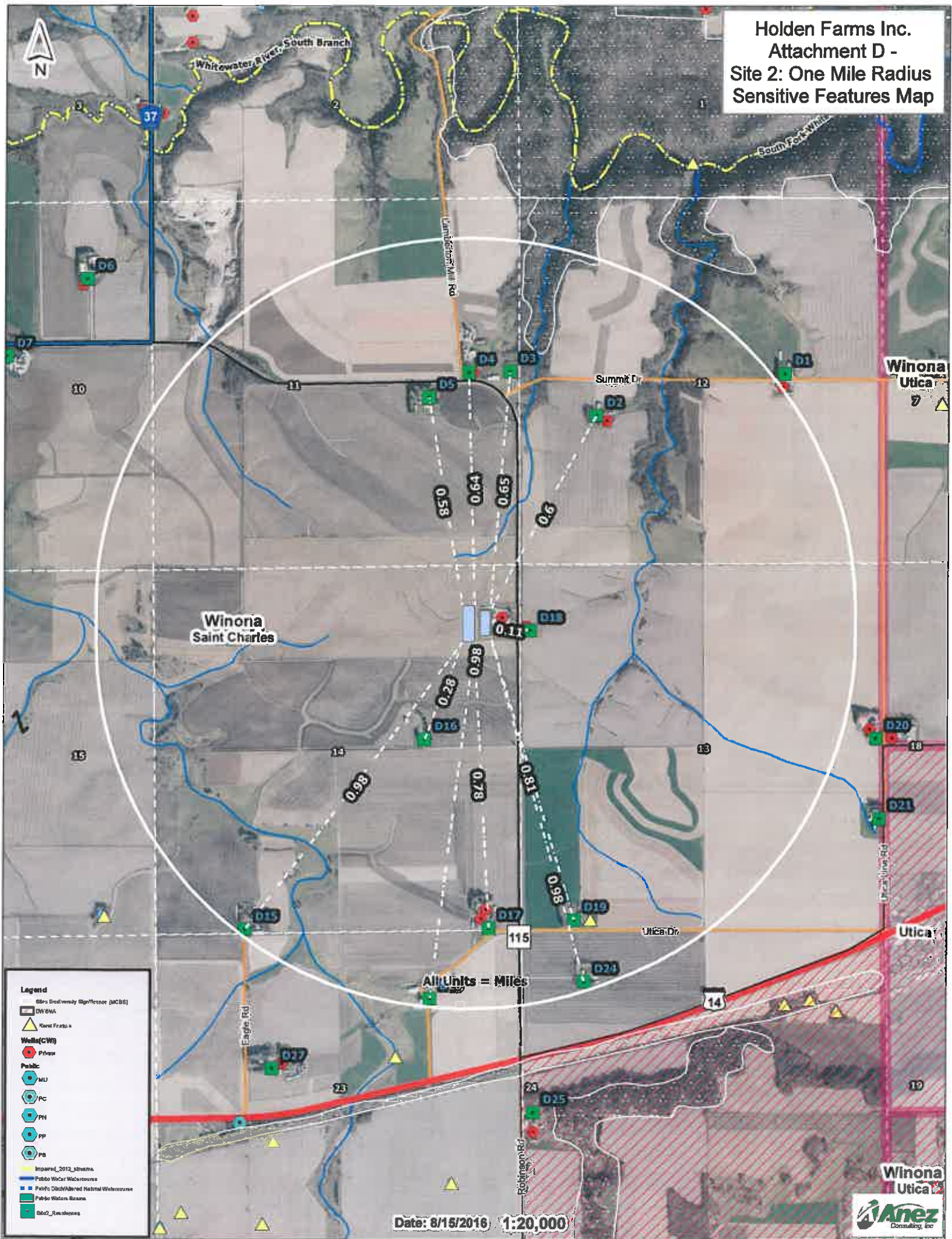
ATTACHMENT D

One Mile Radius Sensitive Features Maps

**Holden Farms Inc.
Attachment D -
Site 1: One Mile Radius
Sensitive Features Map**



Holden Farms Inc.
Attachment D -
Site 2: One Mile Radius
Sensitive Features Map



Legend

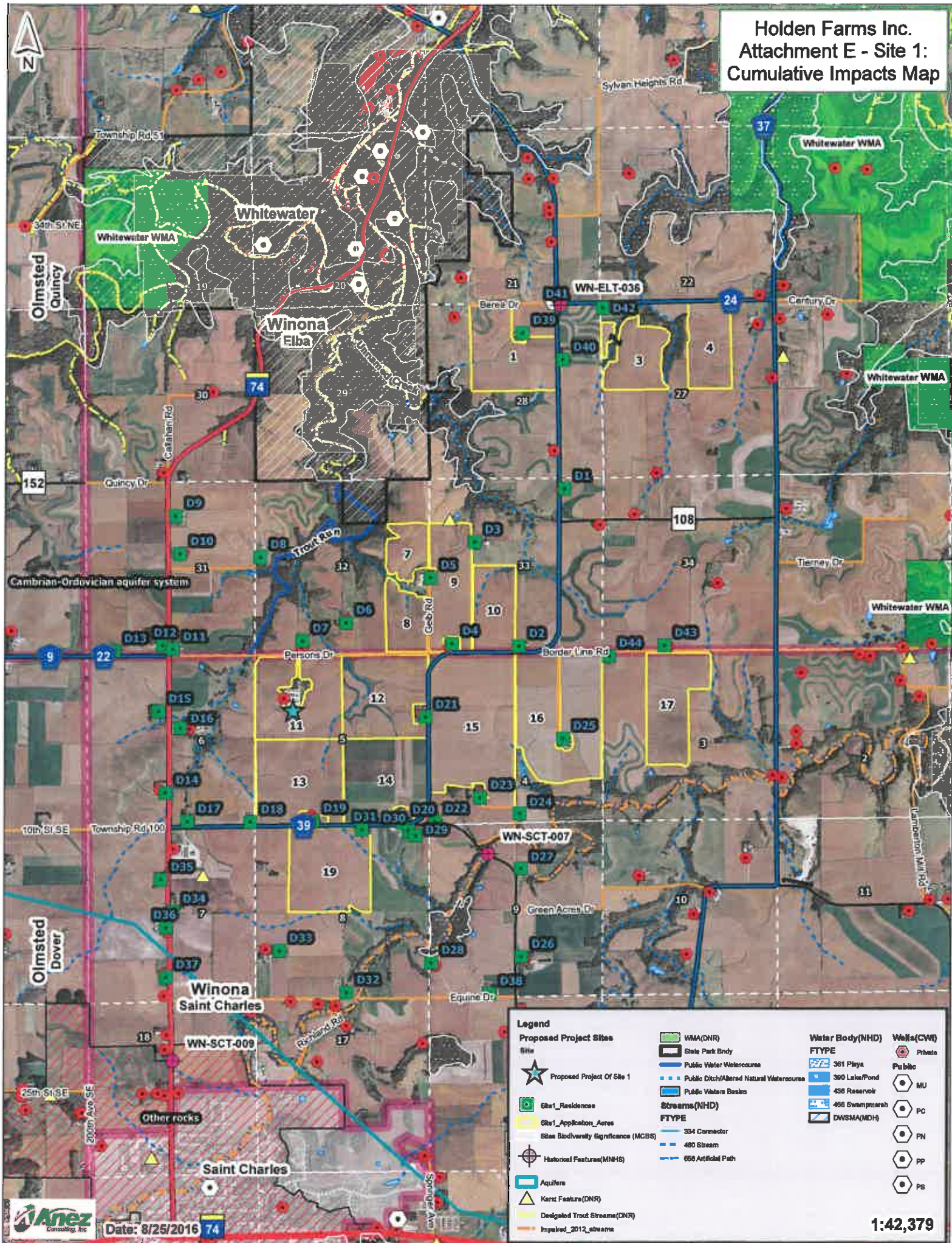
- State University Significance (MCSB)
- DW/DA
- Wetlands (CW)
- Public
- WU
- PC
- PH
- PP
- PS
- Impaired 2012 streams
- Public Water Watersheds
- Public Drinking Water Watersheds
- Public Water Basins
- State Residences

All Units = Miles

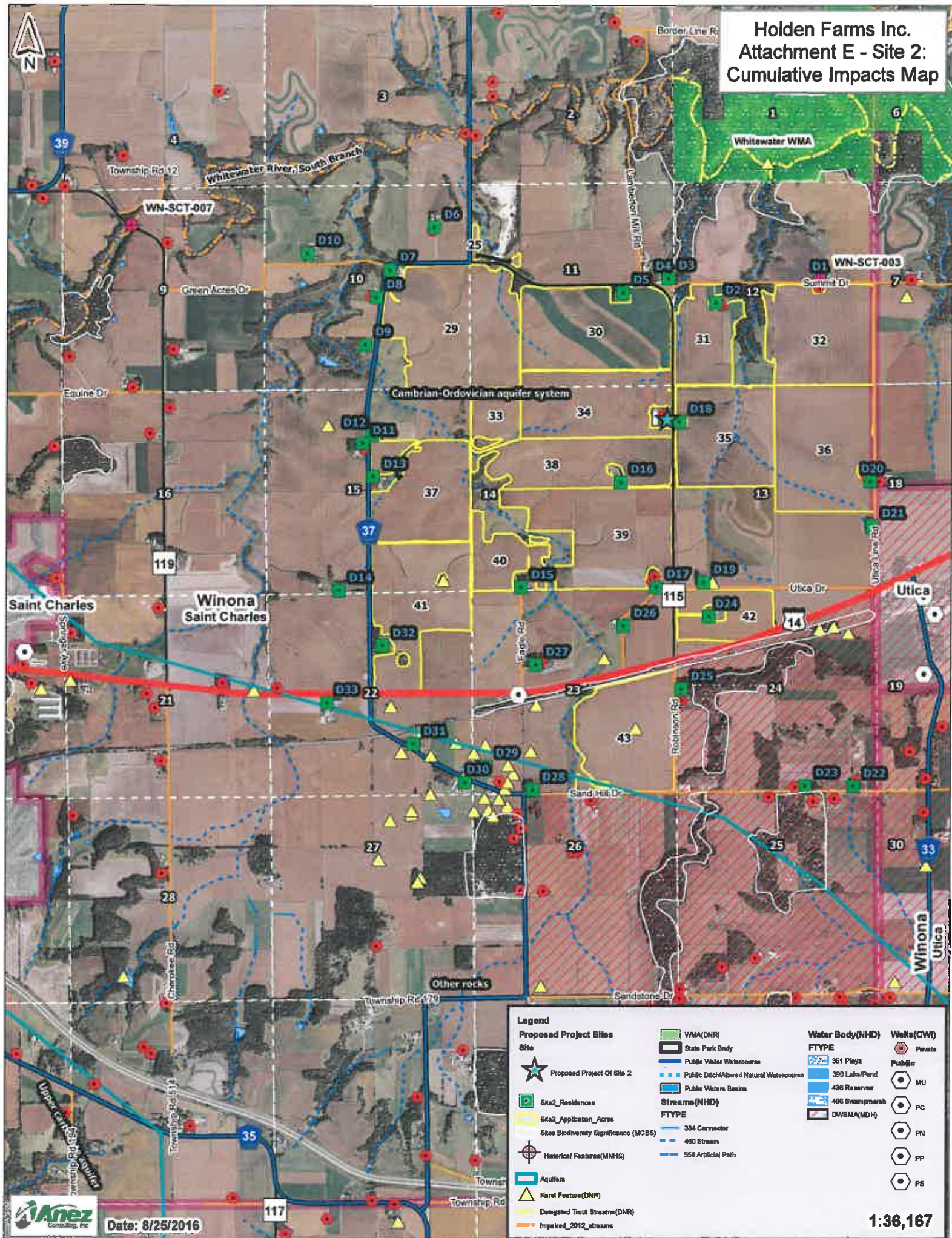
Date: 8/15/2016 1:20,000

ATTACHMENT E
Cumulative Impacts Maps

Holden Farms Inc. Attachment E - Site 1: Cumulative Impacts Map



**Holden Farms Inc.
Attachment E - Site 2:
Cumulative Impacts Map**



ATTACHMENT F

Air Quality Modeling Analyses

**AIR QUALITY
DISPERSION MODELING ANALYSIS**

FOR

**Holden Farms Inc. – St. Charles
560-Head Farrowing Barn Project**

LOCATED IN

**ST. CHARLES TOWNSHIP
WINONA COUNTY, MINNESOTA**

PREPARED FOR

Holden Farms, Inc.
12346 Hall Avenue
Northfield, MN. 55057

PREPARED BY



Anez Consulting, Inc.
1700 Technology Drive NE
Suite 130
Willmar, MN. 56201

August 2016

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table of Contents

Section	Description	Page
1.0	INTRODUCTION	1
2.0	MODELING APPROACH AND PARAMETERS	2
	Air Quality Standards and Thresholds	2
	Background Concentrations	3
	Model Selection and Options	4
	Meteorological Data	4
	Building Downwash	4
	Terrain	5
	Receptor Locations	5
3.0	SOURCE DESCRIPTIONS AND EMISSION RATES	8
	Feedlot Diagrams and Descriptions	8
	Emission Rate Sources	18
4.0	MODELING RESULTS	19
	Hydrogen Sulfide (H ₂ S)	19
	Ammonia (NH ₃)	22
	Odor	25
5.0	SUMMARY AND CONCLUSIONS	28
6.0	REFERENCES	30

**Air Quality Modeling Analysis
Holden Farms Inc.**

Tables and Figures

Table	Description	Page
1	Modeled Compounds and Concentrations	3
2	Background Concentrations	4
3	Monthly H ₂ S Scalars	19
4	Maximum H ₃ H Hourly H ₂ S Concentrations at Property Lines	20
5	Maximum Monthly H ₂ S Concentration For Nearest Neighbors	21
6	Monthly NH ₃ Scalars	22
7	Maximum Hourly NH ₃ Concentrations at Property Lines	23
8	Maximum Annual NH ₃ Concentrations For Nearest Neighbors	24
9	Odor Perception Intensities	25
10	Monthly Odor Scalars	26
11	Maximum Hourly Odor Concentrations at Property Lines	26
12	Maximum Hourly Odor Intensities at Nearest Neighbors	27

Figure	Description	Page
1	Project Overview	6
2	Site Layout	7
3	Project Feedlot Diagram	8
4	Offsite Feedlot 1 Diagram	9
5	Offsite Feedlot 2 Diagram	10
6	Offsite Feedlot 3 Diagram	11
7	Offsite Feedlot 4 Diagram	12
8	Offsite Feedlot 5 Diagram	13
9	Offsite Feedlot 6 Diagram	14
10	Offsite Feedlot 7 Diagram	15
11	Offsite Feedlot 8 Diagram	16
12	Offsite Feedlot 9 Diagram	17

AERMOD Analysis Plots

- Highest Monthly Hydrogen Sulfide (H₂S) Concentrations (µg/m³)
- Highest 1-Hour Ammonia (NH₃) Concentrations (µg/m³)
- Average Annual Ammonia (NH₃) Concentrations (µg/m³)
- Highest 1-hour Average Odor Concentration (OU/m³)

**Air Quality Modeling Analysis
Holden Farms Inc.**

1.0 INTRODUCTION

Holden Farms Inc. (Holden) is requesting approval to expand an existing feedlot operation in the northwest quarter of section 5 in St. Charles Township, Winona County. The existing facility currently has three deep-pit swine barns. The Project will include the addition of one 560-head swine farrowing barn, resulting in a total feedlot capacity of 1,498 animal units. Holden is voluntarily including this site in the Environmental Assessment Worksheet (EAW) being prepared for a second site, Site 2, approximately 5 miles southeast of this site.

In support of that EAW, and based on a protocol approved by the Minnesota Pollution Control Agency (MPCA), an air quality modeling analysis has been performed. This Air Quality Modeling Report presents the results of the quantitative assessment of air quality impacts associated with the planned project and existing feedlots located within a 9 square-mile grid surrounding the project site.

This modeling analysis followed procedures outlined in MPCA document *Air Dispersion Modeling Guidance (July 2013)*, the United States Environmental Protection Agency (USEPA) document *Guideline on Air Quality Models* (USEPA Publication number EPA-450/2-78-027R [revised]), and the USEPA document *AERMOD Implementation Guide* (March 19, 2009).

Section 2.0 of this report describes the general modeling approach and parameters. Section 3.0 describes onsite and offsite sources and emission rates. Section 4.0 provides model results and Section 5.0 provides a summary and conclusions. Complete modeling files are provided in electronic format on the enclosed CD.

**Air Quality Modeling Analysis
Holden Farms Inc.**

2.0 MODELING APPROACH AND PARAMETERS

This air quality modeling analysis was based on a modeling protocol approved by MPCA staff on 8/29/2016, and estimated the hydrogen sulfide concentrations, ammonia concentrations, and odor intensities from the planned project and 9 existing feedlots located within a 9 square-mile grid surrounding the project site. These feedlots were assumed to be the only quantifiable emission sources; any other sources were assumed to contribute to the background concentrations included in the modeling results.

Concentrations were estimated at the new feedlot's effective property lines and at 38 of the nearest neighbors surrounding the project. The effective property lines used are those encompassing the northwest quarter of section 5, as shown in Figure 1.

Existing sources and proposed sources were modeled to establish the current conditions and determine the concentrations directly attributed to the proposed project, both at the site boundaries and at surrounding receptors. Concentration levels at property line receptors and nearest neighbors were within established threshold levels for all averaging periods and pollutants. A further discussion of modeling results can be found in Sections 4 and 5.

Air Quality Standards and Thresholds

AERMOD (version 15181) was used to estimate concentrations based on five years (2009-2013) of historical meteorological data. Maximum 1-hour, monthly and annual average concentrations were calculated to determine compliance with Minnesota's State Ambient Air Quality Standard for hydrogen sulfide, and inhalation Health Risk Values (iHRVs) for hydrogen sulfide and ammonia. Odor intensities were modeled to compare to an odor classification system based on detection-threshold odor intensities.

Table 1 shows the compounds and concentrations that were estimated in the air quality analysis as well as the corresponding air quality standard.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 1: Modeled Compounds and Concentrations

Compound/ Pollutant	Estimated Concentration	Air Quality Standard	Notes
Hydrogen sulfide (H ₂ S)	Maximum hourly concentration at the effective property lines.	30 ppb (by volume) hourly Minnesota State Ambient Air Quality Standard	½ hour average not to be exceeded over 2 times in any 5-day period.
	Maximum monthly concentration at the nearest neighbors.	10 µg/m ³ subchronic (13 week) inhalation Health Risk Value (iHRV)	
Ammonia (NH ₃)	Maximum hourly concentration at the effective property lines.	3,200 µg/m ³ acute hourly inhalation Health Risk Value (iHRV)	
	Maximum annual concentration at the nearest neighbors.	80 µg/m ³ annual chronic inhalation Health Risk Value (iHRV)	
Odor	Maximum hourly odor intensity at the effective property lines.	An odor classification system based on detection/threshold odor intensities.	
	Maximum hourly odor intensity at nearest neighbors.		

Background Concentrations

Background concentrations of hydrogen sulfide and ammonia provided in Table 2 were added to the AERMOD estimated concentrations as described in EPA guidelines.⁷ The listed concentrations represent background concentrations for rural Minnesota. The listed 17-ppb background hydrogen sulfide concentration is appropriate when assessing a feedlot's potential to comply with the 30-ppb standard. If assessing the potential to comply with the 50-ppb hydrogen sulfide standard, a background concentration of 18 ppb would have been used.

The background concentrations shown reflect the monitored data expressed in the terms of the "exceedance or violation condition" for the corresponding iHRV guideline or ambient standard. For example, the background 148 µg/m³ ammonia concentration for the acute ammonia iHRV represents the maximum hourly concentration that occurred within the entire length of monitoring. This is appropriate because the guidance is concerned with any potential exceedance of the iHRV. Also, the 17-ppb hydrogen sulfide background represents the third highest 30-minute concentration that occurred within any 5-day period (i.e., the high-third-high or H3H). This is appropriate due to a violation being defined as the third exceedance of 30-ppb within any 5-day period.

Potential odor impacts were evaluated using AERMOD-generated odor intensities (OU/m³), and were compared to the reference odor intensities provided in Table 9. An odor intensity of 72 detection-threshold odor units (OU) is defined as a faint odor and is the odor intensity that "an average person might detect if attention is called to the odor, but the odor would not otherwise be noticed."¹³

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 2: Background Concentrations (rural Minnesota)

Compound/Pollutant	Hourly Background Concentration	13-Week Background Concentration	Annual Background Concentration
Hydrogen sulfide (H ₂ S)	17ppb (v/v) (24.3 µg/m ³)	0.70 ppb (v/v) (1.0 µg/m ³)	Not required
Ammonia (NH ₃)	208 ppb (v/v) (148 µg/m ³)	Not required	8.07ppb (v/v) (5.72 µg/m ³)

Model Selection and Options

Dispersion modeling was conducted using the AMS/USEPA Regulatory Model – AERMOD (Version 15181), as recommended by MPCA modeling guidance. All AERMOD technical options selected followed the *regulatory default* option without the use of the *Urban* option (URBANOPT). Breeze Modeling Software (version 7.10.1 Pro) was used to execute all AERMOD Model runs. All AERMOD modeling input/output files are provided electronically on the enclosed CD.

Meteorological Data

The modeling analysis utilized the latest pre-processed (AERMET version 14134) meteorological (met) data for use in AERMOD, obtained from the AQDM website. Met data consisted of five years (2009-2013) of surface meteorological data for the National Weather Service (NWS) station in Rochester, MN. and of upper air weather data for the NWS station in Chanhassen, MN. The Rochester Meteorological Station lies at an elevation similar to that of the project site. The station is surrounded by land uses and surface characteristics similar to those found around the project site- primarily flat, agricultural land in corn and soybean production. No on-site meteorological data was available at the time of this analysis.

Building Downwash

For emissions released below “Good Engineering Practice” (GEP) height, as defined by EPA rules, it is necessary to include the potential effect of buildings on the near-field dispersion of emissions. Large buildings and structures disrupt the wind flow, and in the wake of such buildings emissions can be mixed more rapidly to the ground causing elevated ground-level concentrations. This effect is simulated in the AERMOD model.

AERMOD requires “direction-specific” building dimensions for each emission point. The direction-specific building dimensions represent the building width perpendicular to the wind direction along with the building height. The regulatory default selection uses the “upper bound” equation for predicting the

**Air Quality Modeling Analysis
Holden Farms Inc.**

influence of a building on the dispersion of pollutants. This equation is best suited for sources located near the center of the building and may dramatically overestimate concentrations from sources located near the edge of buildings where lateral plume spread is affected by flow around the building; therefore, building downwash effects were not included for those sources with releases near ground-level (ie. area, line and volume sources in this analysis).

The calculation of direction-specific building dimensions for the proposed feedlot buildings was accomplished with the USEPA Building Profile Input Program with Prime (BPIP-Prime), Version 04274. All BPIP-Prime runs were executed using Breeze Modeling Software (Version 7.10.1).

Terrain

Terrain elevations for all sources and receptors were determined using the terrain preprocessing program AERMAP (Version 11103). Pre-processed National Elevation Dataset (NED) files for Winona County were obtained from the Multi-Resolution Land Characteristics Consortium (MRLC) website and were used as input to AERMAP. Elevated (complex) terrain was considered in the model. All modeling was based on the Universal Transverse Mercator (UTM)/NAD83 grid system.

Receptor Locations

In order to assess concentrations at the property line, discrete receptors were placed along the property boundary every 25 meters. The boundary limits were assumed to be the northwest quarter of section 5. No receptors were placed within the property boundary. Additionally, discrete receptors were placed at 38 of the nearest occupied neighboring home sites. Modeled receptor height was assumed at ground level, with elevations being calculated by AERMAP. Figure 1 provides a project overview of the proposed site location with proposed and existing sources and receptor locations. Figure 2 shows the site layout.

Air Quality Modeling Analysis
Holden Farms Inc.

Figure 1 Project Overview

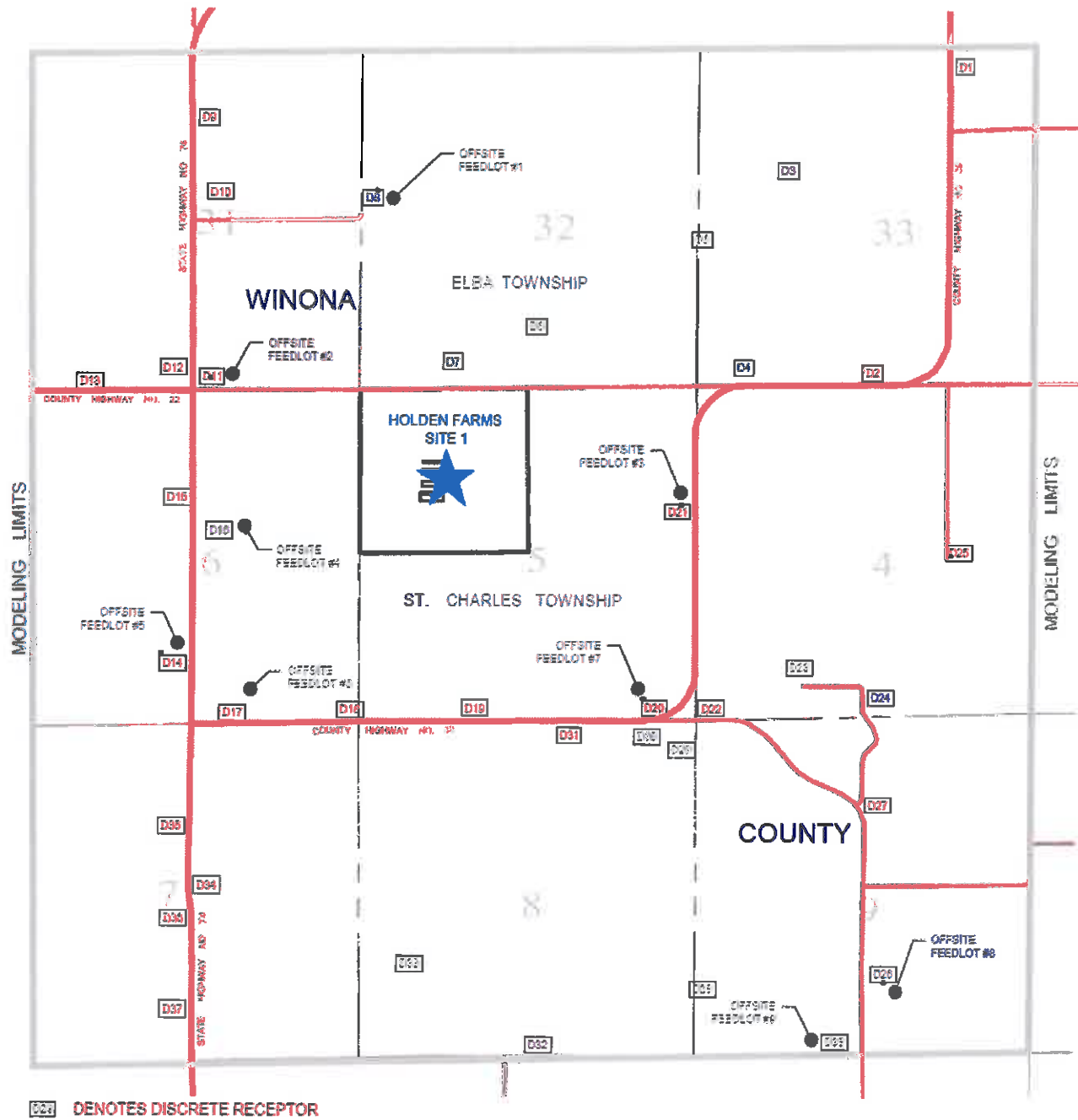
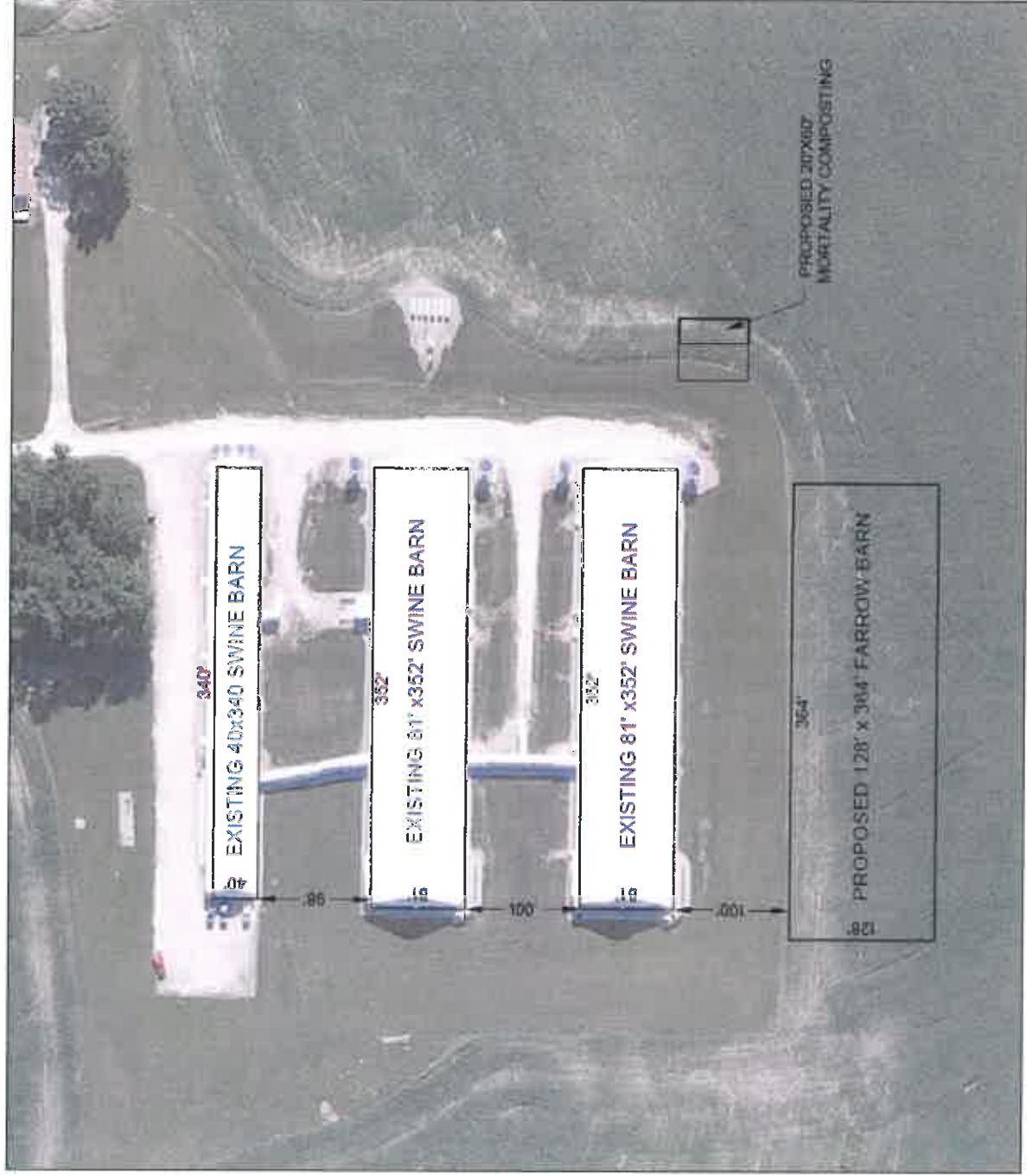


Figure 2 Proposed Site Layout



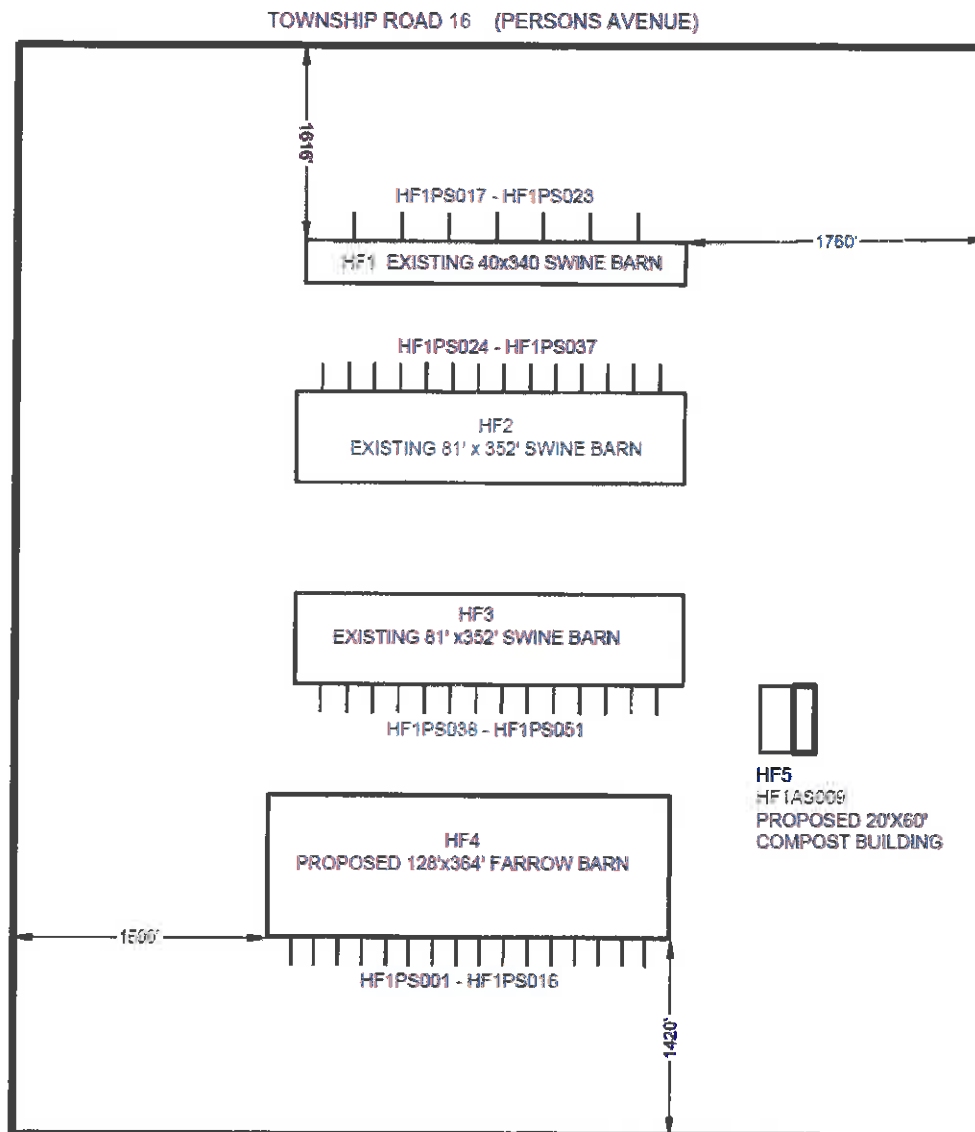
**Air Quality Modeling Analysis
Holden Farms Inc.**

3.0 Source Descriptions and Emission Rates

This air quality modeling analysis was based on a modeling protocol approved by MPCA staff on 8/29/2016 and estimated the hydrogen sulfide concentrations, ammonia concentrations, and odor intensities from the planned project and 9 existing feedlots located within a 9 square-mile grid surrounding the project site. Details on the existing feedlots were obtained from the Winona County Feedlot Office and MPCA staff with dimensions obtained from recent aerial photographs. The following figures show diagrams of the proposed and existing feedlots with descriptions of each. Boundary lines are approximate, where shown, and are based on Winona County GIS data.

Feedlot Diagrams and Descriptions

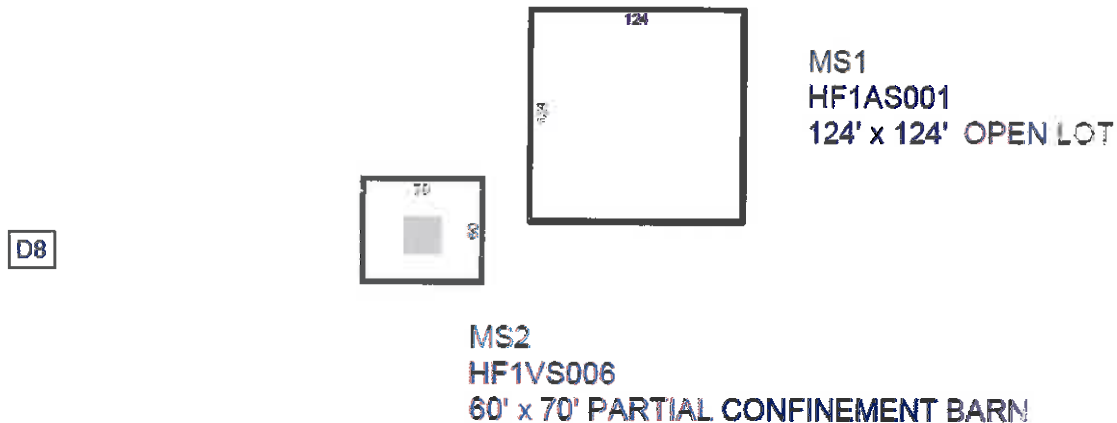
Figure 3 – Project Feedlot Diagram



**Air Quality Modeling Analysis
Holden Farms Inc.**

The existing Holden feedlot is located in the northwest quarter of section 5 in St. Charles Township, and currently consists of one 40'x340' swine barns and two 81'x352' swine barns, each with 8' deep, under floor, reinforced-concrete manure storage. The proposed 128'x364' farrowing barn has been modeled as 16 horizontal point sources. The existing barns were also modeled as series' of horizontal point sources. For conservatism, all horizontal point sources are modeled operating 24 hours a day, 365 days a year. The horizontal stacks were assumed to have a stack diameter of 54" and a flow rate of 27,000 cfm. The proposed mortality compost structure was modeled as a non-buoyant area source. The existing and proposed barns have been located on the site a minimum of 1400 feet from the nearest property /public right-of-way line to mitigate possible impacts from any hydrogen sulfide, ammonia or odor emissions.

Figure 4 – Offsite Feedlot 1

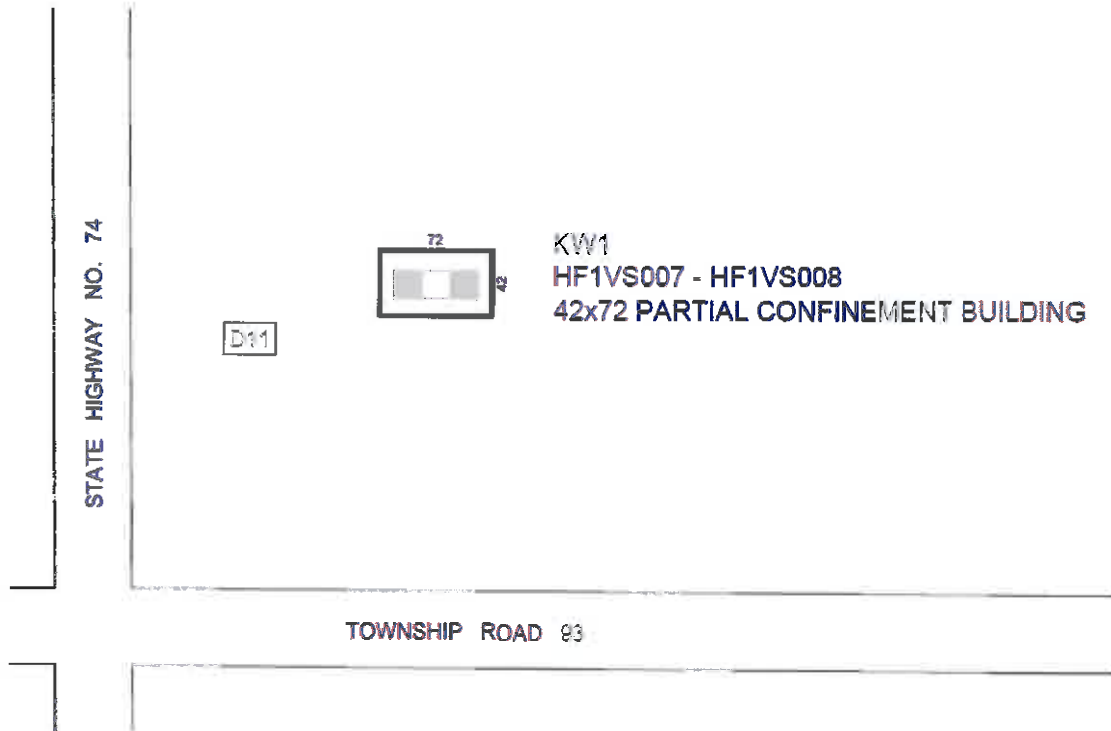


Offsite feedlot 1 – Beef feedlot located in the northwest quarter of Section 32, Elba Township in Winona County. Receptor D8 lies west of the partial confinement barn. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
MS1	Open Lot	Beef Cattle	15,376 s.f.	Non-buoyant area source
MS2	Total Confinement Barn	Beef Cattle	60'x70'	Volume source

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 5 – Off-Site Feedlot 2

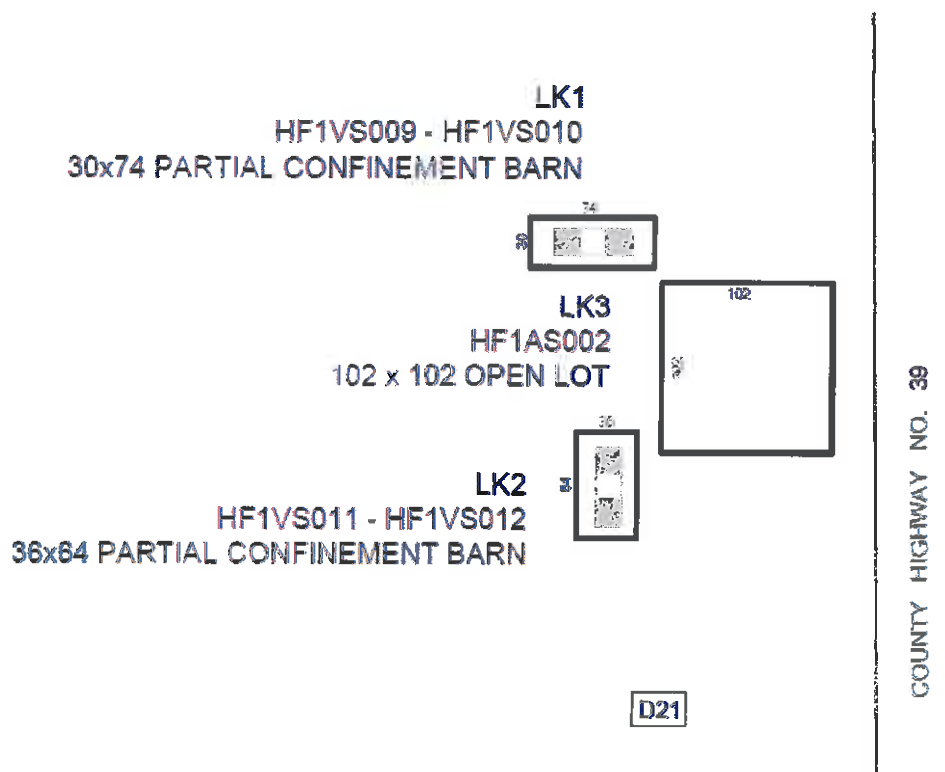


Offsite feedlot 2 – A beef feedlot located in the southeast quarter of Section 31, Elba Township in Winona County. Receptor D11 lies southwest of the partial confinement barn. The table below summarizes the existing source and modeling strategy.

Component	Description	Animals	Dimensions	Source Type
KW1	Partial Confinement Barn	Beef Cattle	42'x72'	2 volume sub-sources

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 6 – Offsite Feedlot 3

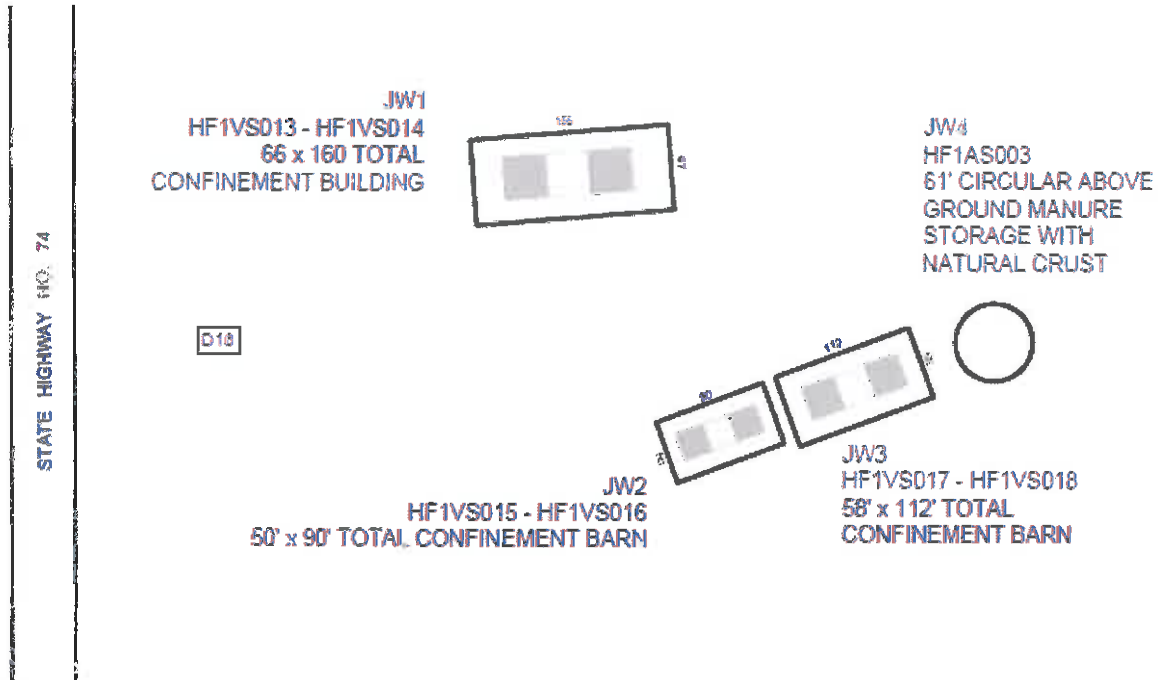


Offsite feedlot 3 – A beef feedlot located in the northeast quarter of Section 5, St. Charles Township in Winona County. The open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D21 lies south of the feedlot components. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
LK1	Partial Confinement Barn	Beef Cattle	30'x74'	2 volume sub-sources
LK2	Open Lot	Beef Cattle	38,000 s.f.	Non-buoyant area source
LK3	Partial Confinement Barn	Beef Cattle	36'x64'	2 volume sub-sources

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 7 – Offsite Feedlot 4

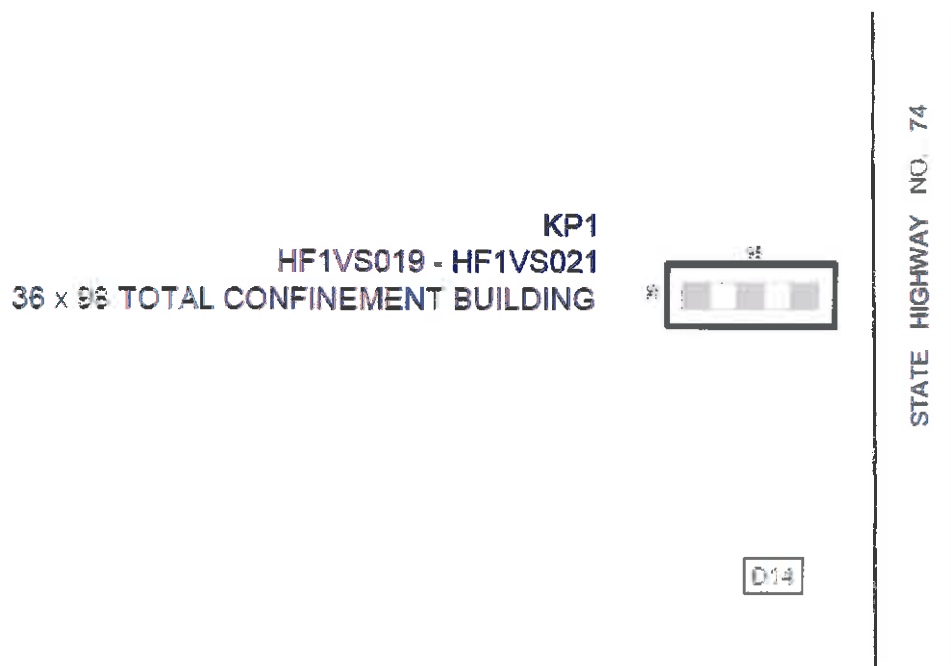


Offsite feedlot 4 – A dairy and beef feedlot located in the northeast quarter of Section 6, St. Charles Township in Winona County. The steel manure storage tank was modeled as a circular, non-buoyant area source with a constant emission rate based on its dimensions. It is assumed to maintain a natural crust covering. Receptor D16 lies west of the feedlot components. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
JW1	Total Confinement Barn	Beef cattle	66' x 160'	2 volume sub-sources
JW2	Total Confinement Barn	Dairy calves	50' x 90'	2 volume sub-sources
JW3	Total Confinement Barn	Dairy cows	58' x 112'	2 volume sub-sources
JW4	Steel manure storage tank	Dairy cows	61' x 19' high	Non-buoyant area source

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 8 – Offsite Feedlot 5

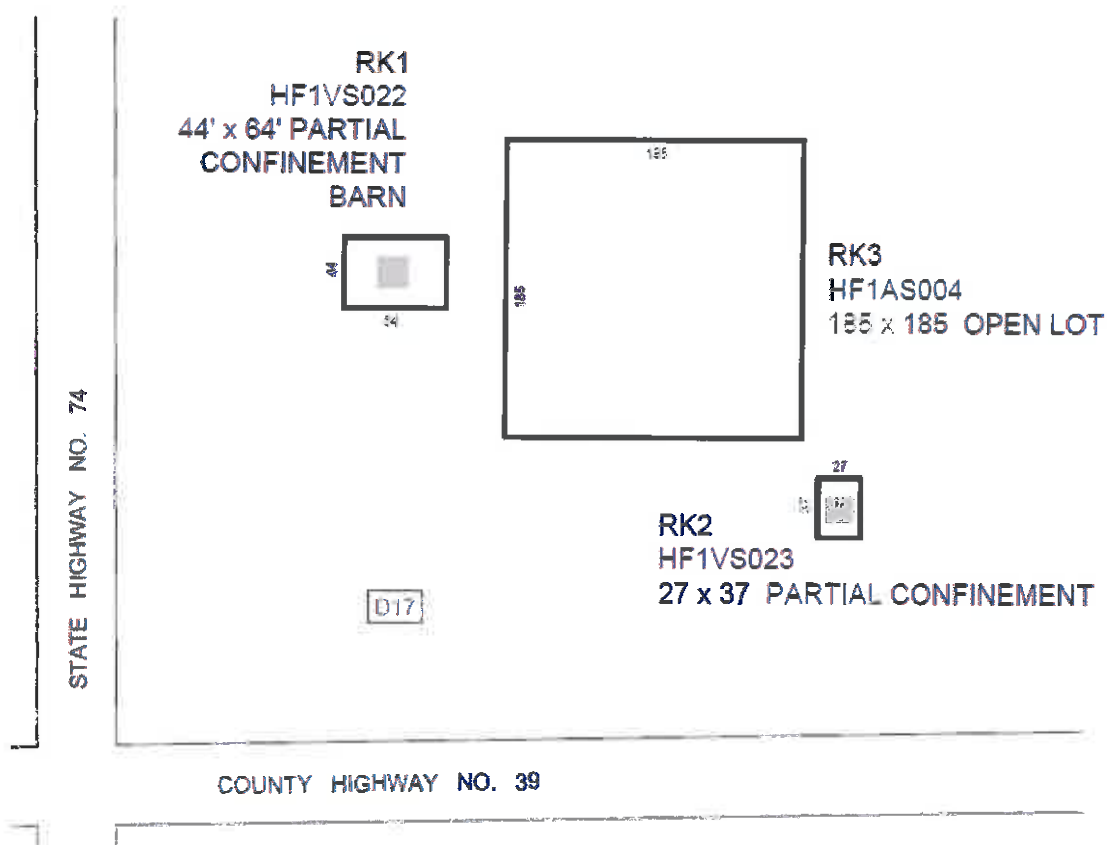


Offsite feedlot 5 – A beef feedlot located in the southwest quarter of Section 6, St. Charles Township in Winona County. Receptor D14 lies south of the total confinement building. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
KP1	Partial Confinement Barn	Beef cattle	36'x98'	3 volume sub-sources

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 9 – Offsite Feedlot 6

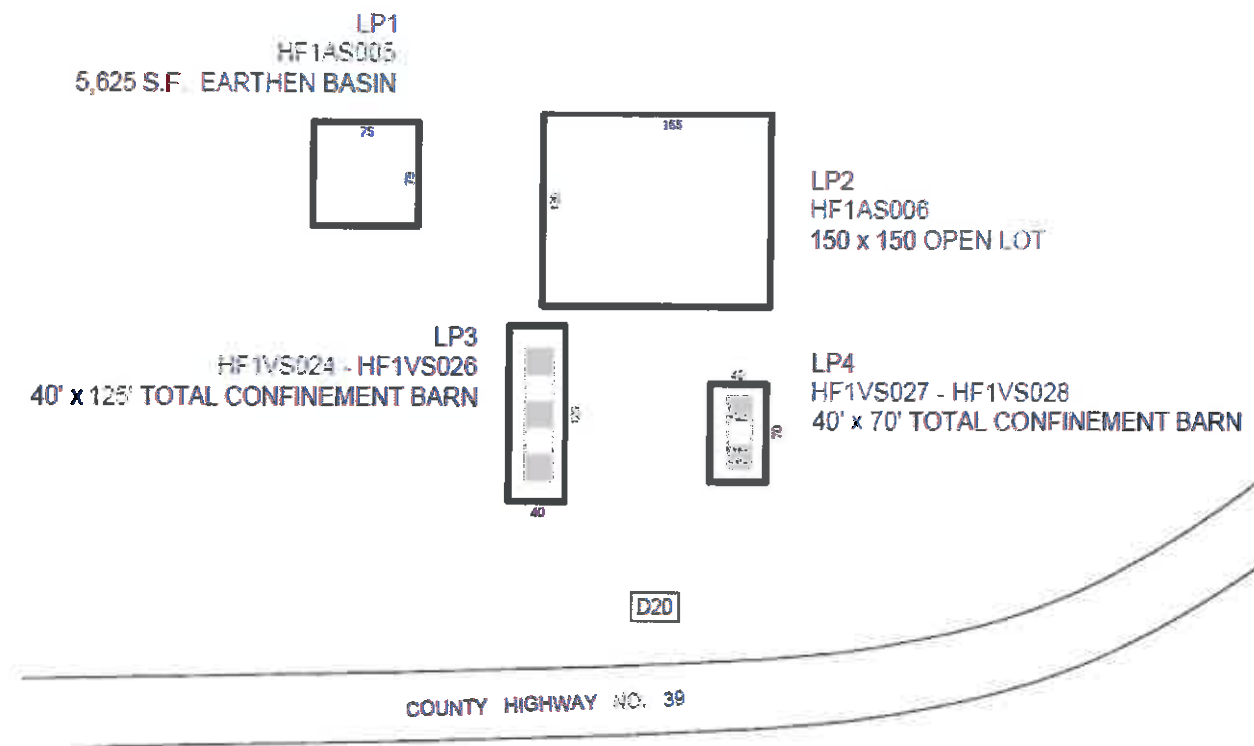


Offsite feedlot 6 – Beef cattle feedlot located in the southeast quarter of Section 6, St. Charles Township in Winona County. The beef open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D17 lies southwest of the feedlot components. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
RK1	Partial Confinement Barn	Beef Cattle	44'x64'	Volume source
RK2	Partial Confinement Barn	Beef Cattle	27'x37'	Volume source
RK3	Open Lot	Beef Cattle	34,225 s.f.	Non-buoyant area source

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 10 – Offsite Feedlot 7

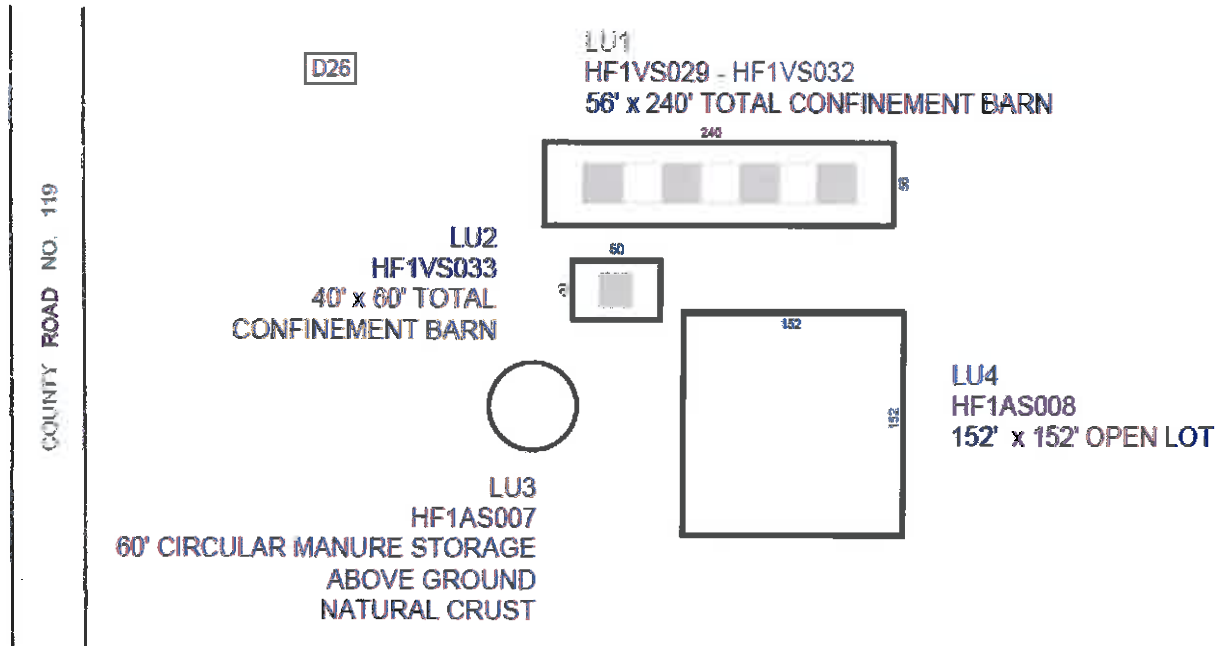


Offsite feedlot 7 – Dairy located in the southeast quarter of Section 5, St. Charles Township in Winona County. The open lot and earthen basin were modeled as non-buoyant area sources with constant emission rates based on their dimensions. The earthen basin is assumed to maintain a natural crust covering. Receptor D20 lies to the south of the feedlot components. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
LP1	Earthen manure basin	Dairy manure	5,625 s.f.	Non-buoyant area source
LP2	Open Lot	Dairy Cattle	22,500 s.f.	Non-buoyant area source
LP3	Total Confinement Barn	Dairy Cattle	40' x 125'	3 Volume sub-sources
LP4	Total Confinement Barn	Dairy Cattle	40' x 70'	2 Volume sub-sources

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 11 – Offsite Feedlot 8

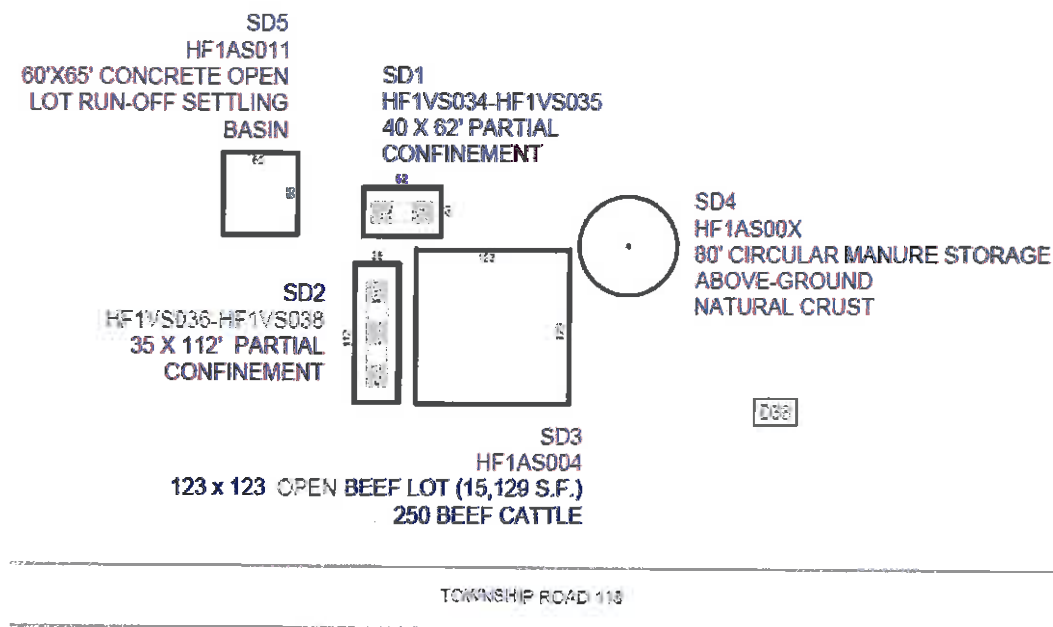


Offsite feedlot 8 – Dairy located in the southeast quarter of Section 9, St. Charles Township in Winona County. The open lot and steel manure storage tank were modeled as non-buoyant area sources with constant emission rates based on their dimensions. The steel tank is assumed to maintain a natural crust covering. Receptor D26 lies northwest of the total confinement barns. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
LU1	Total Confinement Barn	Dairy Cattle	56' x 240'	4 Volume sub-sources
LU2	Total Confinement Barn	Dairy Cattle	40' x 60'	Volume source
LU3	Steel manure storage tank	Dairy manure	60'x19' high	Non-buoyant area source
LU4	Open Lot	Dairy Heifers	23,104 s.f.	Non-buoyant area source

**Air Quality Modeling Analysis
Holden Farms Inc.**

Figure 12 – Offsite Feedlot 9



Offsite feedlot 9 – Beef cattle feedlot located in the southwest quarter of Section 9, St. Charles Township in Winona County. The open lot and steel manure storage tank were modeled as non-buoyant area sources with constant emission rates based on their dimensions. The steel tank is assumed to exhibit the same characteristics as dairy manure, and will maintain a natural crust covering. The surface run-off settling basin was modeled as a non-buoyant area source exhibiting the same characteristics as an open beef feedlot of the same size. Receptor D38 lies southeast of the feedlot components. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
LU1	Partial Confinement Barn	Beef Cattle	40' x 62'	2 Volume sub-sources
LU2	Partial Confinement Barn	Beef Cattle	35' x 112'	3 Volume sub-sources
LU3	Open Lot	Beef Cattle	15,129 s.f.	Non-buoyant area source
LU4	Steel manure storage tank	Beef manure	80'x15' high	Non-buoyant area source
LU5	Surface run-off basin	Open lot run-off	60'x65'	Non-buoyant area source

Any other emissions from sources not listed above were considered insignificant and unquantifiable and contributors to background concentrations. Further discussion of source characterization can be found in Section 4.0.

Emission Rate Sources

As stated, emissions estimates were modeled for the proposed finishing barns as well as 9 feedlots located within the 9 square-mile grid surrounding the project location. Emission rates were developed from emission factors listed in the following published documents:

**Air Quality Modeling Analysis
Holden Farms Inc.**

Species	Pollutant	Publication
Swine	Ammonia (NH ₃)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Gourley Brothers Hog Feedlot, 12/9/2011
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016.
	Hydrogen Sulfide (H ₂ S)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Gourley Brothers Hog Feedlot, 12/9/2011
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016. "Efficacy of a microbial additive in reducing odor, ammonia, and hydrogen sulfide emissions from farrowing-gestation swine operation", Rahman et. al., 2011;
	Odor	Table 4, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016.
Beef Cattle	Ammonia (NH ₃)	Table 6, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	Open Lot	Table 1, "Ammonia, Hydrogen Sulfide and Odor Emissions from a Beef Cattle Feedlot"; R. Duysen et. al.; July, 2003.
	Hydrogen Sulfide (H ₂ S)	Minnesota Pollution Control Agency Memorandum "Curtis Blair Feedlot and Blair West (Ted Reichmann) Feedlot"; Charles Peterson; 4/23/2013.
	Odor	Table 4, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
Dairy Cattle	Ammonia (NH ₃)	Table 6, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	Open Lot	Table 1, "Ammonia, Hydrogen Sulfide and Odor Emissions from a Beef Cattle Feedlot"; R. Duysen et. al.; July, 2003.
	Manure Storage	Table 4, "Air Quality and Emissions from Livestock and Poultry Production/ Waste Management Systems"; K.D. Casey et. al.; January, 2006.
	Hydrogen Sulfide (H ₂ S)	Minnesota Pollution Control Agency Memorandum "Curtis Blair Feedlot and Blair West (Ted Reichmann) Feedlot"; Charles Peterson; 4/23/2013.
	Odor	Table 1, "Air Quality and Emissions from Livestock and Poultry Production/ Waste Management Systems"; K.D. Casey et. al.; January, 2006.

**Air Quality Modeling Analysis
Holden Farms Inc.**

4.0 MODELING RESULTS

This section provides air dispersion modeling results for each pollutant modeled along with background concentrations. Existing sources and proposed sources were modeled to establish concentrations both at the site boundaries and at surrounding receptors.

Hydrogen Sulfide (H₂S)

AERMOD results indicate that the Holden project complies with the Minnesota state ambient air quality standard for hydrogen sulfide. The standard regards the third exceedance of 30 ppb within any 5-day period as a violation. Modeled compliance is demonstrated when the high-third-high (H3H) concentration (with background) for any 5-day period at each property-line receptor is less than 30 ppb.

The existing and proposed barns were modeled as sources of hydrogen sulfide using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD volume source option or the area source option. Open lots were modeled as sources of hydrogen sulfide, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Hydrogen sulfide emission flux rates from dairy feedlots varied monthly, and were based on a May flux rate of 0.55 µg/m²/s.¹² These monthly variations were accounted for by applying the monthly scalars listed in Table 3.

Table 3: Monthly H₂S Scalars

Odor Units	Monthly H₂S Emission Scalar – Dairy Feedlots¹⁰
January	0.94
February	0.87
March	0.79
April	0.90
May	1
June	1.25
July	1.49
August	1.30
September	1.1
October	1.16
November	1.22
December	1.08

**Air Quality Modeling Analysis
Holden Farms Inc.**

AERMOD predicted a maximum H3H property- line hydrogen sulfide concentration of 14.56 $\mu\text{g}/\text{m}^3$ (10.40 ppb). When a background concentration of 17 ppb is added to the AERMOD predictions, the H3H property line hydrogen sulfide concentration is 27.40 ppb, which is below the ambient standard of 30 ppb. Therefore, no exceedances of the state ambient air quality standard for hydrogen sulfide were modeled.

Table 4 – Maximum H3H hourly H2S concentrations at Property Lines

Property Line	H2S Concentration ($\mu\text{g}/\text{m}^3$)	H2S Concentration (ppb)	Background Concentration (ppb)	Total Concentration (ppb)
North	14.56	10.40	17	27.40
South	13.94	9.96	17	26.96
East	7.62	5.44	17	22.44
West	10.54	7.53	17	24.53

**Air Quality Modeling Analysis
Holden Farms Inc.**

The modeling results indicate that the proposed feedlot construction will not will not contribute to exceedances of the subchronic (13-week) hydrogen sulfide iHRV at any neighboring residences. AERMOD is unable to conveniently predict 13-week averages, therefore monthly averages have been used as a conservative surrogate. The estimated maximum monthly average concentration is 1.75 µg/m³. When the background value of 1.00 µg/m³ is added, the total is 2.75 µg/m³, below the subchronic H₂S iHRV of 10 µg/m³. Table 5 shows the maximum monthly H₂S concentrations at all nearest neighbor receptors.

Table 5 – Maximum monthly H₂S concentrations for nearest neighbors

Neighbor Receptor	Modeled H₂S Concentration (µg/m³)	With 1 µg/m³ Background (µg/m³)
D1	0.01	1.01
D2	0.02	1.02
D3	0.02	1.02
D4	0.03	1.03
D5	0.02	1.02
D6	0.05	1.05
D7	0.14	1.14
D8	0.17	1.17
D9	0.04	1.04
D10	0.04	1.04
D11	0.05	1.05
D12	0.04	1.04
D13	0.02	1.02
D14	0.07	1.07
D15	0.04	1.04
D16	0.08	1.08
D17	0.85	1.85
D18	0.04	1.04
D19	0.06	1.06
D20	0.39	1.39
D21	0.21	1.21
D22	0.09	1.09
D23	0.06	1.06
D24	0.04	1.04
D25	0.03	1.03
D26	0.27	1.27
D27	0.07	1.07
D28	0.22	1.22
D29	0.18	1.18
D30	0.25	1.25
D31	0.1	1.1
D32	0.04	1.04
D33	0.03	1.03
D34	0.02	1.02
D35	0.02	1.02
D36	0.02	1.02
D37	0.01	1.01
D38	1.75	2.75

Receptors in bold indicate feedlot residences.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Ammonia

The existing and proposed barns were modeled as sources of ammonia using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD volume source option or the area source option. Open lots were modeled as sources of ammonia, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Ammonia emission flux rates from manure packs at beef feedlots varied monthly, and were based on an April flux rate of 25.1 $\mu\text{g}/\text{m}^2/\text{s}$ ¹¹. Flux rates from dairy feedlots were based on a May odor flux rate of 43.1 $\mu\text{g}/\text{m}^2/\text{s}$ ¹¹. These monthly variations were accounted for by applying the monthly scalars listed in Table 6.

Table 6: Monthly NH3 Scalars

Odor Units	Monthly NH3 Emission Scalar – Beef Feedlots¹⁵	Monthly NH3 Emission Scalar – Dairy Feedlots¹⁰
January	0.57	0.94
February	0.18	0.87
March	0.59	0.79
April	1	0.90
May	1.27	1
June	1.53	1.25
July	1.56	1.49
August	1.58	1.30
September	0.95	1.1
October	0.95	1.16
November	0.95	1.22
December	0.95	1.08

**Air Quality Modeling Analysis
Holden Farms Inc.**

AERMOD results indicate that the Holden project complies with the acute ammonia iHRV. AERMOD predicted a maximum hourly property-line ammonia concentration of 651.69 µg/m³. When a background concentration of 148 µg/m³ is added to the AERMOD predictions, the maximum property-line ammonia concentration is 799.69 µg/m³, which is below the acute ammonia iHRV of 3200 µg/m³. This high value occurs at the southeast corner of the property and is listed as maximum concentrations of both the south and east property lines. Table 7 shows the maximum concentrations by lot line.

Table 7 – Maximum hourly NH₃ concentrations at Property Lines

Property Line	NH ₃ Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	NH ₃ iHRV (µg/m ³)
North	544.84	148	692.84	3200
South	651.69	148	799.69	3200
East	651.69	148	799.69	3200
West	454.58	148	602.58	3200

**Air Quality Modeling Analysis
Holden Farms Inc.**

The AERMOD analysis indicates that the proposed project will not create an exceedance of the chronic ammonia iHRV at any neighboring residences. The estimated maximum concentration is 19.20 µg/m³. When the background value of 5.72 µg/m³ is added, the maximum annual ammonia concentration is 24.92 µg/m³, below the chronic NH₃ iHRV of 80 µg/m³. Table 8 shows the maximum annual NH₃ concentrations for all nearest neighbors.

Table 8 – Maximum Annual NH₃ concentrations for nearest neighbors

Neighbor Receptor	Modeled NH₃ Concentration (µg/m³)	With 5.72 µg/m³ Background (µg/m³)
D1	0.20	5.92
D2	0.43	6.15
D3	0.32	6.04
D4	0.62	6.34
D5	0.44	6.16
D6	0.80	6.52
D7	1.51	7.23
D8	2.01	7.73
D9	0.42	6.14
D10	0.51	6.23
D11	1.19	6.91
D12	0.72	6.44
D13	0.45	6.17
D14	1.66	7.38
D15	1.17	6.89
D16	2.56	8.28
D17	7.92	13.64
D18	0.90	6.62
D19	1.13	6.85
D20	19.20	24.92
D21	4.32	10.04
D22	3.77	9.49
D23	1.27	6.99
D24	0.93	6.65
D25	0.51	6.23
D26	9.90	15.62
D27	1.24	6.96
D28	1.17	6.89
D29	5.47	11.19
D30	6.32	12.04
D31	2.28	8.00
D32	0.46	6.18
D33	0.47	6.19
D34	0.39	6.11
D35	0.43	6.15
D36	0.33	6.05
D37	0.27	5.99
D38	13.99	19.71

1. Receptors in bold indicate feedlot residences.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Odor

Odor is typically measured as the ratio of dilutions of clean air to ambient air that are necessary to reach a detection threshold (DT) by human panelists. DT is dimensionless and reported as odor units (OU).¹⁴ Published odor flux rates (OU/s or OU/m²/s) were input into the AERMOD model to predict maximum hourly odor concentrations (OU/m³) at boundary line receptors and the 38 nearest neighbors within a 9 square-mile grid surrounding the Holden project site. Table 9 shows various odor detection threshold levels and how they are perceived. An odor intensity of 72 OU/m³ is defined as a faint odor and is the odor intensity that “an average person might detect if attention is called to the odor, but the odor would not otherwise be noticed”¹³.

Table 9: Odor Perception Intensities¹⁴

Odor Units	Odor Strength	Detection-Threshold Odor Units (OU, D/T)
0	No odor	0
1	Very Faint	24
2	Faint	72
3	Moderate	212
4	Strong	624
5	Very Strong	1,834

The proposed farrowing barn was modeled as a source of odor using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD line source option, the volume source option, the horizontal point source option or the area source option. Open lots were modeled as sources of odor, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Odor emission flux rates from manure packs at the beef feedlots varied monthly, and were based on an April odor flux rate of 4.42 OU/m²/s¹¹. Flux rates from dairy feedlots were based on a May odor flux rate of 1.34 OU/m²/s¹¹. These monthly variations were accounted for by multiplying by monthly scalars listed in Table 10.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 10: Monthly Odor Scalars

Odor Units	Monthly Odor Emission Scalar – Beef Feedlots ¹⁵	Monthly Odor Emission Scalar – Dairy Feedlots ¹⁰
January	0.38	0.47
February	0.38	0.66
March	0.38	0.84
April	1.0	0.92
May	1.0	1
June	0.67	1
July	0.67	1
August	0.64	0.9
September	0.38	0.79
October	0.38	1.08
November	0.38	1.37
December	0.38	0.92

AERMOD modeling was conducted on existing sources within the 9 square-mile grid surrounding the project site to estimate current odor concentrations at the property line receptors and nearest neighbors. Maximum hourly concentrations at the property lines vary from 66.48 OU/m³ along the east property line to 145.25 OU/m³ on the north property line.

When modeling was conducted on existing and proposed sources, the modeling results indicate that the proposed sources will not contribute to a significant increase in the existing odor concentrations. Table 11 shows modeled maximum hourly odor concentrations by lot line, as well as the frequency at which the hourly odor intensity exceeds 72 OU/m³, which is considered “Faint”, along that lot line.

Table 11 – Maximum hourly Odor concentrations at Property Lines

Property Line	Proposed Conditions	Odor Strength	Frequency “Faint” Odor Threshold is Exceeded (%) ¹
	Odor Concentration (OU/m ³)		
North	145.25	Faint	0.10
South	127.02	Faint	0.09
East	66.48	Very Faint	0.0
West	73.12	Faint	0.0

1. Based on 5 years of meteorological data.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Odor concentrations at the nearest neighbor receptors vary from 29.31 OU/m³ to 541.53 OU/m³ on existing feedlot properties and from 5.18 OU/m³ to 107.95 OU/m³ on properties without feedlot operations. Table 12 shows the maximum hourly odor concentrations at all nearest neighbor receptors, as well as the frequency at which the hourly odor intensity exceeds 72 OU/m³, which is considered "Faint".

Table 12 – Maximum Hourly Odor Intensities at Nearest Neighbors

Neighbor Receptor	Maximum Hourly Odor Intensity (OU/m³)	Frequency "Faint" Odor Threshold is Exceeded (%)
D1	5.18	0.00
D2	10.15	0.00
D3	7.52	0.00
D4	18.67	0.00
D5	13.39	0.00
D6	37.71	0.00
D7	107.95	0.00
D8	190.24	0.17
D9	11.08	0.00
D10	27.00	0.00
D11	29.82	0.00
D12	25.84	0.00
D13	14.61	0.00
D14	133.31	0.01
D15	35.13	0.00
D16	29.31	0.00
D17	403.76	0.45
D18	50.19	0.00
D19	41.42	0.00
D20	64.39	0.00
D21	255.19	0.11
D22	28.08	0.00
D23	19.44	0.00
D24	11.77	0.00
D25	8.88	0.00
D26	85.49	0.00
D27	14.03	0.00
D28	38.26	0.00
D29	53.29	0.00
D30	39.43	0.00
D31	39.45	0.00
D32	9.58	0.00
D33	21.83	0.00
D34	46.70	0.00
D35	30.22	0.00
D36	24.44	0.00
D37	49.57	0.00
D38	541.53	0.29

1. Receptors shown in bold indicate feedlot residences.

**Air Quality Modeling Analysis
Holden Farms Inc.**

5.0 SUMMARY AND CONCLUSIONS

In support of an Environmental Assessment Worksheet (EAW), and based on a protocol approved by the Minnesota Pollution Control Agency (MPCA), an air dispersion modeling analysis was performed to estimate the air quality impacts of the expansion of an existing swine breeding facility. This expansion included the construction of one 500-head swine farrowing barn in the northwest quarter of section 5 in St. Charles Township, Winona County. This report presents the results of the quantitative assessment of air quality impacts associated with the planned project as well as existing feedlots located within a 9 square-mile grid surrounding the project site.

Hydrogen Sulfide

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed farrowing barn complies with the 30 ppb (42 $\mu\text{g}/\text{m}^3$) hourly Minnesota State Ambient Air Quality Standard for hydrogen sulfide at property line receptors. The standard regards the third exceedance of 30 ppb within any 5-day period as a violation. Modeled compliance is demonstrated when the high-third-high (H3H) concentration (with background) for any 5-day period at each property-line receptor is less than 30 ppb. With the background concentration of 17ppb, no modeled exceedances were indicated. Additionally, the modeling results indicate that the construction of the proposed farrowing barn will not contribute to exceedances of the 10 $\mu\text{g}/\text{m}^3$ subchronic (13-week) hydrogen sulfide iHRV at any neighboring residences. The modeled maximum monthly average concentration is 2.75 $\mu\text{g}/\text{m}^3$, including the background value of 1.00 $\mu\text{g}/\text{m}^3$, below the subchronic H2S iHRV of 10 $\mu\text{g}/\text{m}^3$.

Ammonia

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed farrowing barn complies with the 3,200 $\mu\text{g}/\text{m}^3$ acute hourly ammonia iHRV at property line receptors. The hourly high ammonia concentration was modeled at 799.69 $\mu\text{g}/\text{m}^3$, including the background value of 148 $\mu\text{g}/\text{m}^3$, well below the iHRV. Additionally, the modeling results indicate that the construction of the proposed farrowing barn will not contribute to exceedances of the 80 $\mu\text{g}/\text{m}^3$ annual chronic inhalation ammonia iHRV at any neighboring residences. The maximum annual concentration was modeled at 24.92 $\mu\text{g}/\text{m}^3$, including the background value of 5.72 $\mu\text{g}/\text{m}^3$.

Odor

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed farrowing barn will not contribute to odor concentrations above an odor intensity of 72 OU/ m^3 , defined as a "faint odor" at nearby residences. Modeled hourly maximum odor concentrations at the nearest neighbor receptors vary from 29.31 OU/ m^3 to 541.53 OU/ m^3 on feedlot properties and from 5.18 OU/ m^3 to 107.95 OU/ m^3 on properties without feedlot operations. Additionally, the analysis indicates that the addition of the proposed farrowing barn would not significantly impact the odor concentrations along the property line. The modeled high hourly concentration at the property line is 145.25 OU/ m^3 and would occur along the north property line.

Conclusion

Results of the air quality dispersion modeling analysis indicate that emissions from the operation of the proposed swine farrowing barns will not exceed state ambient air quality standards for hydrogen sulfide. Additionally, the project will not contribute to exceedances of the subchronic hydrogen sulfide

**Air Quality Modeling Analysis
Holden Farms Inc.**

iHRV, the acute hourly ammonia iHRV, or the annual chronic ammonia iHRV. Modeling results also indicate that the project will not contribute to a significant increase in odor concentrations.

**Air Quality Modeling Analysis
Holden Farms Inc.**

6.0 References

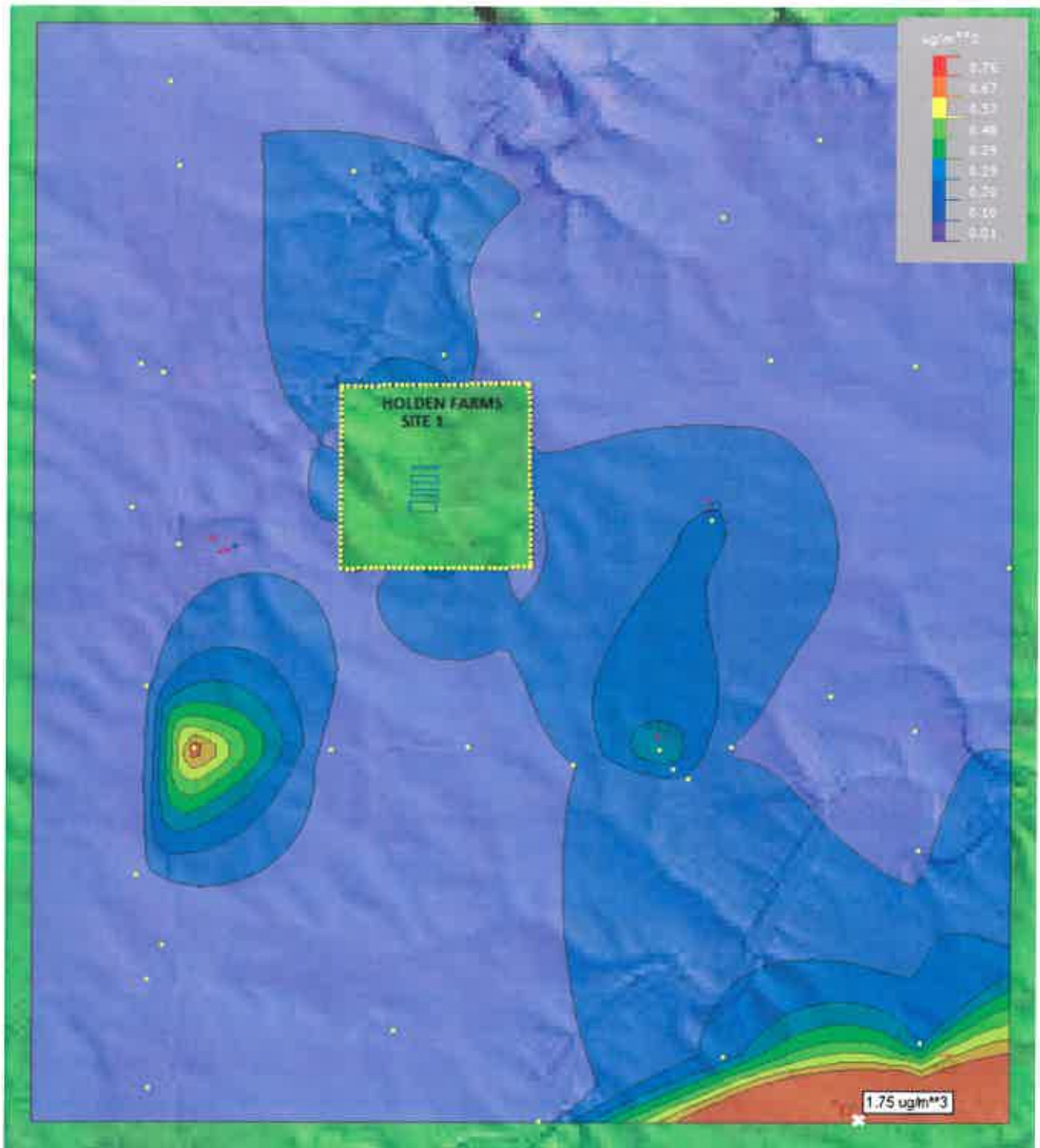
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Appendix A

Modeling Plots

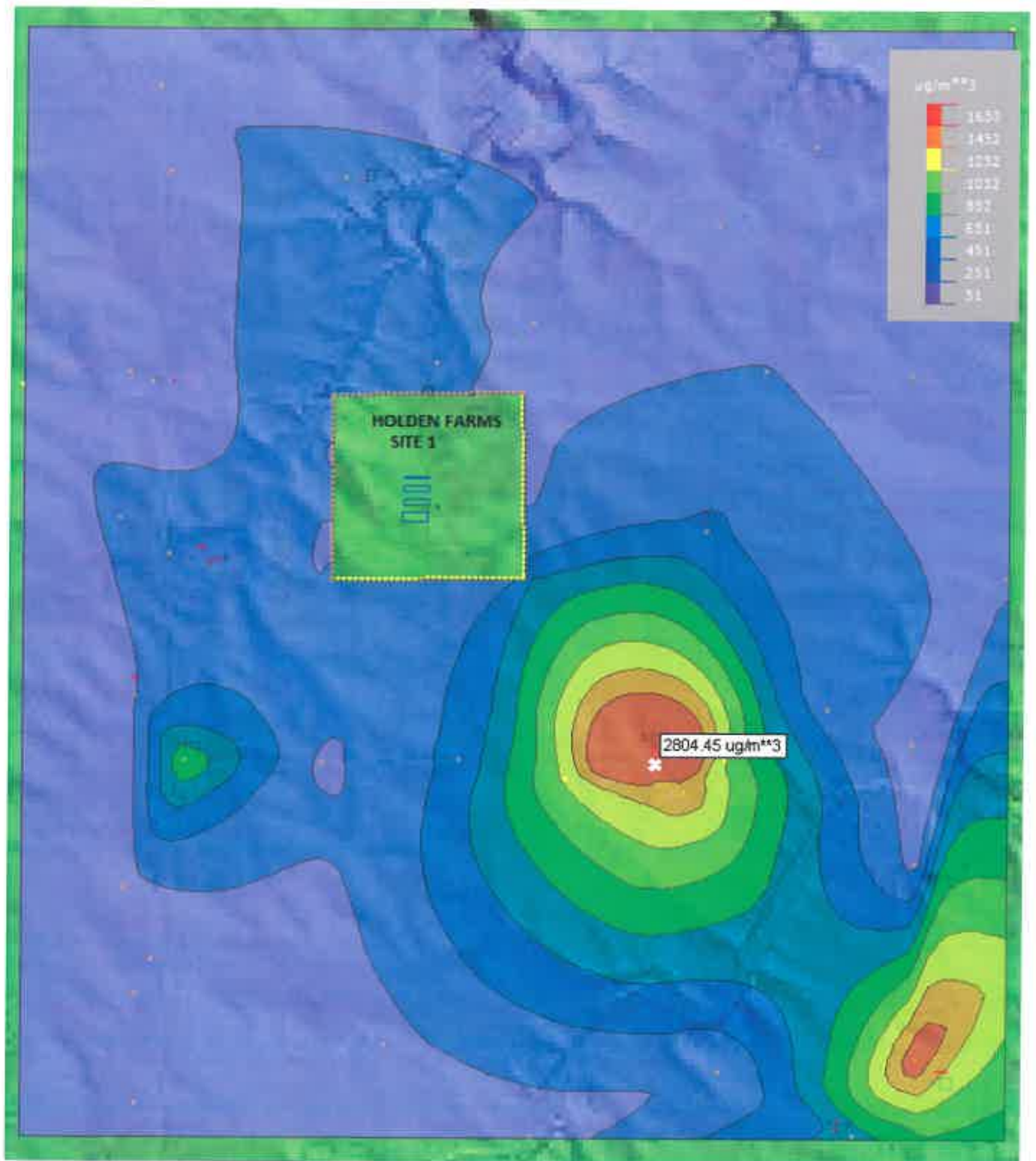
Air Quality Modeling Analysis
Holden Farms Inc.

Highest Monthly Hydrogen Sulfide (H₂S) Concentrations (µg/m³)



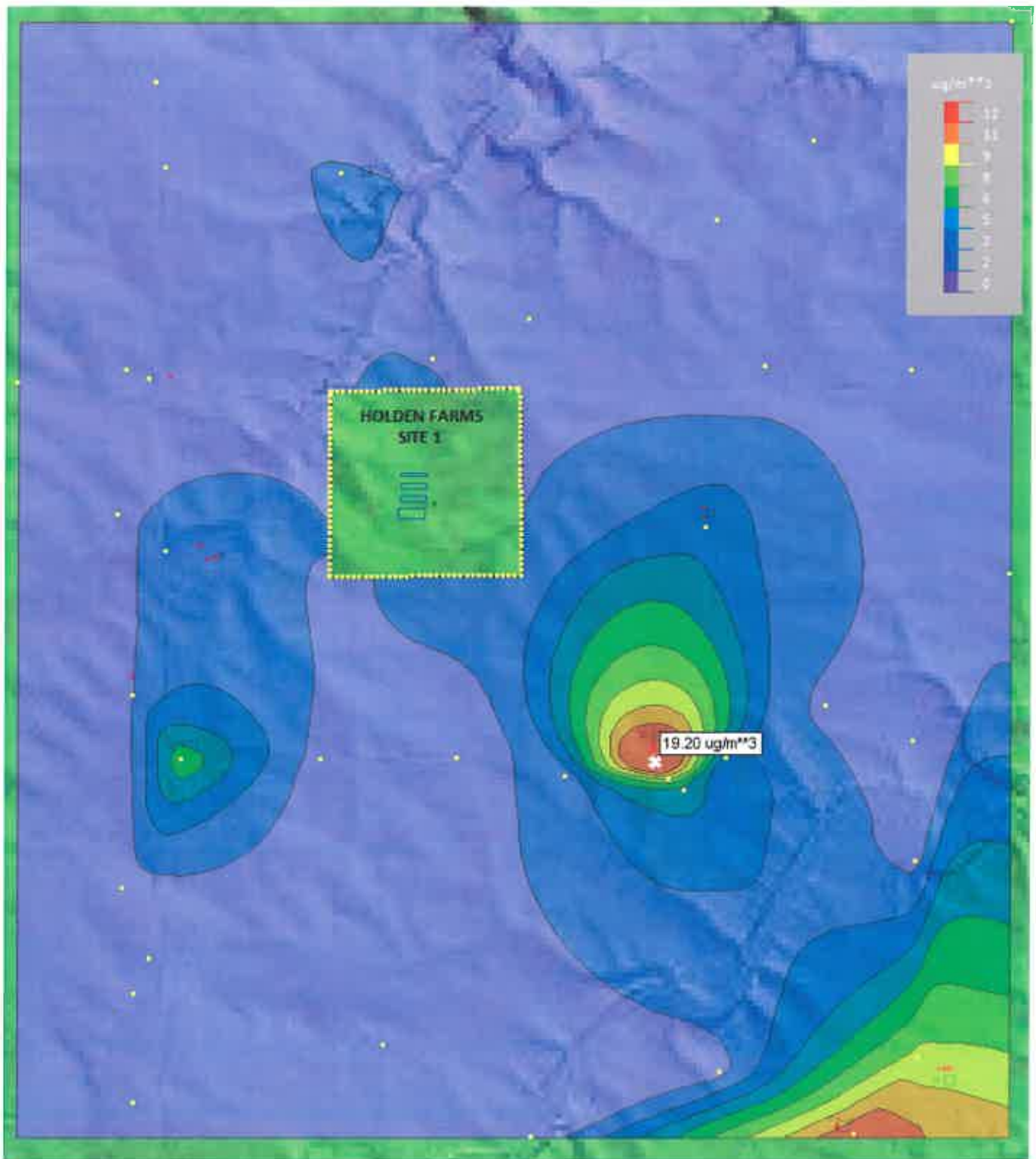
Air Quality Modeling Analysis
Holden Farms Inc.

Highest 1-Hour Ammonia (NH₃) Concentrations (µg/m³)



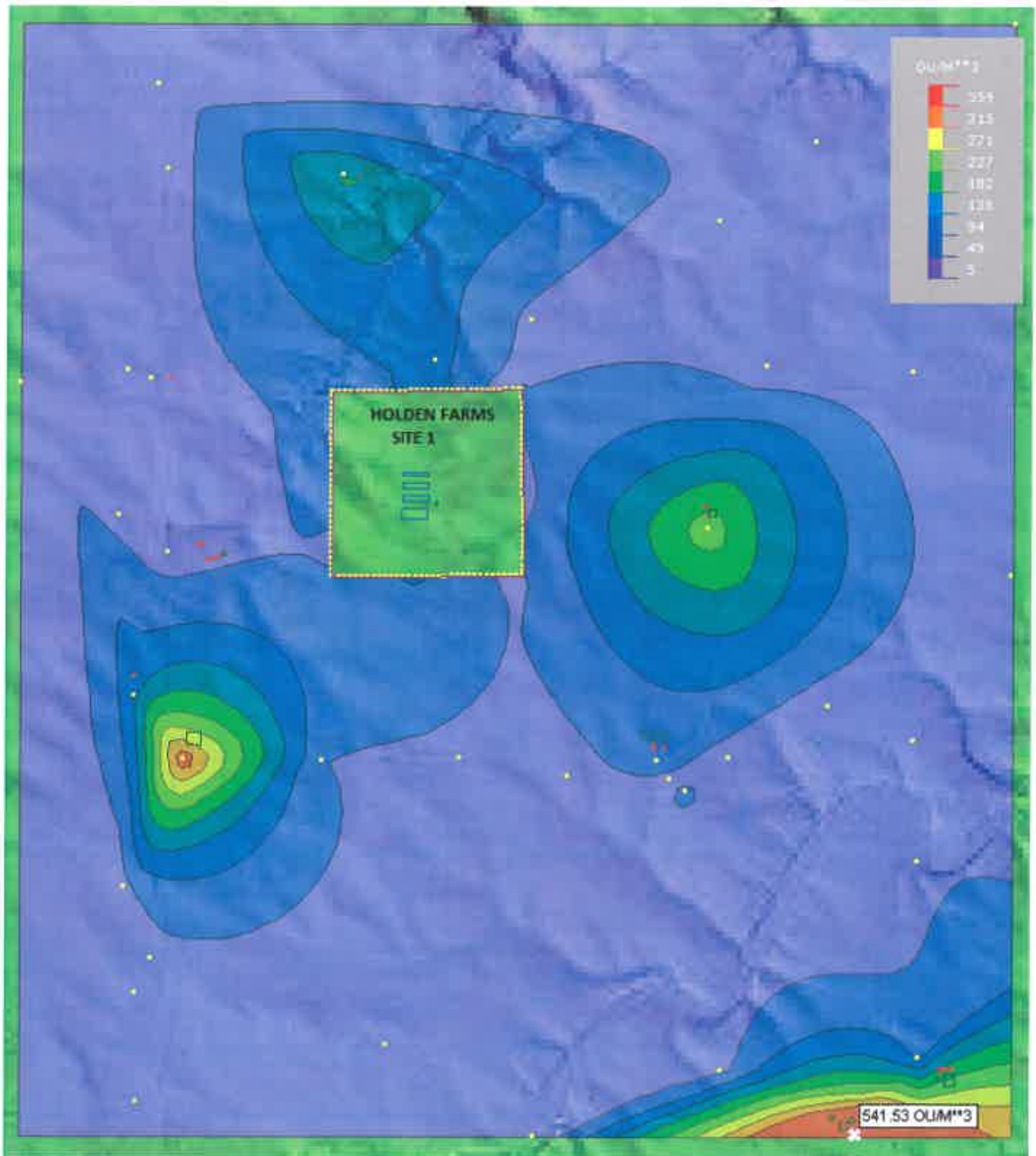
**Air Quality Modeling Analysis
Holden Farms Inc.**

Average Annual Ammonia (NH₃) Concentrations (µg/m³)



Air Quality Modeling Analysis
Holden Farms Inc.

Highest 1-hour Average Odor Concentration (OU/m³)



**AIR QUALITY
DISPERSION MODELING ANALYSIS**

FOR

**Holden Farms Inc. – Section 14
3000-Head Breeding Barn Project**

LOCATED IN

**ST. CHARLES TOWNSHIP
WINONA COUNTY, MINNESOTA**

PREPARED FOR

Holden Farms, Inc.
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August 2016

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table of Contents

Section	Description	Page
1.0	INTRODUCTION	1
2.0	MODELING APPROACH AND PARAMETERS	2
	Air Quality Standards and Thresholds	2
	Background Concentrations	3
	Model Selection and Options	4
	Meteorological Data	4
	Building Downwash	4
	Terrain	5
	Receptor Locations	5
3.0	SOURCE DESCRIPTIONS AND EMISSION RATES	8
	Feedlot Diagrams and Descriptions	8
	Emission Rate Sources	16
4.0	MODELING RESULTS	18
	Hydrogen Sulfide (H ₂ S)	18
	Ammonia (NH ₃)	21
	Odor	24
5.0	SUMMARY AND CONCLUSIONS	26
6.0	REFERENCES	28

**Air Quality Modeling Analysis
Holden Farms Inc.**

Tables and Figures

Table	Description	Page
1	Modeled Compounds and Concentrations	3
2	Background Concentrations	4
3	Monthly H ₂ S Scalars	18
4	Maximum H ₃ H Hourly H ₂ S Concentrations at Property Lines	19
5	Maximum Monthly H ₂ S Concentration For Nearest Neighbors	20
6	Monthly NH ₃ Scalars	21
7	Maximum Hourly NH ₃ Concentrations at Property Lines	22
8	Maximum Annual NH ₃ Concentrations For Nearest Neighbors	23
9	Odor Perception Intensities	24
10	Monthly Odor Scalars	25
11	Maximum Hourly Odor Concentrations at Property Lines	25
12	Maximum Hourly Odor Intensities at Nearest Neighbors	26

Figure	Description	Page
1	Project Overview	6
2	Site Layout	7
3	Proposed Swine Breeding Barn	8
4	Offsite Feedlot 1 Diagram	9
5	Offsite Feedlot 2 Diagram	10
6	Offsite Feedlot 3 Diagram	11
7	Offsite Feedlot 4 Diagram	12
8	Offsite Feedlot 5 Diagram	13
9	Offsite Feedlot 6 Diagram	14
10	Offsite Feedlot 7 Diagram	15
11	Offsite Feedlot 8 Diagram	16

AERMOD Analysis Plots

- Highest Monthly Hydrogen Sulfide (H₂S) Concentrations (µg/m³)
- Highest 1-Hour Ammonia (NH₃) Concentrations (µg/m³)
- Average Annual Ammonia (NH₃) Concentrations (µg/m³)
- Highest 1-hour Average Odor Concentration (OU/m³)

**Air Quality Modeling Analysis
Holden Farms Inc.**

1.0 INTRODUCTION

Holden Farms Inc. (Holden) is requesting approval to expand an existing feedlot operation in the northeast quarter of section 14 in St. Charles Township, Winona County. The existing facility currently has one farrowing barn with a total capacity of 550 animals. The Project will include the addition of one 3000-head swine breeding/gestation barn. This will result in an expansion of 1200 animal units and will give the feedlot a total capacity of 1,494 animal units. Minnesota Administrative Rule 4410.4300, Subpart 29 states that an Environmental Assessment Worksheet (EAW) must be prepared for the construction of an animal feedlot facility with a capacity of 1,000 animal units or more or the expansion of an existing facility by 1,000 animal units or more.

In support of that EAW, and based on a protocol approved by the Minnesota Pollution Control Agency (MPCA), an air quality modeling analysis has been performed. This Air Quality Modeling Report presents the results of the quantitative assessment of air quality impacts associated with the planned project and existing feedlots located within a 9 square-mile grid surrounding the project site.

This modeling analysis followed procedures outlined in MPCA document *Air Dispersion Modeling Guidance (July 2013)*, the United States Environmental Protection Agency (USEPA) document *Guideline on Air Quality Models* (USEPA Publication number EPA-450/2-78-027R [revised]), and the USEPA document *AERMOD Implementation Guide* (March 19, 2009).

Section 2.0 of this report describes the general modeling approach and parameters. Section 3.0 describes onsite and offsite sources and emission rates. Section 4.0 provides model results and Section 5.0 provides a summary and conclusions. Complete modeling files are provided in electronic format on the enclosed CD.

**Air Quality Modeling Analysis
Holden Farms Inc.**

2.0 MODELING APPROACH AND PARAMETERS

This air quality modeling analysis was based on a modeling protocol approved by MPCA staff on 8/29/2016, and estimated the hydrogen sulfide concentrations, ammonia concentrations, and odor intensities from the planned project and 8 existing feedlots located within a 9 square-mile grid surrounding the project site. These feedlots were assumed to be the only quantifiable emission sources; any other sources were assumed to contribute to the background concentrations included in the modeling results.

Concentrations were estimated at the new feedlot's effective property lines and at 33 of the nearest neighbors surrounding the project. Additionally, due to the proximity of the feedlot to the City of Utica, concentrations were also estimated along the boundary of the Utica city limits, per modeling guidance from MPCA staff. The effective property lines of the Project site are shown in Figure 1.

Existing sources and proposed sources were modeled to establish the current conditions and determine the concentrations directly attributed to the proposed project at the site boundaries, at surrounding receptors and along the boundary of the city limits of Utica. Concentration levels were within established threshold levels for all averaging periods and pollutants. A further discussion of modeling results can be found in Sections 4 and 5.

Air Quality Standards and Thresholds

AERMOD (version 15181) was used to estimate concentrations based on five years (2009-2013) of historical meteorological data. Maximum 1-hour, monthly and annual average concentrations were calculated to determine compliance with Minnesota's State Ambient Air Quality Standard for hydrogen sulfide, and inhalation Health Risk Values (iHRVs) for hydrogen sulfide and ammonia. Odor intensities were modeled to compare to an odor classification system based on detection-threshold odor intensities.

Table 1 shows the compounds and concentrations that were estimated in the air quality analysis as well as the corresponding air quality standard.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 1: Modeled Compounds and Concentrations

Compound/ Pollutant	Estimated Concentration	Air Quality Standard	Notes
Hydrogen sulfide (H ₂ S)	Maximum hourly concentration at the effective property lines.	30 ppb (by volume) hourly Minnesota State Ambient Air Quality Standard	½ hour average not to be exceeded over 2 times in any 5-day period.
	Maximum monthly concentration at the nearest neighbors.	10 µg/m ³ subchronic (13 week) inhalation Health Risk Value (iHRV)	
Ammonia (NH ₃)	Maximum hourly concentration at the effective property lines.	3,200 µg/m ³ acute hourly inhalation Health Risk Value (iHRV)	
	Maximum annual concentration at the nearest neighbors.	80 µg/m ³ annual chronic inhalation Health Risk Value (iHRV)	
Odor	Maximum hourly odor intensity at the effective property lines.	An odor classification system based on detection/ threshold odor intensities.	
	Maximum hourly odor intensity at nearest neighbors.		

Background Concentrations

Background concentrations of hydrogen sulfide and ammonia provided in Table 2 were added to the AERMOD estimated concentrations as described in EPA guidelines.⁷ The listed concentrations represent background concentrations for rural Minnesota. The listed 17-ppb background hydrogen sulfide concentration is appropriate when assessing a feedlot's potential to comply with the 30-ppb standard. If assessing the potential to comply with the 50-ppb hydrogen sulfide standard, a background concentration of 18 ppb would have been used.

The background concentrations shown reflect the monitored data expressed in the terms of the "exceedance or violation condition" for the corresponding iHRV guideline or ambient standard. For example, the background 148 µg/m³ ammonia concentration for the acute ammonia iHRV represents the maximum hourly concentration that occurred within the entire length of monitoring. This is appropriate because the guidance is concerned with any potential exceedance of the iHRV. Also, the 17-ppb hydrogen sulfide background represents the third highest 30-minute concentration that occurred within any 5-day period (i.e., the high-third-high or H3H). This is appropriate due to a violation being defined as the third exceedance of 30-ppb within any 5-day period.

Potential odor impacts were evaluated using AERMOD-generated odor intensities (OU/m³), and were compared to the reference odor intensities provided in Table 9. An odor intensity of 72 detection-threshold odor units (OU) is defined as a faint odor and is the odor intensity that "an average person might detect if attention is called to the odor, but the odor would not otherwise be noticed."¹³

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 2: Background Concentrations (rural Minnesota)

Compound/Pollutant	Hourly Background Concentration	13-Week Background Concentration	Annual Background Concentration
Hydrogen sulfide (H ₂ S)	17ppb (v/v) (24.3 µg/m ³)	0.70 ppb (v/v) (1.0 µg/m ³)	Not required
Ammonia (NH ₃)	208 ppb (v/v) (148 µg/m ³)	Not required	8.07ppb (v/v) (5.72 µg/m ³)

Model Selection and Options

Dispersion modeling was conducted using the AMS/USEPA Regulatory Model – AERMOD (Version 15181), as recommended by MPCA modeling guidance. All AERMOD technical options selected followed the *regulatory default* option without the use of the *Urban* option (URBANOPT). Breeze Modeling Software (version 7.10.1 Pro) was used to execute all AERMOD Model runs. All AERMOD modeling input/output files are provided electronically on the enclosed CD.

Meteorological Data

The modeling analysis utilized the latest pre-processed (AERMET version 14134) meteorological (met) data for use in AERMOD, obtained from the AQDM website. Met data consisted of five years (2009-2013) of surface meteorological data for the National Weather Service (NWS) station in Rochester, MN. and of upper air weather data for the NWS station in Chanhassen, MN. The Rochester Meteorological Station lies at an elevation similar to that of the project site. The station is surrounded by land uses and surface characteristics similar to those found around the project site- primarily flat, agricultural land in corn and soybean production. No on-site meteorological data was available at the time of this analysis.

Building Downwash

For emissions released below “Good Engineering Practice” (GEP) height, as defined by EPA rules, it is necessary to include the potential effect of buildings on the near-field dispersion of emissions. Large buildings and structures disrupt the wind flow, and in the wake of such buildings emissions can be mixed more rapidly to the ground causing elevated ground-level concentrations. This effect is simulated in the AERMOD model.

AERMOD requires “direction-specific” building dimensions for each emission point. The direction-specific building dimensions represent the building width perpendicular to the wind direction along with the building height. The regulatory default selection uses the “upper bound” equation for predicting the

**Air Quality Modeling Analysis
Holden Farms Inc.**

influence of a building on the dispersion of pollutants. This equation is best suited for sources located near the center of the building and may dramatically overestimate concentrations from sources located near the edge of buildings where lateral plume spread is affected by flow around the building; therefore, building downwash effects were not included for those sources with releases near ground-level (ie. area, line and volume sources in this analysis).

The calculation of direction-specific building dimensions for the proposed feedlot buildings was accomplished with the USEPA Building Profile Input Program with Prime (BPIP-Prime), Version 04274. All BPIP-Prime runs were executed using Breeze Modeling Software (Version 7.10.1).

Terrain

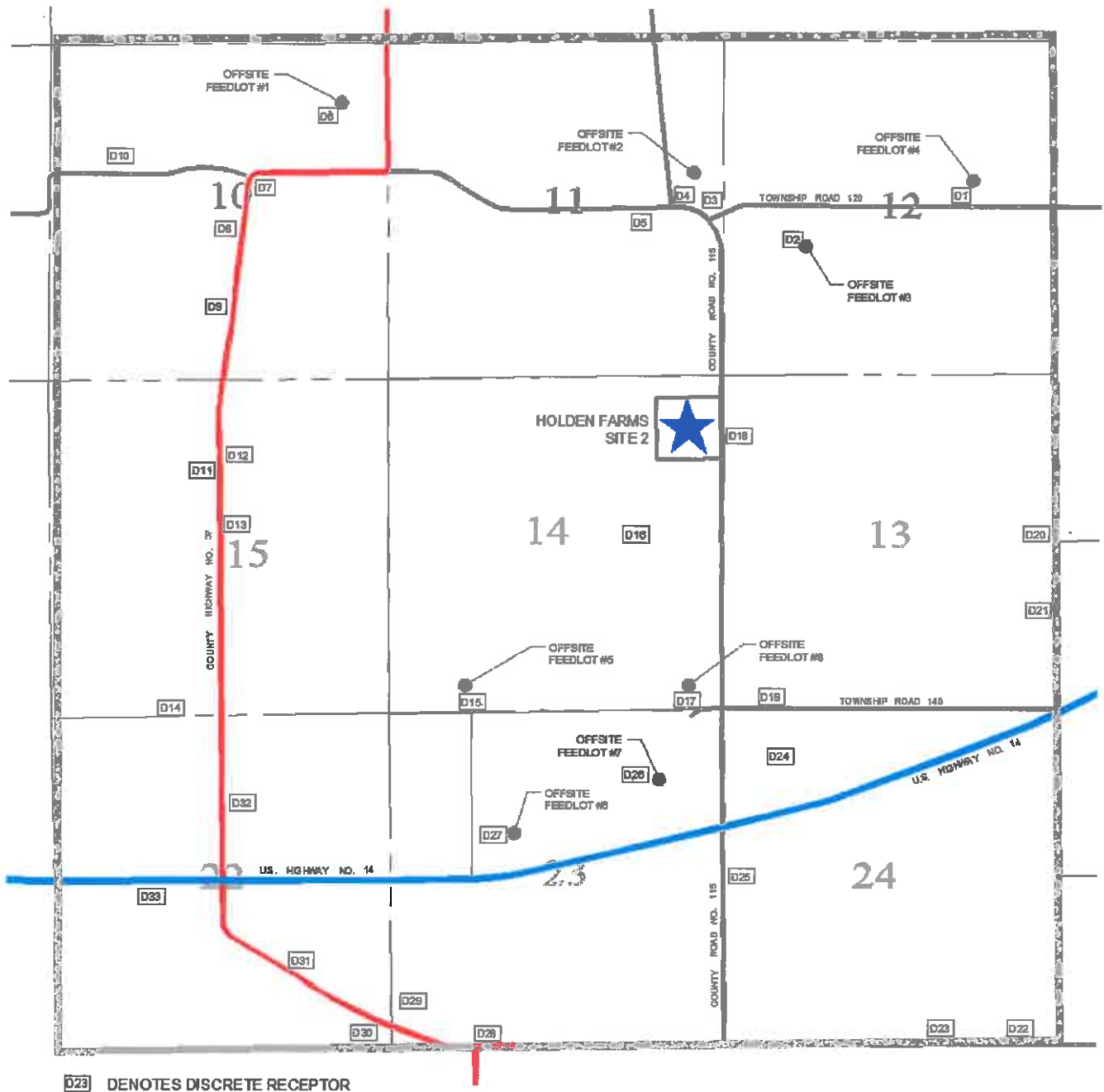
Terrain elevations for all sources and receptors were determined using the terrain preprocessing program AERMAP (Version 11103). Pre-processed National Elevation Dataset (NED) files for Winona County were obtained from the Multi-Resolution Land Characteristics Consortium (MRLC) website and were used as input to AERMAP. Elevated (complex) terrain was considered in the model. All modeling was based on the Universal Transverse Mercator (UTM)/NAD83 grid system.

Receptor Locations

In order to assess concentrations at the property line, discrete receptors were placed along the property boundary every 25 meters. No receptors were placed within the property boundary. Discrete receptors were placed at 33 of the nearest occupied neighboring home sites. Additionally, due to the proximity of the feedlot to the City of Utica, discrete receptors were placed every 25 meters along the boundary of the Utica city limits, per modeling guidance from MPCA staff. Modeled receptor height was assumed at ground level, with elevations being calculated by AERMAP. Figure 1 provides a project overview of the proposed site location with proposed and existing sources and receptor locations. Figure 2 shows the site layout.

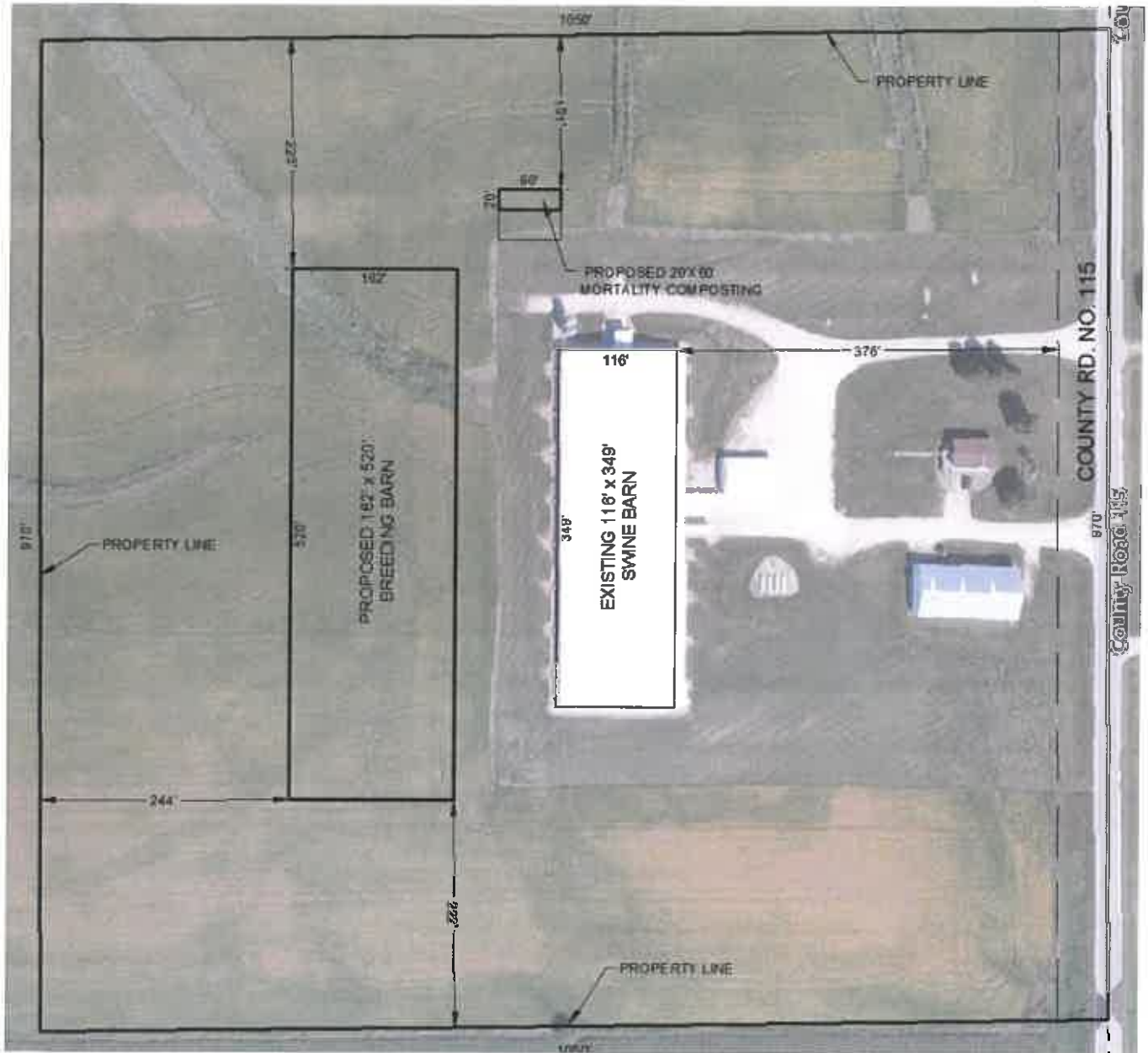
Air Quality Modeling Analysis
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Figure 1 Project Overview



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Figure 2 Proposed Site Layout



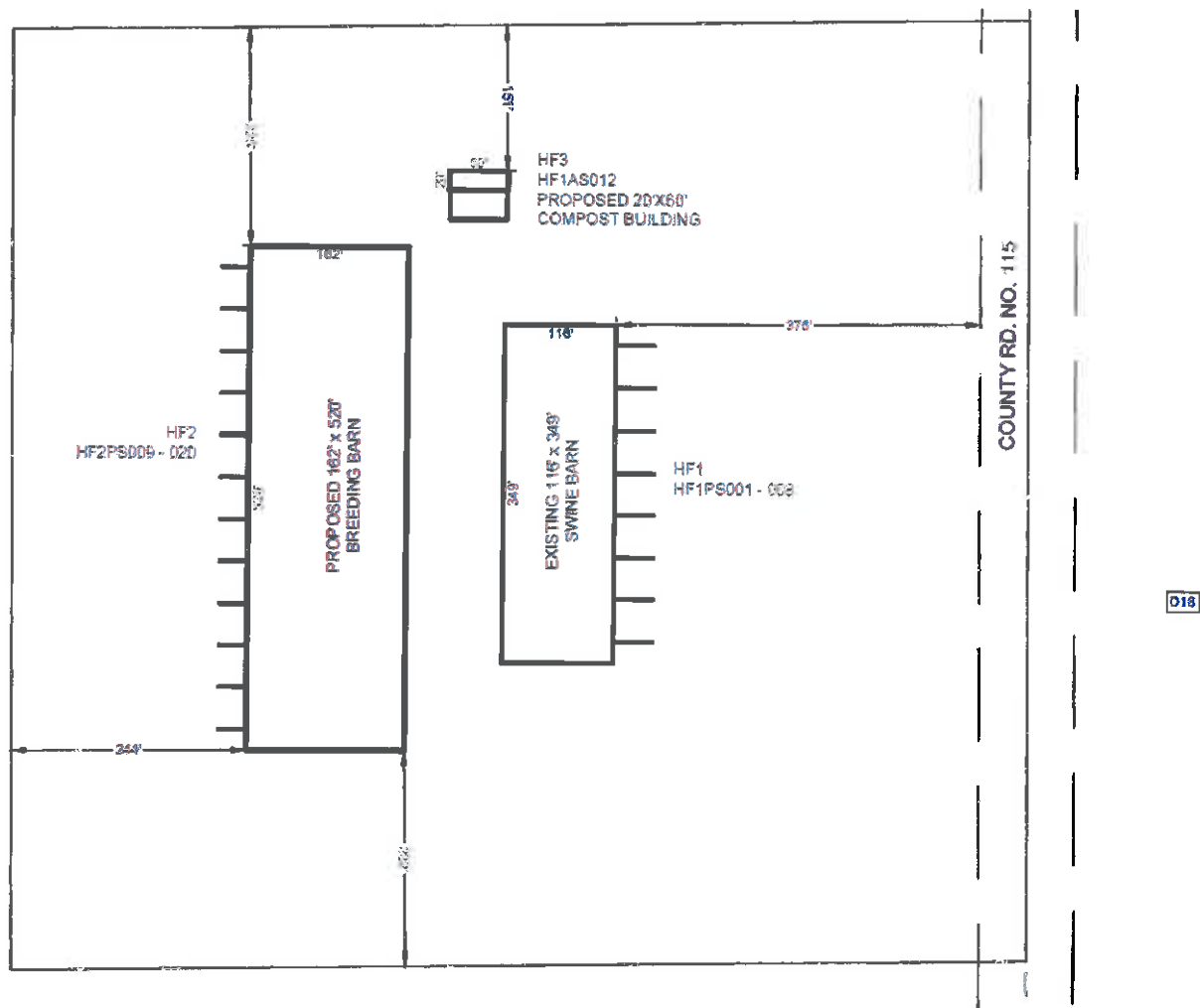
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3.0 Source Descriptions and Emission Rates

This air quality modeling analysis was based on a modeling protocol approved by MPCA staff on 8/29/2016, and estimated the hydrogen sulfide concentrations, ammonia concentrations, and odor intensities from the planned project and 9 existing feedlots located within a 9 square-mile grid surrounding the project site. Details on the existing feedlots were obtained from the Winona County Feedlot Office and MPCA staff with dimensions obtained from recent aerial photographs. The following figures show diagrams of the proposed and existing feedlots with descriptions of each. Boundary lines are approximate, where shown, and are based on Winona County GIS data.

Feedlot Diagrams and Descriptions

Figure 3 – Proposed Swine Breeding Barn

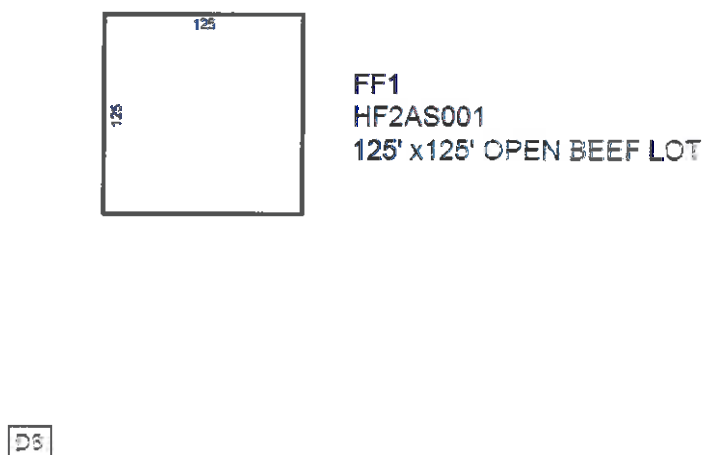


The existing Holden feedlot is located in the northwest quarter of section 14 in St. Charles Township, Winona County, and currently consists of a 116'x349' swine farrowing barn with 8' deep, under floor, reinforced-concrete manure storage. The existing barn has been modeled as 8 horizontal point sources,

**Air Quality Modeling Analysis
Holden Farms Inc.**

operating 24 hours a day, 365 days a year. The proposed 162'x520' breeding and gestation barn has been modeled as 12 horizontal point sources, operating 24 hours a day, 365 days a year. The horizontal stacks were assumed to have a stack diameter of 54" and a flow rate of 27,000 cfm. The proposed mortality compost structure has been modeled as a non-buoyant area source. Receptor D18 lies east of the site, on the east side of the county road. The proposed breeding and gestation barn has been located on the site a minimum of 200 feet from the property lines to mitigate possible impacts from any hydrogen sulfide, ammonia or odor emissions.

Figure 4 – Offsite Feedlot 1

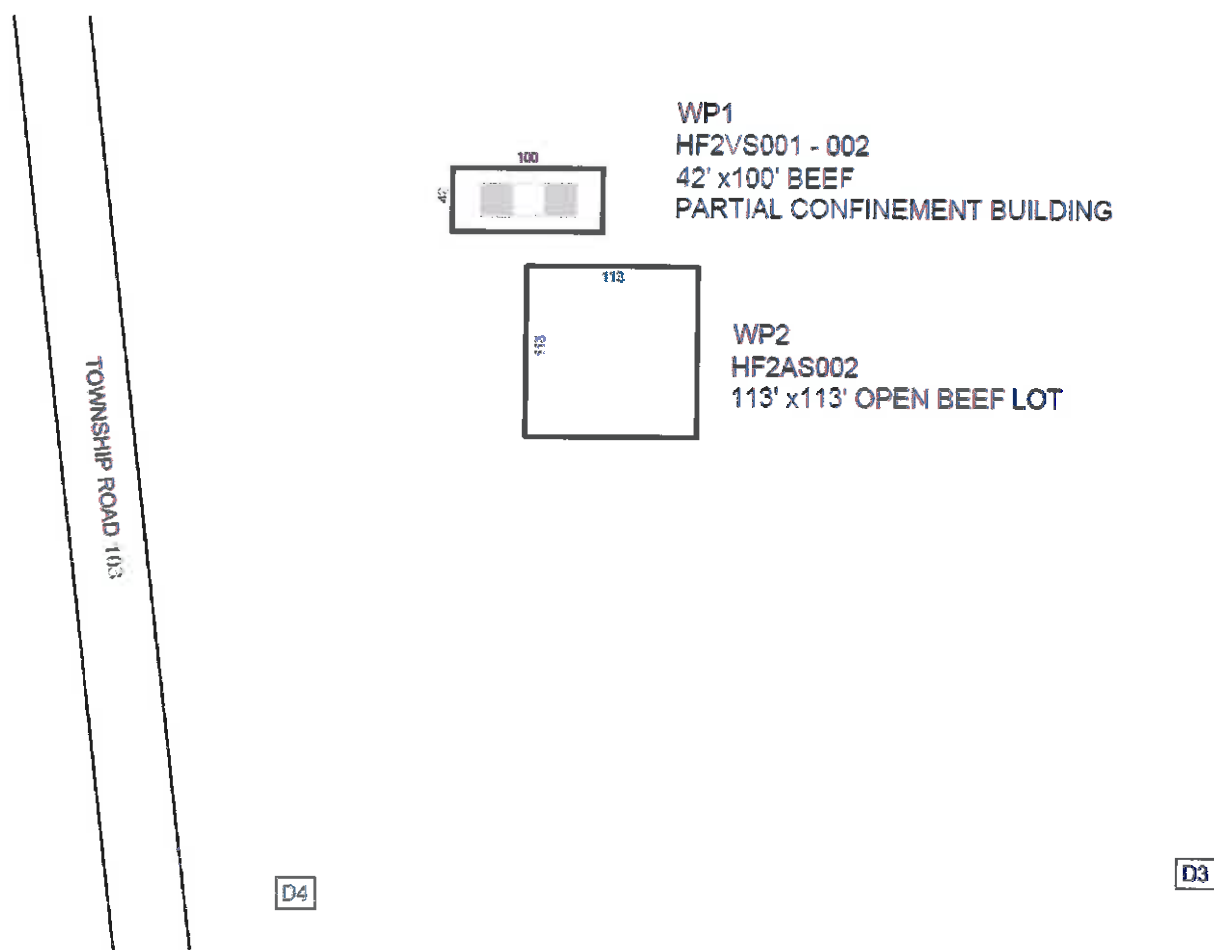


Offsite feedlot 1 – Beef feedlot located in the northeast quarter of Section 10, St. Charles Township in Winona County. The 40 beef cattle are assumed to spend 100% of the time in the open lot. The open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D6 lies southwest of the open lot. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
FF1	Open Lot	Beef Cattle	15,625 s.f..	Non-buoyant area source

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Holden Farms Inc.**

Figure 5 – Off-Site Feedlot 2

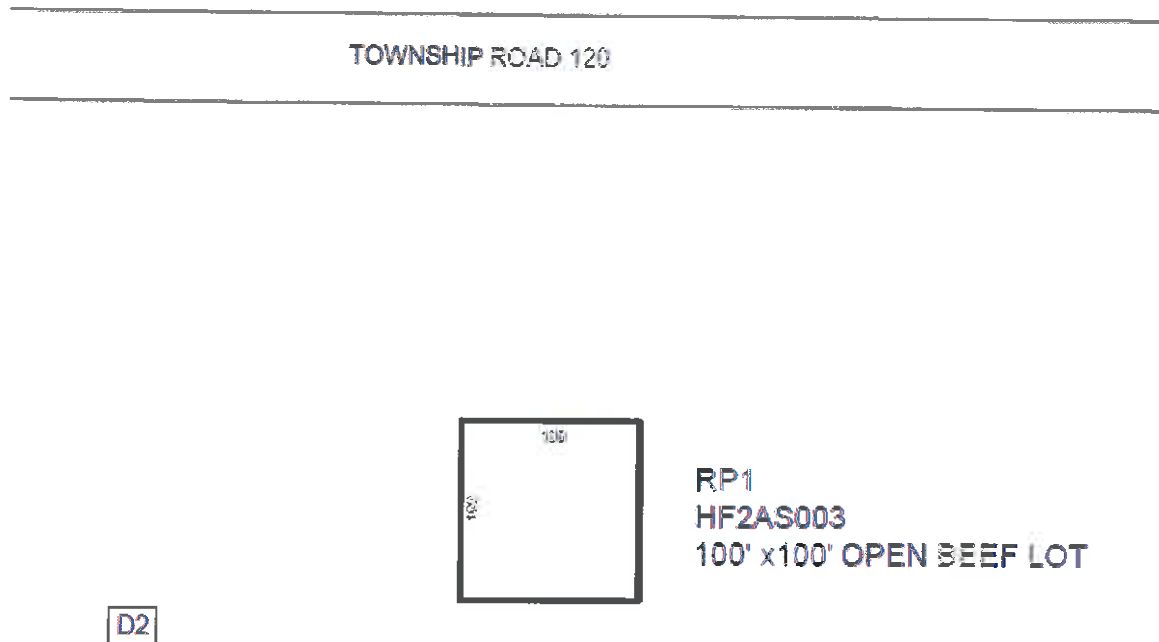


Offsite feedlot 2 – A beef feedlot located in the northeast quarter of Section 11, St. Charles Township in Winona County. Receptor D4 lies southwest and D3 lies southeast of the open lot. The table below summarizes the existing source and modeling strategy.

Component	Description	Animals	Dimensions	Source Type
WP1	Partial Confinement Barn	Beef Cattle	42'x100'	2 volume sub-sources
WP2	Open Lot	Beef Cattle	12,769 s.f.	Non-buoyant area source

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Holden Farms Inc.**

Figure 6 – Offsite Feedlot 3

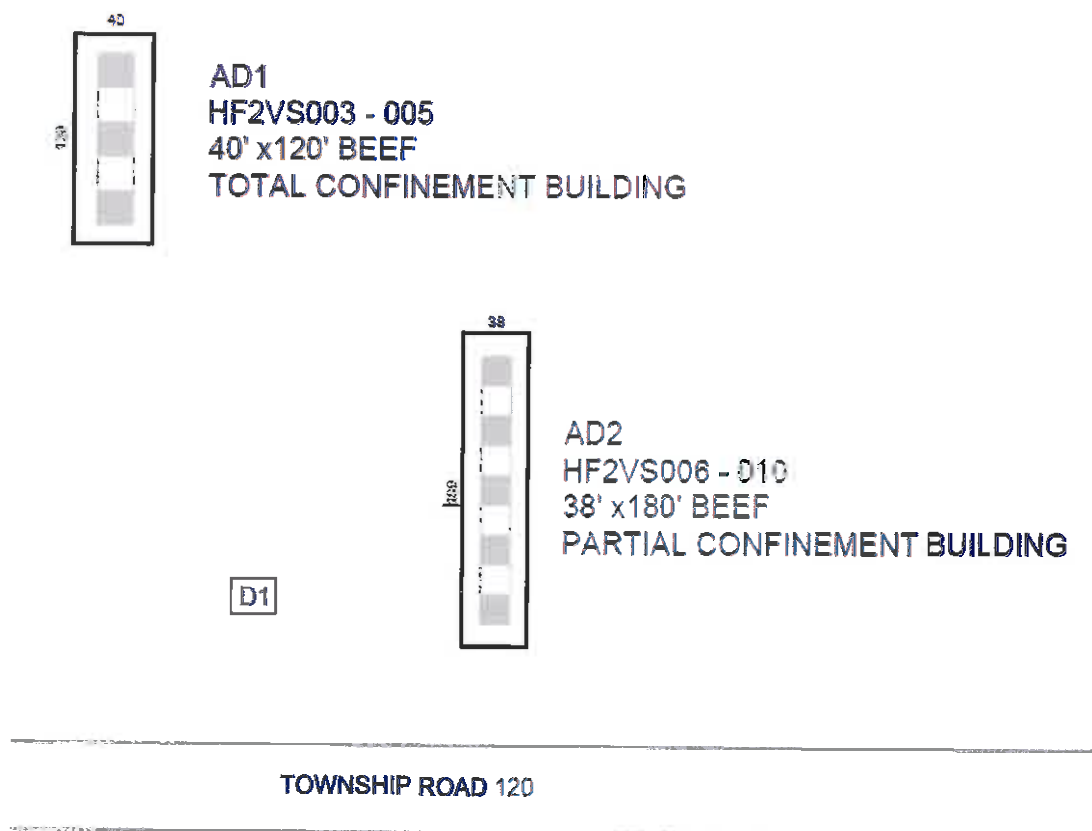


Offsite feedlot 3 – A beef feedlot located in the southwest quarter of Section 12, St. Charles Township in Winona County. The open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D2 lies southwest of the open lot. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
RP1	Open Lot	Beef Cattle	10,000 s.f.	Non-buoyant area source

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Holden Farms Inc.**

Figure 7 – Offsite Feedlot 4

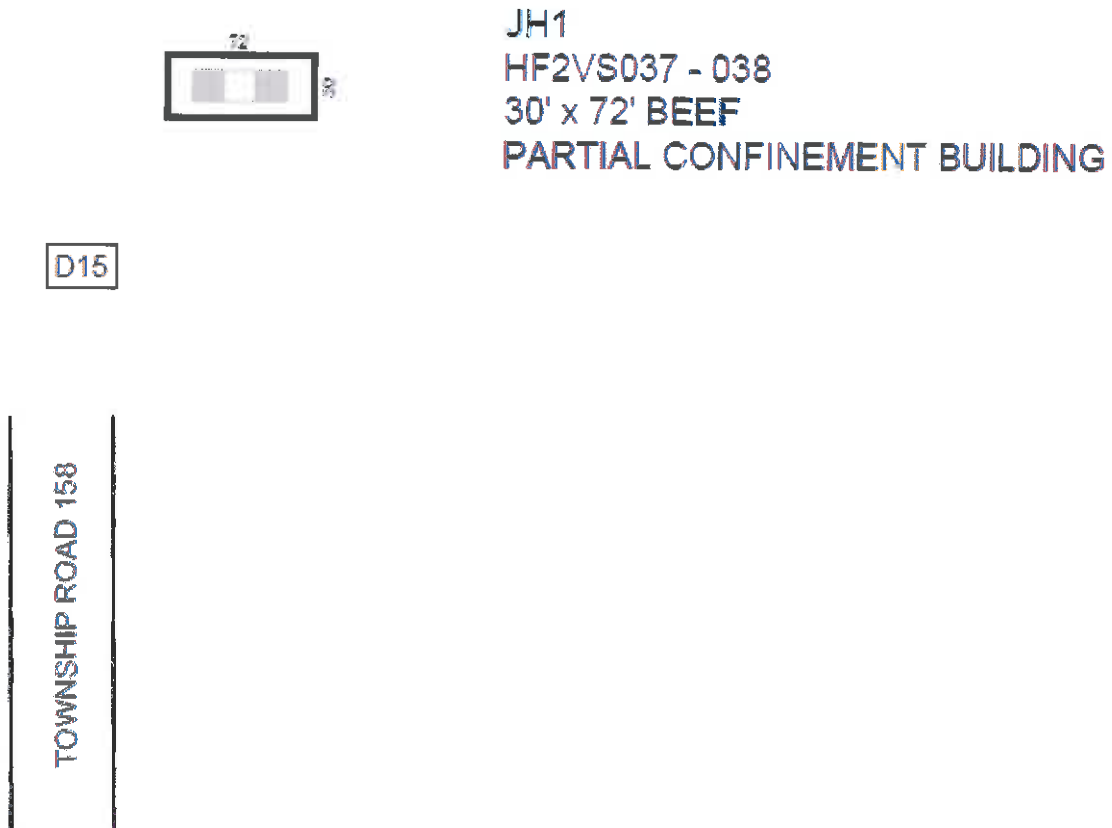


Offsite feedlot 4 – A feedlot located in the northeast quarter of Section 12, St. Charles Township in Winona County. Receptor D1 lies west of component AD2. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
AD1	Total Confinement Barn	Beef cattle	40' x 120'	3 volume sub-sources
AD2	Total Confinement Barn	Beef Cattle	38' x 180' high	5 volume sub-sources

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Figure 8 – Offsite Feedlot 5

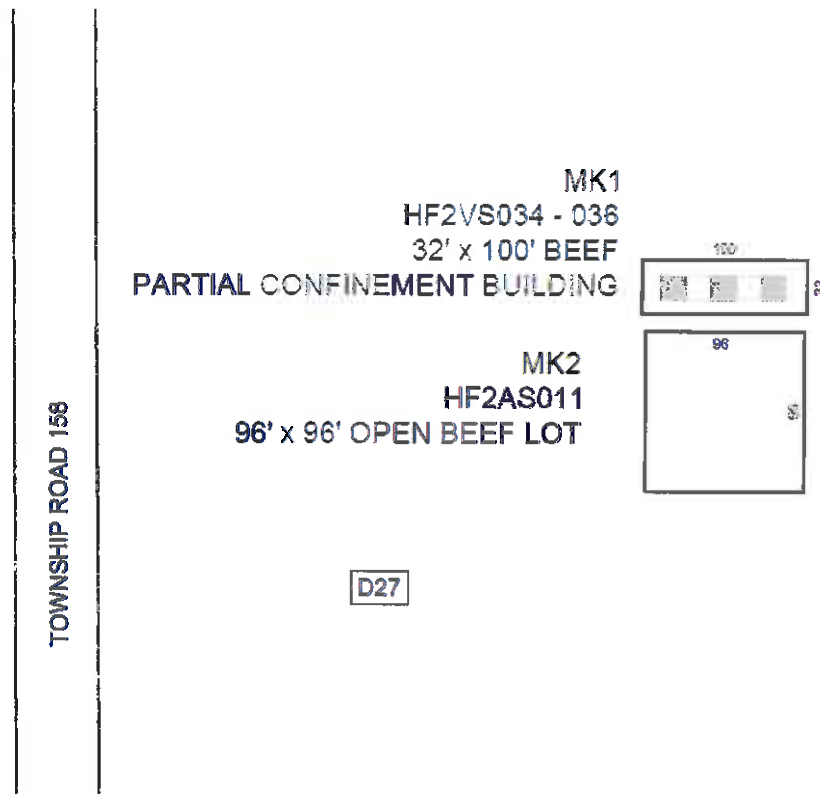


Offsite feedlot 5 – Feedlot located in the southwest quarter of Section 14, St. Charles Township in Winona County. Receptor D15 lies southwest of the cattle barn. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
JH1	Partial Confinement Barn	Beef cattle	30'x72'	2 volume sub-sources

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Figure 9 – Offsite Feedlot 6

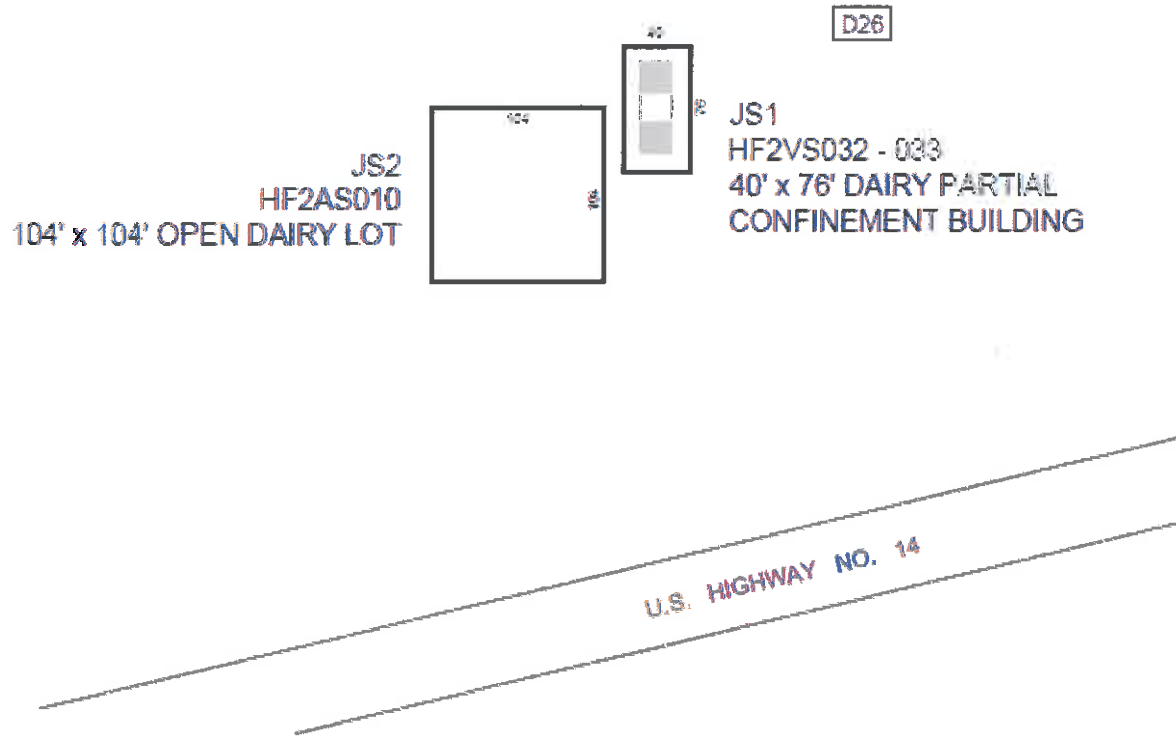


Offsite feedlot 6 – Feedlot located in the northwest quarter of Section 23, St. Charles Township in Winona County. The beef open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D27 lies southwest of the open lot. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
MK1	Partial Confinement Barn	Beef Cattle	32'x100'	3 Volume sub-sources
MK2	Open Lot	Beef Cattle	9,216 s.f.	Non-buoyant area source

**Air Quality Modeling Analysis
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Figure 10 – Offsite Feedlot 7

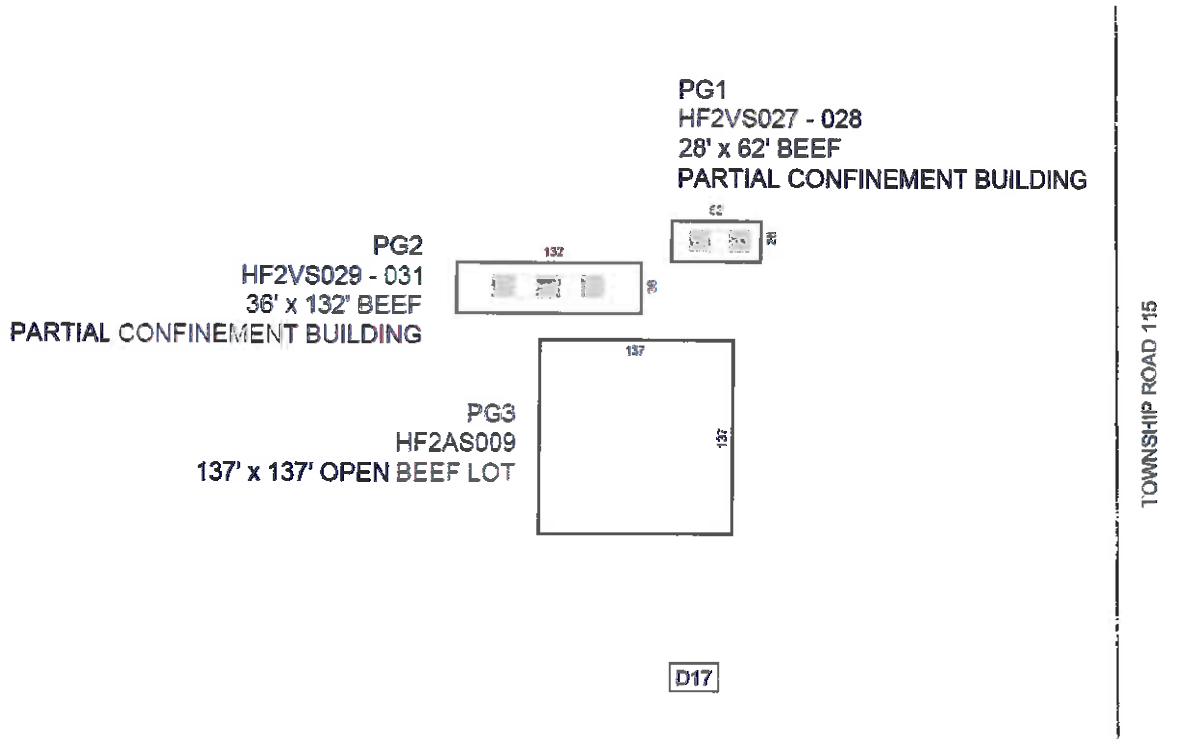


Offsite feedlot 7 – Dairy located in the northeast quarter of Section 23, St. Charles Township in Winona County. The dairy open lot was modeled as non-buoyant area source with a constant emission rate based on its area. Receptor D26 lies northeast of the dairy barn. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
JS1	Partial Confinement Barn	Dairy Cattle	40' x 76'	2 Volume sub-sources
JS2	Open Lot	Dairy Cattle	10,816 s.f.	Non-buoyant area source

**Air Quality Modeling Analysis
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Figure 11 – Offsite Feedlot 8



Offsite feedlot 7 – Feedlot located in the southeast quarter of Section 14, St. Charles Township in Winona County. The open lot was modeled as a non-buoyant area source with a constant emission rate based on its area. Receptor D17 lies south of the open lot. The table below summarizes the existing sources and modeling strategies.

Component	Description	Animals	Dimensions	Source Type
PG1	Partial Confinement Barn	Beef Cattle	28' x 62'	2 Volume sub-sources
PG2	Partial Confinement Barn	Beef Cattle	36'x132'	3 Volume sub-sources
PG3	Open Lot	Beef Cattle	18,769 s.f.	Non-buoyant area source

Any other emissions from sources not listed above were considered insignificant and unquantifiable and contributors to background concentrations. Further discussion of source characterization can be found in Section 4.0.

Emission Rate Sources

As stated, emissions estimates were modeled for the proposed finishing barns as well as 6 feedlots located within the 9 square-mile grid surrounding the project location. Emission rates were developed from emission factors listed in the following published documents:

Air Quality Modeling Analysis
Holden Farms Inc.

Species	Pollutant	Publication
Swine	Ammonia (NH₃)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Gourley Brothers Hog Feedlot, 12/9/2011.
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016.
	Hydrogen Sulfide (H₂S)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Gourley Brothers Hog Feedlot, 12/9/2011.
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016.
		"Efficacy of a microbial additive in reducing odor, ammonia, and hydrogen sulfide emissions from farrowing-gestation swine operation", Rahman et. al., 2011.
	Odor	Table 4, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	(Composting)	Minnesota Pollution Control Agency; Environmental Assessment Worksheet, Johnson Hog Feedlot, 8/20/2016.
Beef Cattle	Ammonia (NH₃)	Table 6, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	Open Lot	Table 1, "Ammonia, Hydrogen Sulfide and Odor Emissions from a Beef Cattle Feedlot"; R. Duysen et. al.; July, 2003.
	Hydrogen Sulfide (H₂S)	Minnesota Pollution Control Agency Memorandum "Curtis Blair Feedlot and Blair West (Ted Reichmann) Feedlot"; Charles Peterson; 4/23/2013.
	Odor	Table 4, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
		Table 1, "Air Quality and Emissions from Livestock and Poultry Production/Waste Management Systems"; K.D. Casey et. al.; January, 2001.
Dairy Cattle	Ammonia (NH₃)	Table 6, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	Open Lot	Table 6, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.
	Hydrogen Sulfide (H₂S)	Minnesota Pollution Control Agency Memorandum "Curtis Blair Feedlot and Blair West (Ted Reichmann) Feedlot"; Charles Peterson; 4/23/2013.
	Odor	Table 4, "Odor, Total Reduced Sulfur, and Ammonia Emissions from Animal Housing Facilities and Manure Storage Units in Minnesota"; S.W. Gay et. al.; April, 2002.

**Air Quality Modeling Analysis
Holden Farms Inc.**

4.0 MODELING RESULTS

This section provides air dispersion modeling results for each pollutant modeled along with background concentrations. Existing sources and proposed sources were modeled to establish concentrations both at the site boundaries and at surrounding receptors.

Hydrogen Sulfide (H₂S)

AERMOD results indicate that the Holden project complies with the Minnesota state ambient air quality standard for hydrogen sulfide. The standard regards the third exceedance of 30 ppb within any 5-day period as a violation. Modeled compliance is demonstrated when the third highest 1-hour (H₃H) concentration (with background) for any 5-day period at each property-line receptor is less than 30 ppb.

The existing and proposed barns were modeled as sources of hydrogen sulfide using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD volume source option or the area source option. Open lots were modeled as sources of hydrogen sulfide, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Hydrogen sulfide emission flux rates from dairy feedlots varied monthly, and were based on a May flux rate of 0.55 µg/m²/s.¹² These monthly variations were accounted for by applying the monthly scalars listed in Table 3.

Table 3: Monthly H₂S Scalars

Odor Units	Monthly H₂S Emission Scalar – Dairy Feedlots¹⁰
January	0.94
February	0.87
March	0.79
April	0.90
May	1
June	1.25
July	1.49
August	1.30
September	1.1
October	1.16
November	1.22
December	1.08

**Air Quality Modeling Analysis
Holden Farms Inc.**

AERMOD predicted a maximum H3H property- line hydrogen sulfide concentration of 17.36 $\mu\text{g}/\text{m}^3$ (12.40 ppb). When a background concentration of 17 ppb is added to the AERMOD predictions, the H3H property line hydrogen sulfide concentration is 29.40 ppb, which is below the ambient standard of 30 ppb. Therefore, no exceedances of the state ambient air quality standard for hydrogen sulfide were modeled.

Table 4 – Third Highest 1-hr (H3H) H2S Concentrations at Property Lines

Property Line	H2S Concentration ($\mu\text{g}/\text{m}^3$)	H2S Concentration (ppb)	Background Concentration (ppb)	Total Concentration (ppb)
North	14.88	10.63	17	27.63
South	13.42	9.59	17	26.59
East	7.52	5.37	17	22.37
West	17.36	12.40	17	29.40

Air Quality Modeling Analysis
Holden Farms Inc.

The modeling results indicate that the proposed feedlot construction will not will not contribute to exceedances of the subchronic (13-week) hydrogen sulfide iHRV at any neighboring residences. AERMOD is unable to conveniently predict 13-week averages, therefore monthly averages have been used as a conservative surrogate. The estimated maximum monthly average concentration is 0.22 µg/m³. When the background value of 1.00 µg/m³ is added, the total is 1.22 µg/m³, below the subchronic H₂S iHRV of 10 µg/m³. The maximum monthly concentration along the westerly line of the city limits of Utica is 0.01 µg/m³. Table 5 shows the maximum monthly H₂S concentrations at all nearest neighbor receptors.

Table 5 – Highest Month-Average H₂S Concentrations at Nearest Neighbors

Neighbor Receptor	Modeled H₂S Concentration (µg/m³)	With 1 µg/m³ Background (µg/m³)
D1	0.07	1.07
D2	0.02	1.02
D3	0.04	1.04
D4	0.06	1.06
D5	0.07	1.07
D6	0.01	1.01
D7	0.01	1.01
D8	0.01	1.01
D9	0.01	1.01
D10	0.01	1.01
D11	0.01	1.01
D12	0.01	1.01
D13	0.01	1.01
D14	0.01	1.01
D15	0.02	1.02
D16	0.05	1.05
D17	0.07	1.07
D18	0.19	1.19
D19	0.03	1.03
D20	0.01	1.01
D21	0.01	1.01
D22	0.01	1.01
D23	0.01	1.01
D24	0.02	1.02
D25	0.02	1.02
D26	0.22	1.22
D27	0.05	1.05
D28	0.01	1.01
D29	0.01	1.01
D30	0.01	1.01
D31	0.01	1.01
D32	0.01	1.01
D33	0.01	1.01

1. Receptors in bold indicate feedlot residences.

**Air Quality Modeling Analysis
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Ammonia

The existing and proposed barns were modeled as sources of ammonia using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD volume source option or the area source option. Open lots were modeled as sources of ammonia, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Ammonia emission flux rates from manure packs at beef feedlots varied monthly, and were based on an April flux rate of $25.1 \mu\text{g}/\text{m}^2/\text{s}$ ¹¹. Flux rates from dairy feedlots were based on a May odor flux rate of $43.1 \mu\text{g}/\text{m}^2/\text{s}$ ¹¹. These monthly variations were accounted for by applying the monthly scalars listed in Table 6.

Table 6: Monthly NH3 Scalars

Odor Units	Monthly NH3 Emission Scalar – Beef Feedlots ¹⁵	Monthly NH3 Emission Scalar – Dairy Feedlots ¹⁰
January	0.57	0.94
February	0.18	0.87
March	0.59	0.79
April	1	0.90
May	1.27	1
June	1.53	1.25
July	1.56	1.49
August	1.58	1.30
September	0.95	1.1
October	0.95	1.16
November	0.95	1.22
December	0.95	1.08

**Air Quality Modeling Analysis
Holden Farms Inc.**

AERMOD results indicate that the Holden project complies with the acute ammonia iHRV. AERMOD predicted a maximum hourly property-line ammonia concentration of 765.78 µg/m³. When a background concentration of 148 µg/m³ is added to the AERMOD predictions, the maximum property-line ammonia concentration is 913.78 µg/m³, which is below the acute ammonia iHRV of 3200 µg/m³. Table 7 shows the maximum concentrations by lot line.

Table 7 – Highest 1-hr Average NH₃ Concentrations at Property Lines

Property Line	NH₃ Concentration (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NH₃ iHRV (µg/m³)
North	765.78	148	913.78	3200
South	416.66	148	564.66	3200
East	431.78	148	579.78	3200
West	649.07	148	797.07	3200

**Air Quality Modeling Analysis
Holden Farms Inc.**

The AERMOD analysis indicates that the proposed project will not create an exceedance of the chronic ammonia iHRV at any neighboring residences. The estimated maximum concentration is 8.40 µg/m³. When the background value of 5.72 µg/m³ is added, the maximum annual ammonia concentration is 14.12 µg/m³, below the chronic NH₃ iHRV of 80 µg/m³. The maximum annual concentration along the westerly line of the city limits of Utica ranges from 0.11 µg/m³ on the south end to 0.25 µg/m³ at the north end. Table 8 shows the maximum annual NH₃ concentrations for all nearest neighbors.

Table 8 –Annual Average NH₃ Concentrations at Nearest Neighbors

Neighbor Receptor	Modeled NH₃ Concentration (µg/m³)	With 5.72 µg/m³ Background (µg/m³)
D1	3.56	9.28
D2	1.38	7.1
D3	1.36	7.08
D4	1.10	6.82
D5	0.81	6.53
D6	2.03	7.75
D7	0.19	5.91
D8	0.16	5.88
D9	0.14	5.86
D10	0.11	5.83
D11	0.14	5.86
D12	0.14	5.86
D13	0.14	5.86
D14	0.10	5.82
D15	0.59	6.31
D16	0.85	6.57
D17	5.17	10.89
D18	3.05	8.77
D19	0.70	6.42
D20	0.24	5.96
D21	0.24	5.96
D22	0.13	5.85
D23	0.13	5.85
D24	0.61	6.33
D25	0.48	6.2
D26	8.40	14.12
D27	1.80	7.52
D28	0.14	5.86
D29	0.14	5.86
D30	0.12	5.84
D31	0.11	5.83
D32	0.12	5.84
D33	0.09	5.81

1. Receptors in bold indicate feedlot residences.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Odor

Odor is typically measured as the ratio of dilutions of clean air to ambient air that are necessary to reach a detection threshold (DT) by human panelists. DT is dimensionless and reported as odor units (OU).¹⁴ Published odor flux rates (OU/s or OU/m²/s) were input into the AERMOD model to predict maximum hourly odor concentrations (OU/m³) at boundary line receptors and the 33 nearest neighbors within a 9 square-mile grid surrounding the Holden project site, as well as receptors placed along the westerly boundary line of the city limits of Utica. Table 9 shows various odor detection threshold levels and how they are perceived. An odor intensity of 72 OU/m³ is defined as a faint odor and is the odor intensity that “an average person might detect if attention is called to the odor, but the odor would not otherwise be noticed”¹³.

Table 9: Odor Perception Intensities¹⁴

Odor Units	Odor Strength	Detection-Threshold Odor Units (OU, D/T)
0	No odor	0
1	Very Faint	24
2	Faint	72
3	Moderate	212
4	Strong	624
5	Very Strong	1,834

The proposed finishing barns were modeled as sources of odor using the AERMOD horizontal point source option. Existing feedlots were modeled using the AERMOD line source option, the volume source option, the horizontal point source option or the area source option. Open lots were modeled as sources of odor, using emission rates that were equal to the surface area multiplied by the estimated emission flux rates.

Odor emission flux rates from manure packs at the beef feedlots varied monthly, and were based on an April odor flux rate of 4.42 OU/m²/s¹¹. Flux rates from dairy feedlots were based on a May odor flux rate of 3.00 OU/m²/s¹¹. These monthly variations were accounted for by multiplying by monthly scalars listed in Table 10.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 10: Monthly Odor Scalars

Odor Units	Monthly Odor Emission Scalar – Beef Feedlots ¹⁵	Monthly Odor Emission Scalar – Dairy Feedlots ¹⁰
January	0.38	0.47
February	0.38	0.66
March	0.38	0.84
April	1.0	0.92
May	1.0	1
June	0.67	1
July	0.67	1
August	0.64	0.9
September	0.38	0.79
October	0.38	1.08
November	0.38	1.37
December	0.38	0.92

AERMOD modeling was conducted on existing sources within the 9 square-mile grid surrounding the project site to estimate current odor concentrations at the property line receptors and nearest neighbors. Maximum hourly concentrations at the property lines vary from 68.88 OU/m³ along the east property line to 160.79 OU/m³ on the north property line.

When modeling was conducted on existing and proposed sources, the modeling results indicate that the proposed sources will not contribute to a significant increase in the existing odor concentrations. Table 11 shows modeled maximum hourly odor concentrations by lot line, as well as the frequency at which the hourly odor intensity exceeds 72 OU/m³, which is considered “Faint”, along that lot line.

Table 11 – Highest 1-hr Average Odor Concentrations at Property Lines

Property Line	Proposed Conditions	Odor Strength	Frequency “Faint” Odor Threshold is Exceeded (%) ¹
	Odor Concentration (OU/m ³)		
North	160.79	Faint	0.09
South	126.98	Faint	0.08
East	68.88	Very Faint	0.00
West	139.05	Faint	0.31

1. Based on 5 years of meteorological data.

Odor concentrations at the nearest neighbor receptors vary from 16.55 OU/m³ to 359.17 OU/m³ on existing feedlot properties and from 6.43 OU/m³ to 115.65 OU/m³ on properties without feedlot operations. The maximum hourly odor concentration along the westerly line of the city limits of Utica ranges from 6.68 OU/m³ on the south end to 22.00 OU/m³ near the north end. Table 12 shows the maximum hourly odor concentrations at all nearest neighbor receptors, as well as the frequency at which the hourly odor intensity exceeds 72 OU/m³, which is considered “Faint”.

**Air Quality Modeling Analysis
Holden Farms Inc.**

Table 12 – Highest 1-hr Average Odor Concentration at Nearest Neighbors

Neighbor Receptor	Maximum Hourly Odor Intensity (OU/m3)	Frequency “Faint” Odor Threshold is Exceeded
D1	16.55	0.00%
D2	102.29	0.03%
D3	90.06	0.00%
D4	54.08	0.00%
D5	40.86	0.00%
D6	238.67	0.18%
D7	49.07	0.00%
D8	16.47	0.00%
D9	13.59	0.00%
D10	11.02	0.00%
D11	17.18	0.00%
D12	20.13	0.00%
D13	11.20	0.00%
D14	11.89	0.00%
D15	27.83	0.00%
D16	47.76	0.00%
D17	359.17	0.45%
D18	53.80	0.00%
D19	115.65	0.00%
D20	17.80	0.00%
D21	14.17	0.00%
D22	7.64	0.00%
D23	17.83	0.00%
D24	80.17	0.00%
D25	21.33	0.00%
D26	79.61	0.00%
D27	145.09	0.11%
D28	20.52	0.00%
D29	11.62	0.00%
D30	11.76	0.00%
D31	17.76	0.00%
D32	10.78	0.00%
D33	6.43	0.00%

1. Receptors shown in bold indicate feedlot residences.

5.0 SUMMARY AND CONCLUSIONS

In support of an Environmental Assessment Worksheet (EAW), and based on a protocol approved by the Minnesota Pollution Control Agency (MPCA), an air dispersion modeling analysis was performed to estimate the air quality impacts of the expansion of an existing swine facility. This expansion includes the construction of one 3000-head swine breeding/gestation barn in the northeast quarter of section 14 in St. Charles Township, Winona County. This report presents the results of the quantitative assessment of air quality impacts associated with the planned project as well as existing feedlots located within a 9 square-mile grid surrounding the project site.

Air Quality Modeling Analysis Holden Farms Inc.

Hydrogen Sulfide

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed breeding barn complies with the 30 ppb (42 $\mu\text{g}/\text{m}^3$) hourly Minnesota State Ambient Air Quality Standard for hydrogen sulfide at property line receptors. The standard regards the third exceedance of 30 ppb within any 5-day period as a violation. Modeled compliance is demonstrated when the high-third-high (H3H) concentration (with background) for any 5-day period at each property-line receptor is less than 30 ppb. With the background concentration of 17ppb, no modeled exceedances were indicated. Additionally, the modeling results indicate that the construction of the proposed breeding barn will not contribute to exceedances of the 10 $\mu\text{g}/\text{m}^3$ subchronic (13-week) hydrogen sulfide iHRV at any neighboring residences. The modeled maximum monthly average concentration is 1.22 $\mu\text{g}/\text{mg}$, including the background value of 1.00 $\mu\text{g}/$, below the subchronic H₂S iHRV of 10 $\mu\text{g}/\text{m}^3$.

Ammonia

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed breeding barn complies with the 3,200 $\mu\text{g}/\text{m}^3$ acute hourly ammonia iHRV at property line receptors. The hourly high ammonia concentration was modeled at 913.78 $\mu\text{g}/\text{m}^3$, including the background value of 148 $\mu\text{g}/\text{m}^3$, well below the iHRV. Additionally, the modeling results indicate that the construction of the proposed breeding barn will not contribute to exceedances of the 80 $\mu\text{g}/\text{m}^3$ annual chronic inhalation ammonia iHRV at any neighboring residences. The maximum annual concentration was modeled at 14.12 $\mu\text{g}/\text{m}^3$, including the background value of 5.72 $\mu\text{g}/\text{m}^3$.

Odor

Based on the air dispersion modeling analysis performed, AERMOD results indicate that construction of the proposed breeding barn will not contribute to odor concentrations above an odor intensity of 72 OU/ m^3 , defined as a "faint odor" at nearby non-feedlot residences. Modeled hourly maximum odor concentrations at the nearest neighbor receptors vary from 16.55 OU/ m^3 to 359.17 OU/ m^3 on existing feedlot properties and from 6.43 OU/ m^3 to 115.65 OU/ m^3 on properties without existing feedlot operations. The analysis indicates that the addition of the proposed breeding barn would not significantly impact the odor concentrations along the property line. The modeled high hourly concentration at the property line is 160.79 OU/ m^3 and would occur along the north property line. Additionally, the frequency at which the hourly odor intensity exceeds 72 OU/ m^3 along all lot lines is 0.46%.

Conclusion

Results of the air quality dispersion modeling analysis indicate that emissions from the operation of the proposed swine breeding barn will not exceed state ambient air quality standards for hydrogen sulfide. Additionally, the project will not contribute to exceedances of the subchronic hydrogen sulfide iHRV, the acute hourly ammonia iHRV, or the annual chronic ammonia iHRV. Modeling results also indicate that the project will not contribute to a significant increase in odor concentrations.

**Air Quality Modeling Analysis
Holden Farms Inc.**

6.0 References

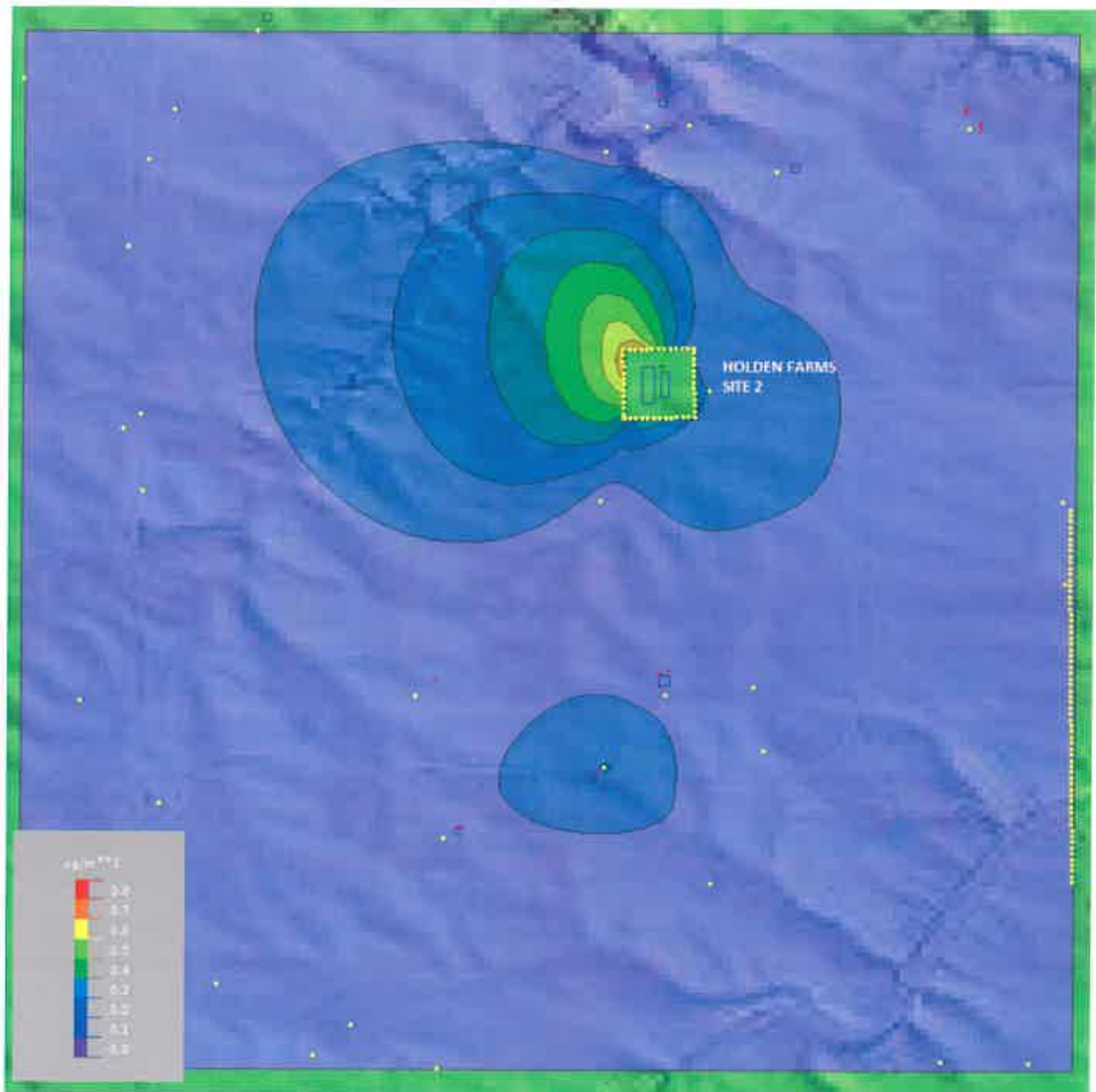
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2. Minnesota Pollution Control Agency; Air Dispersion Modeling Guidance (July 2013)
3. MPCA Internal Guidance Reviewing, Approving and Interpreting Air Quality Modeling Evaluations For Livestock Production Facilities, Version 1.0; April 2005.
4. U.S. EPA. 2005. Revision to the Guideline for Air Quality Models. 40 CFR Ch. 1, Part 51, Appendix W.
5. U.S. EPA. AERMOD Implementation Guide, March, 2009.
6. L. Jacobson et. al.; "Sampling Pit and Wall Emission For H₂S, NH₃, CO₂, PM, & Odor From Deep-Pit Pig Finishing Facilities"; September, 2007.
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8. K.D. Casey et. al.; "Air Quality and Emissions from Livestock and Poultry Production/ Waste Management Systems"; Animal Agriculture and the Environment; National Center for Manure and Animal Waste Management White Papers; January, 2006.
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12. Minnesota Pollution Control Agency Memorandum "Curtis Blair Feedlot and Blair West (Ted Reichmann) Feedlot"; Charles Peterson; 4/23/2013.
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17. Zahn J. A. et. al.; Functional classification of swine manure management systems based on effluent and gas emission characteristics, Table 7; 2001; Journal of Environmental Quality
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19. R. Stenglein et.al.; March 2011; "Covers for Mitigating Odor and Gas Emissions in Animal Agriculture: An Overview"; Air Quality Education in Animal Agriculture; 10 pp.

Appendix A

Modeling Plots

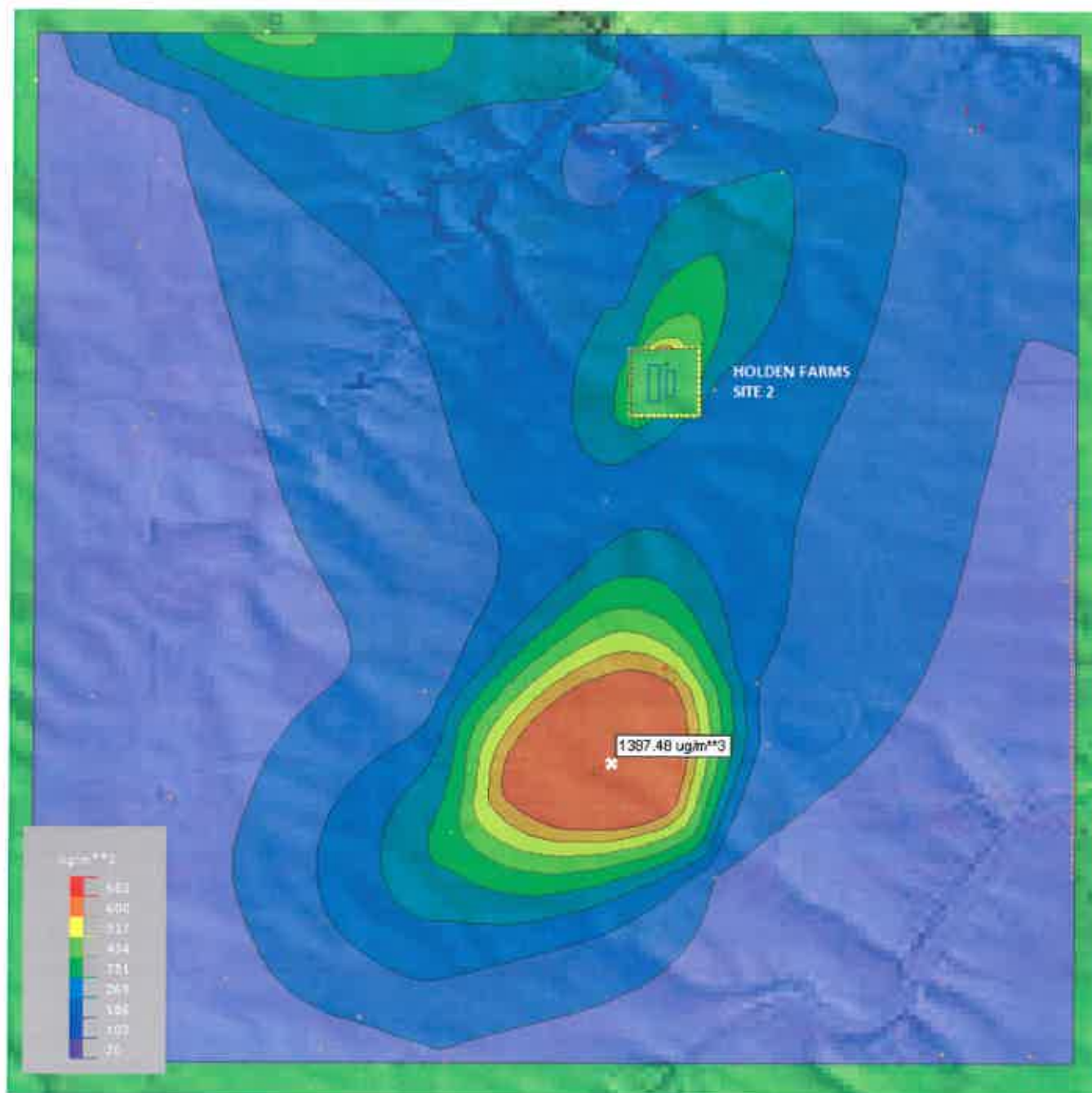
**Air Quality Modeling Analysis
Holden Farms Inc.**

Highest Monthly Hydrogen Sulfide (H₂S) Concentrations (µg/m³)



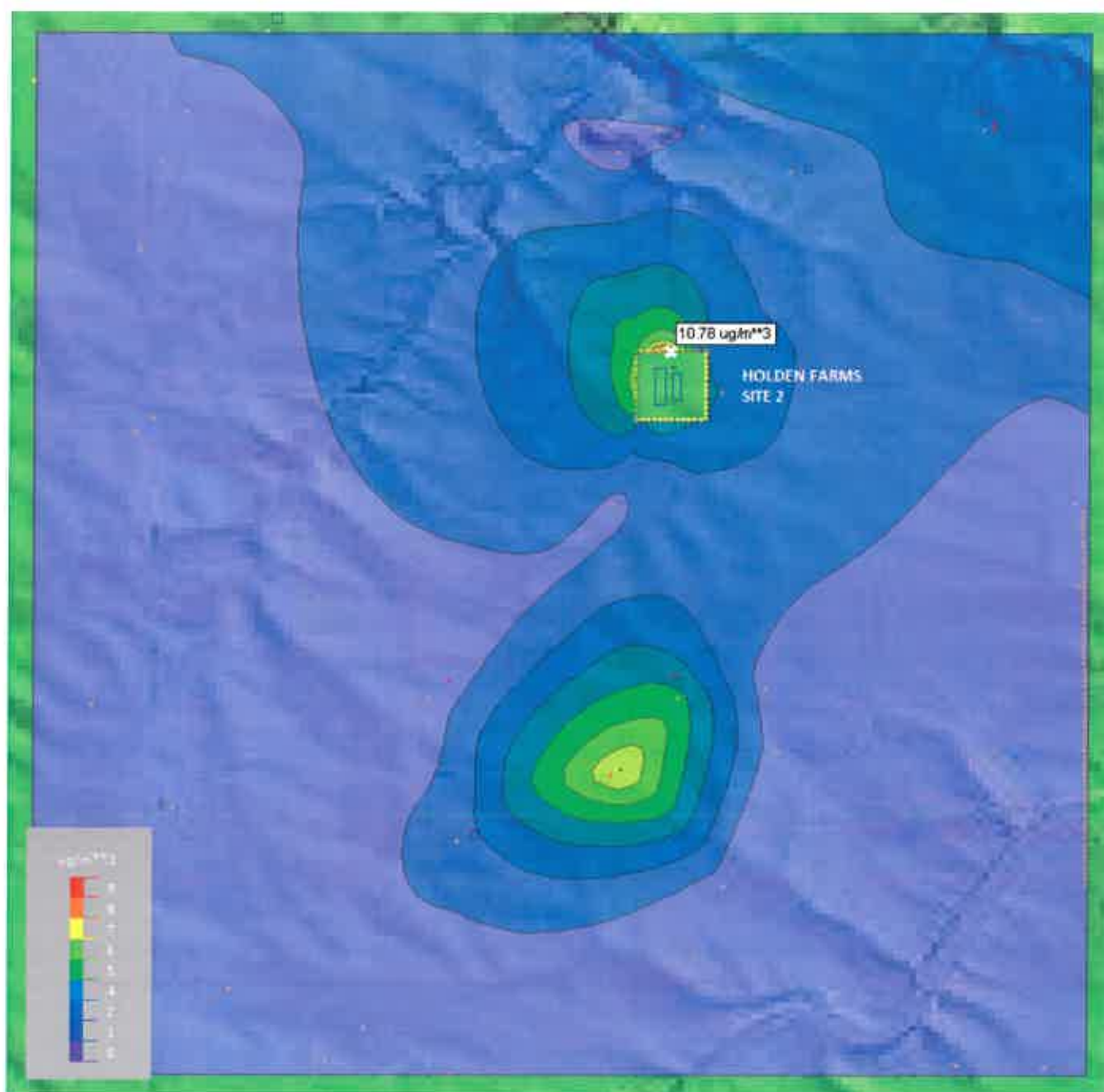
Air Quality Modeling Analysis
Holden Farms Inc.

Highest 1-Hour Ammonia (NH₃) Concentrations (µg/m³)



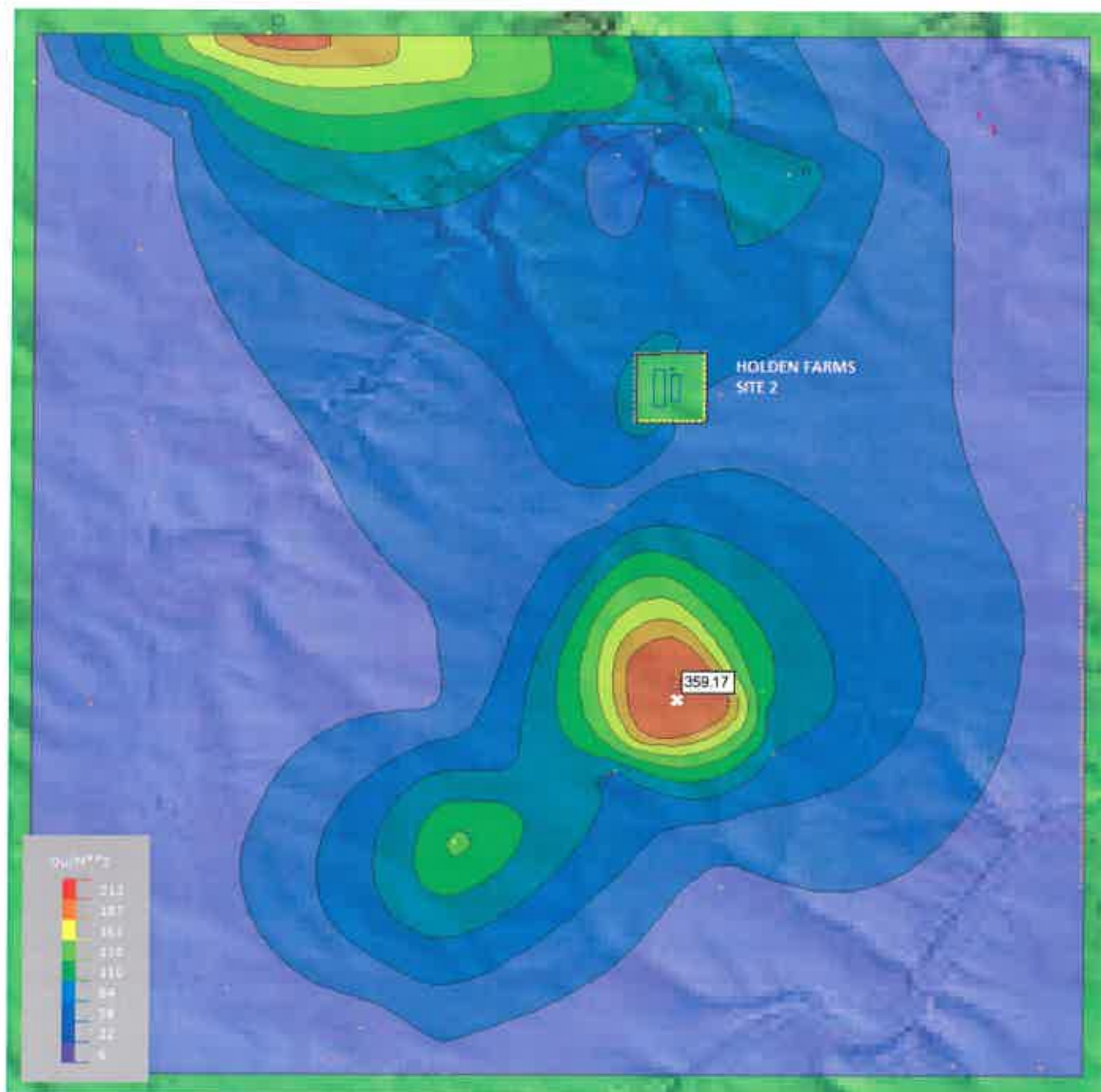
**Air Quality Modeling Analysis
Holden Farms Inc.**

Average Annual Ammonia (NH₃) Concentrations (µg/m³)



**Air Quality Modeling Analysis
Holden Farms Inc.**

Highest 1-hour Average Odor Concentration (OU/m³)



ATTACHMENT G

**Minnesota Archaeological Inventory
And Historic Structures Inventory Report**

From: [Thomas Cinadr](#)
To: [David Plagge](#); jared@anezconsulting.com
Subject: Re: FW: SHPO database request
Date: Sunday, August 07, 2016 7:14:32 PM
Attachments: [Historic.rtf](#)

THIS EMAIL IS NOT A PROJECT CLEARANCE.

This message simply reports the results of the cultural resources database search you requested. The database search produced results for only previously known archaeological sites and historic properties. Please read the note below carefully.

No archaeological sites were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested. **A report containing the history/architecture properties 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.

Properties that are listed in the National Register of Historic Places (NRHP) or have been determined eligible for listing in the NRHP are indicated on the reports you have received. The following codes on the reports you received are:

NR – National Register listed. The properties may be individually listed or may be within the boundaries of a National Register District.

CEF – Certified Eligible to the National Register findings are usually made during the federal review process, these properties have been evaluated as being eligible for listing in the National Register.

SEF – Staff eligible findings to the National Register are properties that have been determined eligible by SHPO staff.

DOE – Determination of Eligibility is made by the National Park Service and typically refers to properties deemed eligible but the owner objects to the listing.

CNEF – Certified Not Eligible to the National Register. SHPO has begun to record properties that have been evaluated as **not eligible** for listing in the National Register. If the box on the form has a check the property has been determined to be **not eligible**.

Properties without **NR, CEF, SEF, DOE, or CNEF** designations in the reports you received may not have been evaluated and therefore no assumption to their eligibility can be made.

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. If you need assistance with

a project review, please contact Kelly Gragg-Johnson in Review and Compliance @ 651-259-3455 or by email at kelly.graggjohnson@mnhs.org

The Minnesota SHPO Survey Manuals and Database Metadata can be found at
<http://www.mnhs.org/shpo/survey/inventories.htm>

SHPO research hours are 8:30 AM – 4:00 PM Tuesday-Friday.

The Office is closed on Mondays.

Tom Cinadr

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

651-259-3453

On Fri, Aug 5, 2016 at 4:18 PM, David Plagge <david@anezconsulting.com> wrote:

Tom- Can you send the results to jared@anezconsulting.com?

Thanks-

Dave

From: Thomas Cinadr [mailto:thomas.cinadr@mnhs.org]

Sent: Friday, August 05, 2016 12:57 PM

To: David Plagge <david@anezconsulting.com>

Subject: Re: FW: SHPO database request

I will run your request over the weekend.

Tom

On Friday, August 5, 2016, David Plagge <david@anezconsulting.com> wrote:

Tom- I never received the database search results from the Holden Farms EAW request. Can you forward those to me? Can you send it in rtf/pdf?

The original request is below, if you need to re-run it.

Thanks-

Dave

From: David Plagge [mailto:david@anezconsulting.com]
Sent: Wednesday, June 15, 2016 4:05 PM
To: Thomas Cinadr <thomas.cinadr@mnhs.org>
Subject: SHPO database request

Hello Tom-

I have a database search request for the Holden Farms EAW in Winona County. Here are the sections:

In Elba Township (T. 107N, R. 10W)

Sections 27, 28, 32 and 33.

In St. Charles Township (T.106N, R. 10W)

Sections 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 18, 22 and 23

Thanks-

Dave

David Plagge

Engineering/Permitting Consultant

Office (320) 262-5714

Cell (320) 444-7842

Fax (320) 235-1986

Anez Consulting Inc.

1700 Technology Dr. NE, Suite 130

Willmar, MN 56201

www.facebook.com/anezconsulting (Like us on Facebook)

www.anezconsulting.com



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Tom Cinadr

Survey and Information Management Coordinator

Minnesota Historic Preservation Office

Minnesota Historical Society

345 Kellogg Blvd. West

St. Paul, MN 55102

651-259-3453

History/Architecture Inventory

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY: Winona											
CITY/TOWNSHIP: Elba Twp.											
Berca Moravian Parsonage	off Co. Hwy. 39	107	10	28	NW-NE-NE	Elba					WN-ELT-036
CITY/TOWNSHIP: St. Charles Twp.											
Holt Farmhouse	off Co. Hwy. 115	106	10	12	SE-SW-NE	Utica					WN-SCT-003
Bridge No. L1392	CR 119 over South Fork Whitewater River	106	10	9	SE-NE-NW	Elba					WN-SCT-007
Culvert 1		106	10	18	SW-SW-NW	Chatfield			Y		WN-SCT-009

From: [Thomas Cinadr](#)
To: [David Plagge](#)
Subject: Re: FW: SHPO database request
Date: Tuesday, August 09, 2016 8:11:47 AM
Attachments: [Historic2.rtf](#)

THIS EMAIL IS NOT A PROJECT CLEARANCE.

This message simply reports the results of the cultural resources database search you requested. The database search produced results for only previously known archaeological sites and historic properties. Please read the note below carefully.

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

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SEF – Staff eligible findings to the National Register are properties that have been determined eligible by SHPO staff.

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CNEF – Certified Not Eligible to the National Register. SHPO has begun to record properties that have been evaluated as **not eligible** for listing in the National Register. If the box on the form has a check the property has been determined to be **not eligible**.

Properties without **NR, CEF, SEF, DOE, or CNEF** designations in the reports you received may not have been evaluated and therefore no assumption to their eligibility can be made.

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. If you need assistance with

a project review, please contact Kelly Gragg-Johnson in Review and Compliance @ 651-259-3455 or by email at kelly.graggjohnson@mnhs.org.

The Minnesota SHPO Survey Manuals and Database Metadata can be found at <http://www.mnhs.org/shpo/survey/inventories.htm>

SHPO research hours are 8:30 AM – 4:00 PM Tuesday-Friday.

The Office is closed on Mondays.

Tom Cinadr

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

651-259-3453

On Fri, Aug 5, 2016 at 1:07 PM, David Plagge <david@anezconsulting.com> wrote:

Thank you, Tom. I appreciate that.

Dave

From: Thomas Cinadr [mailto:thomas.cinadr@mnhs.org]

Sent: Friday, August 05, 2016 12:57 PM

To: David Plagge <david@anezconsulting.com>

Subject: Re: FW: SHPO database request

I will run your request over the weekend.

Tom

On Friday, August 5, 2016, David Plagge <david@anezconsulting.com> wrote:

Tom- I never received the database search results from the Holden Farms EAW request.

Can you forward those to me? Can you send it in rtf/pdf?

The original request is below, if you need to re-run it.

Thanks-

Dave

From: David Plagge [mailto:david@anezconsulting.com]
Sent: Wednesday, June 15, 2016 4:05 PM
To: Thomas Cinadr <thomas.cinadr@mnhs.org>
Subject: SHPO database request

Hello Tom-

I have a database search request for the Holden Farms EAW in Winona County. Here are the sections:

In Elba Township (T. 107N, R. 10W)

Sections 27, 28, 32 and 33.

In St. Charles Township (T.106N, R. 10W)

Sections 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 18, 22 and 23

Thanks-

Dave

David Plagge

Engineering/Permitting Consultant

Office (320) 262-5714

Cell (320) 444-7842

Fax (320) 235-1986

Anez Consulting Inc.

1700 Technology Dr. NE, Suite 130

Willmar, MN 56201

www.facebook.com/anezconsulting (Like us on Facebook)

www.anezconsulting.com



--

Tom Cinadr

Survey and Information Management Coordinator

Minnesota Historic Preservation Office

Minnesota Historical Society

345 Kellogg Blvd. West

St. Paul, MN 55102

651-259-3453

History/Architecture Inventory

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY: Winona											
CITY/TOWNSHIP: Elba Twp.											
Whitewater State Park	off Mn. Hwy. 74 (Whitewater State Park)	107	10	29		Elba		Y			WN-ELT-003
stone ramp		107	10	29	SE-SE-NW	Elba	xx-88-3H	Y			WN-ELT-010
entrance signs (north and south)		107	10	29	SW-SW-NW	Elba	xx-88-3H	Y			WN-ELT-017
Bridge No. 8592	T.H. 74 5.4 mi. N of W Jct. T.H. 14	107	10	29		Elba			Y		WN-ELT-037
Bridge No. 8593	T.H. 74 5.5 mi. N of W Jct. T.H. 14	107	10	29		Elba			Y		WN-ELT-038
Bridge No. 8594		107	10	29		Elba			Y		WN-ELT-039
Bridge No. 8595	T.H. 74 5.6 mi. N of W Jct. T.H. 14	107	10	29		Elba			Y		WN-ELT-040
CITY/TOWNSHIP: St. Charles Twp.											
Holt Farmhouse	off Co. Hwy. 115	106	10	12	SE-SW-NE	Utica					WN-SCT-003
Bridge No. L1392	CR 119 over South Fork Whitewater River	106	10	9	SE-NE-NW	Elba					WN-SCT-007
Culvert 1		106	10	18	SW-SW-NW	Chatfield			Y		WN-SCT-009

ATTACHMENT H

Natural Heritage Information System Search Report



September 1, 2016

Anez Consulting
1700 Technology Drive NE
Suite 130
Willmar, MN 56201

Nick Holden
Holden Farms Inc.
12346 Hall Avenue
Northfield, MN. 55057

**Subj: Report of Natural Heritage Information System (NHIS) Database Review
Holden Farms Inc. – Two Feedlot Expansion Projects
St. Charles Township, Winona County, Minnesota**

Dear Mr. Holden-

We understand that Holden Farms Inc. (Holden) intends to expand two feedlots in St. Charles Township in Winona County. Site 1 is an existing swine operation located in the northwest quarter of section 5. This site currently has three swine barns. The proposal is to build a new farrowing barn south of the existing barns. A total of 1,872 designated manure application acres associated with the project lie within 3 miles of the site. Site 2 is an existing swine operation located in the northeast quarter of section 14. This site currently has one swine barn. The proposal is to build a new breeding/gestation barn to the west of the existing barn. A total of 2,145 designated manure application acres associated with the project lie within 2 miles of the site. Minnesota Administrative Rule 4410.4300, Subpart 29 states that an Environmental Assessment Worksheet (EAW) must be prepared for the construction of an animal feedlot facility with a capacity of 1,000 animal units or more or the expansion of an existing facility by 1,000 animal units or more. Site 2, because of the increase in animal units, triggers the threshold for the preparation of a mandatory EAW. Site 1 does not require an EAW, but is also being included in the scope of the EAW.

In support of that EAW, a search of the Minnesota Natural Heritage Information System has been performed by Anez Consulting Inc., under license (LA-764) from the Minnesota Department of Natural Resources, Division of Ecological and Water Resources to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the Holden confinement project sites. No habitat assessment or survey work was conducted as part of this search.

Based on this search, a number of rare species have been documented within the search area. Note that the following rare features *may* be adversely affected by the proposed project:

- **Timber Rattlesnake** (*Crotalus horridus*) is a large, grey to yellow to dark brown, banded snake with a gray to tan rattle. This species was listed as threatened in Minnesota in 1996 due to its declining populations. The timber rattlesnake is 1 of 2 venomous snakes in Minnesota, and inhabit buff prairies located on steep, south or west-facing hillsides, with rock outcroppings and ledges. Surrounding forests, prairies, and crop fields are used as summer feeding grounds. Manure application rates should be carefully determined to ensure that nutrient input does not exceed the ability for crop nutrient uptake and result in runoff into sensitive habitat areas. Other ways to protect this species may include maintaining buffer zones around bluff habitats and den sites.
- **Acadian Flycatcher** (*Empidonax virescens*), a state listed species of special concern, has been documented in the vicinity of the Project. This small, olive-green song bird prefers large stands of mature deciduous forest for breeding. This species avoids areas of cultivation and is vulnerable to deforestation and habitat fragmentation. To protect this species, manure rates should be carefully determined to ensure that nutrient input does not exceed the ability for crop nutrient uptake and result in runoff into sensitive habitat areas. Other activities that may impact this species include destruction/fragmentation of habitat, including tree removal.
- **Cerulean Warbler** (*Setophaga cerulea*), a state listed species of special concern, has been documented in the vicinity of the Project. This small, sky-blue (male) song bird occupies much of the same habitat as the Acadian Flycatcher, but at higher levels in the tree canopy.
- **Louisiana Waterthrush** (*Parkesia motacilla*) is another state-listed species of special concern. This thrush-sized brown song bird is almost exclusively found in mature riparian forests. Typical habitat consists of steep-sided valleys with swiftly flowing streams that have rocky stream beds and riffles, so it is sensitive to disturbance of forest cover and streambeds, as well as degradation of water quality. Potential threats to Louisiana waterthrushes include deforestation and habitat fragmentation as well as stream siltation and poor water quality due to agricultural runoff or other sources. Again, to protect this species, manure rates should be carefully determined to ensure that nutrient input does not exceed the ability for crop nutrient uptake and result in runoff into sensitive habitat areas.
- **Bluff Vertigo** (*Vertigo meramecensis*) is a rare landsnail found in a small number of sites in southeastern Minnesota and is a state-listed threatened species. The bluff vertigo occurs on forested, limestone or dolomite cliffs and outcrops, generally on steep, moist, shaded, and cool north-facing slopes. Land use activities that could compact the talus soil of landsnail habitat and crush the snails themselves, including grazing, hiking, and use of heavy equipment for timber harvest or vegetation clearing, should be carefully managed. Application of pesticides, herbicides, and fertilizers can alter the flora in landsnail habitat and may be toxic to the snails. To protect this species, manure rates should be carefully determined to ensure that nutrient input does not exceed the ability for crop nutrient uptake and result in runoff into sensitive habitat areas.

Additionally, sensitive ecological resources are known to occur within the search area. Please note that the following rare features *may* be adversely affected by the proposed project:

- A search of the Minnesota Biological Survey (MBS) has identified eight sites “below” minimum biodiversity significance located within a one-mile buffer of the proposed manure application sites. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites below the minimum threshold for statewide biodiversity significance lack occurrences of rare species and natural features, or do not meet MCBS standards for Outstanding, High, or Moderate rank. These sites may include areas of conservation value at the local level such as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, or areas with good potential for restoration of native habitat.
- The search identified one site as “Moderate” – or sites containing occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.
- The search identified two sites classified as “High”- or sites containing very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.
- The search identified three sites classified as “Outstanding”. These sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.

The following native plant communities were present in these three sites and are imperiled, to varying degrees in the state of Minnesota:

- | | |
|---|-----------------------------|
| • Red Oak - White Oak – (Sugar Maple) Forest | (Apparently Secure) |
| • Algific Talus; Dolomite Subtype | (Critically Imperiled) |
| • White Pine - Oak – (Sugar Maple) Forest | (Vulnerable to Extirpation) |
| • Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest | (Vulnerable to Extirpation) |
| • Oak - Shagbark Hickory Woodland | (Vulnerable to Extirpation) |
| • Maderate Cliff; Dolomite Subtype | (Critically Imperiled) |
| • Mesic Limestone – Dolomite Cliff (Southern) | (Vulnerable to Extirpation) |
| • Black Ash - Sugar Maple - Basswood - (Blue Beech) Seepage Swamp | (Critically Imperiled) |
| • Elm - Basswood - Black Ash - (Blue Beech) Forest | (Imperiled) |
| • Elm - Basswood - Black Ash - (Hackberry) Forest | (Vulnerable to Extirpation) |
| • Sugar Maple - Basswood - (Bitternut Hickory) Forest | (Imperiled) |

- Sugar Maple - Basswood - Red Oak - (Blue Beech) Forest (Vulnerable to Extirpation)
- White Pine - Oak - Sugar Maple Forest (Vulnerable to Extirpation)

Nitrogen loading is a potential threat to native plant communities as it can result in a loss of plant species diversity, an increased abundance of nonnative invasive species, and the disruption of ecosystem functioning. As such, manure application rates and timing should be carefully considered in order to prevent runoff to these areas. See the enclosed map for locations of these sites and their proximity to application acres.

The Environmental Assessment Worksheet should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Include a copy of this letter in any DNR license or permit application.

The Natural Heritage Information System (NHIS) is a collection of databases that contains information about Minnesota's rare natural features. Anez Consulting Inc. is under license (LA-764) with the Division of Ecological and Water Resources, Minnesota Department of Natural Resources to maintain and perform a search of these databases. The NHIS 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. The NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which there are no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at: http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html).

This Report may be reprinted, unaltered, in any environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled for the project listed above. If you wish to reproduce the Index Report for any other purpose, please contact Anez Consulting Inc. to request written permission.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and description noted above. Please contact Anez Consulting Inc. if project details change or for an updated review if construction has not occurred within one year.

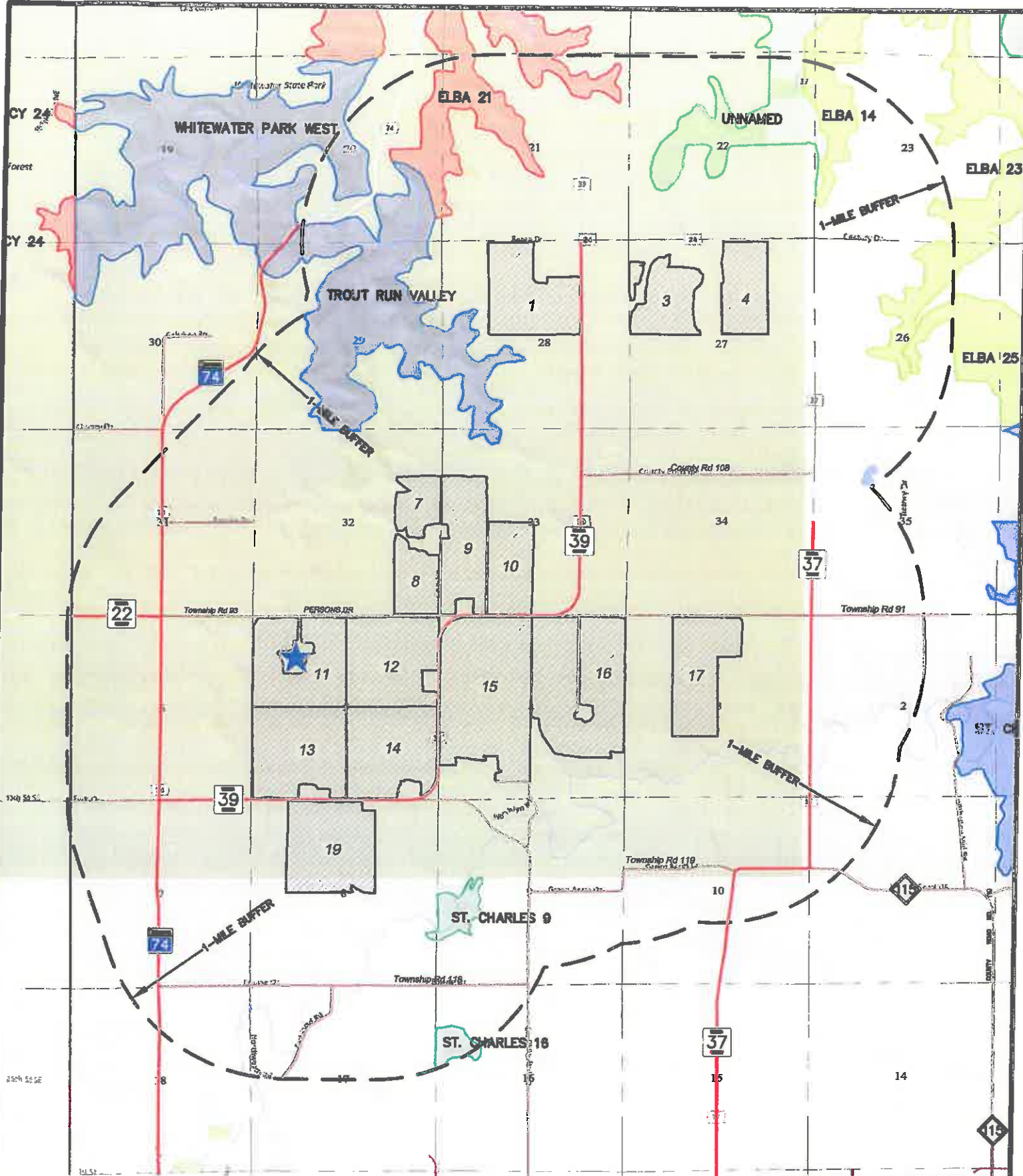
Sincerely,

A handwritten signature in blue ink, appearing to read 'David Plagge', with a long horizontal line extending to the right.

David Plagge
Anez Consulting Inc.

Encl: (2) Maps

Copy: Lisa Joyal, MN DNR Endangered Species Review Coordinator



HOLDEN FARMS APPLICATION ACRES

MINNESOTA BIOLOGICAL SURVEY (MBS) SITES OF BIODIVERSITY SIGNIFICANCE

 OUTSTANDING	 MODERATE
 HIGH	 BELOW

HOLDEN FARMS SITE 1

HOLDEN FARMS - SITE 1

NHIS REPORT EXHIBIT

ST. CHARLES TOWNSHIP
WINONA COUNTY, MN.

Scale 1" = 3600'	Date 8/31/16
Project Number	Sheet Number 1 OF 2

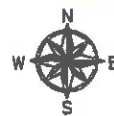
Anez
Consulting, Inc.

1700 Technology Drive NE
Suite 130
Willmar, MN 56201
(320) 235-1970



 HOLDEN FARMS APPLICATION ACRES

 HOLDEN FARMS SITE 2



MINNESOTA BIOLOGICAL SURVEY (MBS) SITES OF BIODIVERSITY SIGNIFICANCE

- | | |
|--|--|
|  OUTSTANDING |  MODERATE |
|  HIGH |  BELOW |

HOLDEN FARMS - SITE 2
NHIS REPORT EXHIBIT

ST. CHARLES TOWNSHIP
WINONA COUNTY, MN.

Scale 1" = 3600'	Date 8/31/16
Project Number	Sheet Number 2 OF 2



1700 Technology Drive NE
Suite 130
Willmar, MN 56201
(320) 235-1970

ATTACHMENT I

St. Charles and Elba Township Zoning Districts



Beacon™

Winona County, MN

I

Overview



Legend

County 2011 Zoning

Agriculture/Resource
Conservation

Business &
Recreational

Commercial

Community
Development

Community
Development 2

*Industrial

Rural Residential

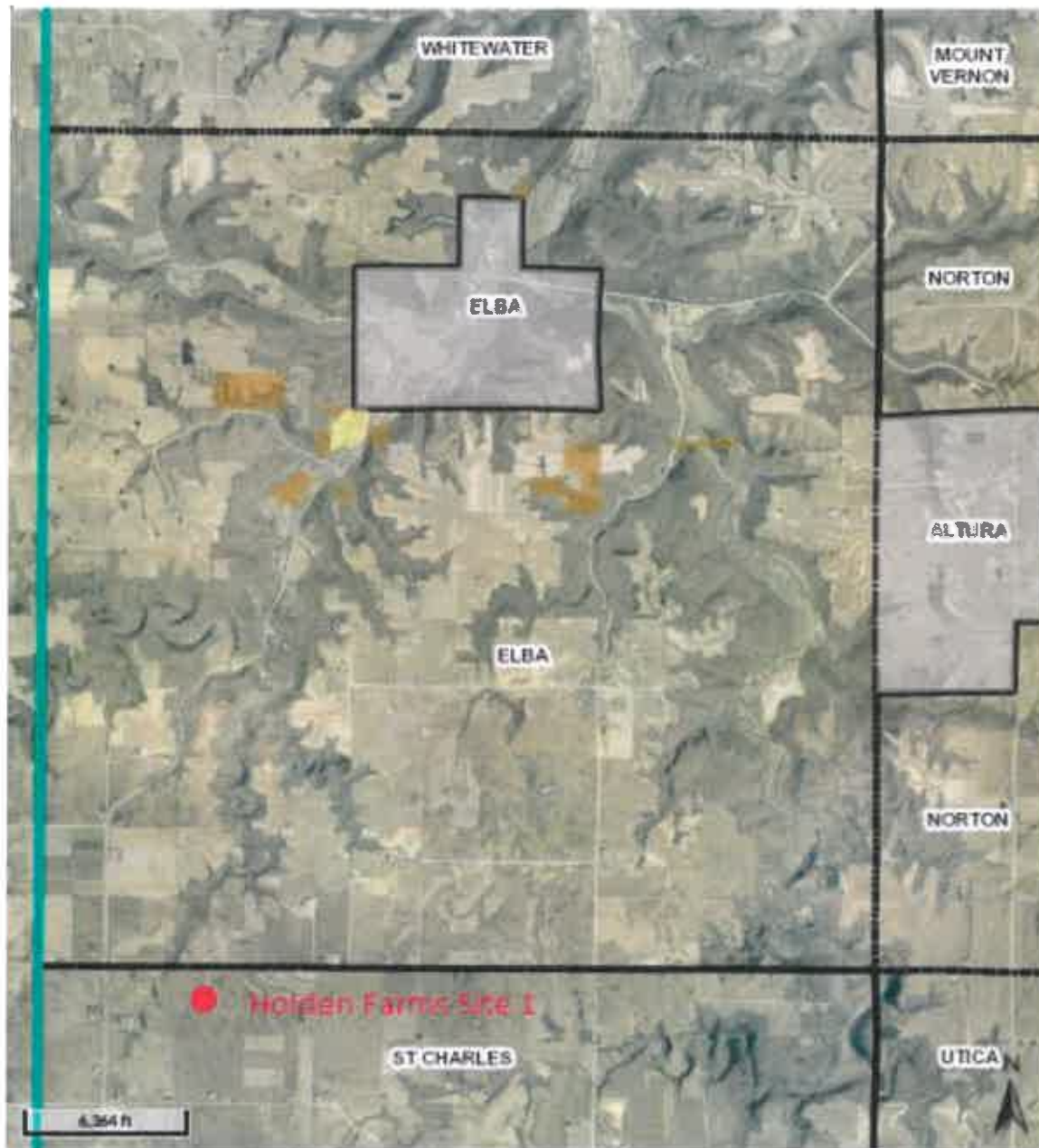
Urban Residential

Rural Heritage

Municipality

Winona Boundary

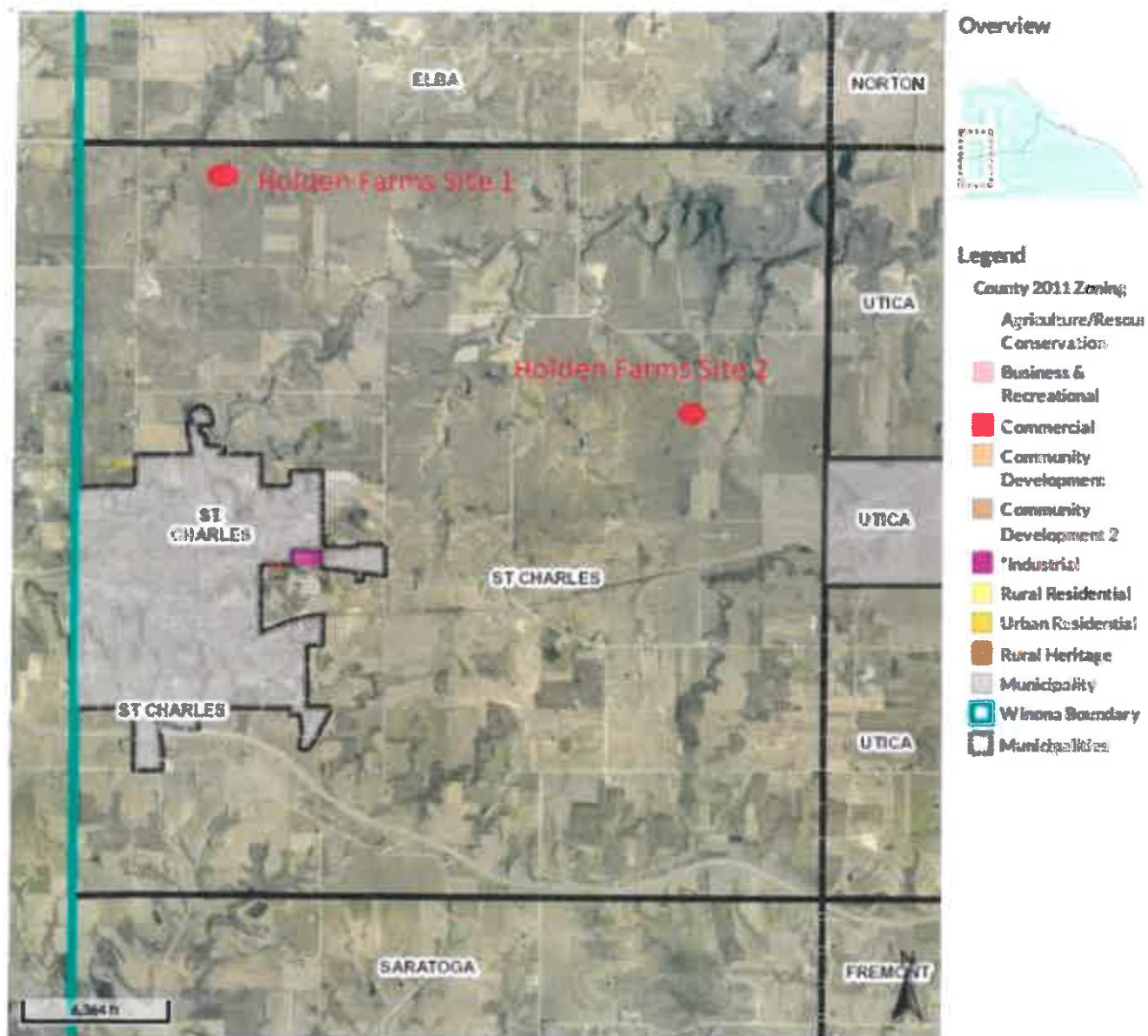
Municipalities



Map created: 6/15/2016



Developed by
The Schneider Corporation



Date created: 8/15/2016



Developed by
The Schneider Corporation

ATTACHMENT J

MN DNR Well Construction Preliminary Assessments



Minnesota Department of Natural Resources
Division of Ecological and Water Resources
MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)

August 23, 2016

Re: DNR Well Construction Preliminary Assessment; Tracking No. 2016-1578; T106N-R10W-S5 SWNW;
Winona County.

Holden Farms, Inc.
12346 Hall Avenue
Northfield, MN 55057

Dear Holden Farms, Inc.:

This is your preliminary approval to construct a well. We have reviewed your well drilling proposal and determined that the proposed rate and volume may interfere with other water users or have negative impacts on nearby lakes, streams or wetlands.

Basis for recommendation:

State law¹ requires that use of water not cause harm to ecosystems, degrade water quality, or significantly reduce the public water supply. We found that your proposed well has the following potential concerns:

- The well is located within 5 miles of 99 stretches of designated trout stream.
- The proposed well is located within 1.5 miles of 53 WCA wetlands and two public water courses (Trout Run and Whitewater River, South Branch).
- Six Rare species have been seen within 1.5 miles of the well including Timber Rattlesnake, Upland Boneset, Louisiana Waterthrush, Sugar maple Forest, and the Pickerel Frog.
- Trout Run Valley, located 1.3 miles away, is considered to be a site of outstanding biodiversity significance.
- Whitewater State Park is located approximately 1 mile from the proposed well location.

The attached assessment checklist contains further information about our analysis.

If you choose to drill this well:

The well contractor or property owner needs to notify the MN Department of Health² before the well is constructed.

Then:

The landowner needs to apply for a DNR water appropriation permit before the well is pumped for production. A permit from the DNR is required for water use above 10,000 gallons per day or 1 million gallons per year. The easiest method to apply for a water use permit is through the Minnesota DNR Permitting and Reporting System (MPARS) at www.mndnr.gov/mpars/signin. Instructions at this website will assist you, step-by-step, through the application process.

¹ Minnesota Statute 103G.287

² Minnesota Statute 103I

Yellow Level, Well Assessment ID 981, MPARS revision 03-23-2015, printed 08-23-2016.

Holden Farms, Inc.
August 23, 2016
Re: DNR Well Construction Preliminary Assessment
Page 2

To more completely understand the risk to other wells or lakes, streams or wetlands, you may be asked for additional information and testing or monitoring, at your expense. We will use this information to determine how much water can be appropriated.

Please note:

This preliminary approval to construct a well is information you can use to decide whether to proceed in constructing a well and is based largely on information you provided. It is not notification to the MN Department of Health, and is not a DNR water use permit.

Thank you for your attention. We anticipate this process will save money for landowners with water needs near sensitive or limited water resources, and will help avoid water shortages. If you have any questions, please contact me at or mary.coburn@state.mn.us.

Sincerely,

Mary Coburn
Hydrologist

Enclosures



Minnesota Department of Natural Resources
Division of Ecological and Water Resources
MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)

WELL CONSTRUCTION PRELIMINARY ASSESSMENT CHECKLIST

**Re: DNR Well Construction Preliminary Assessment; Tracking No. 2016-1578; T106N-R10W-S5
SWNW; Winona County.**

This well construction preliminary assessment is not an appropriation permit. State law requires you to obtain preliminary approval to drill a well that is required to have a DNR water appropriation permit. A water appropriation permit from the DNR is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. DNR Staff have evaluated your project to determine whether the proposed appropriation is likely to meet statutory requirements in Minnesota Statute section 103G.287.

The factors checked below are those that we believe may be impacted by your proposed water use:

- ☐ Calcareous fens
- ☒ Designated trout streams
- ☒ Lakes and rivers, wetlands
- ☒ Rare Species (Threatened, Endangered, Special Concern), Native Plant Communities (S1-3)
- ☒ Minnesota Biological Survey Sites of Biodiversity Significance (High, Outstanding)
- ☐ Known well interference problems
- ☐ Existing water appropriation permits with higher priority as defined in Statute 103G.261
- ☒ Publicly owned lands such as DNR Wildlife Management Areas
- ☐ Municipal Wellhead Protection Areas, Drinking Water Source Management Areas, Source Water Protection Areas
- ☐ Known groundwater contamination
- ☐ Groundwater management areas or areas with declining water levels
- ☐ MDH Special Well and Boring Construction Areas

If any of the factors above are marked with a checkmark, you may be required to install monitoring well(s), perform aquifer test(s), or provide other information to ascertain anticipated impacts to these features. This information will be used to evaluate and make a decision on your water appropriation request. Your water appropriation request may be modified, reduced, or denied based upon site specific information.



Minnesota Department of Natural Resources
Division of Ecological and Water Resources
MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)
1200 Warner Road
St. Paul, MN 55106

August 23, 2016

Re: DNR Well Construction Preliminary Assessment; Tracking No. 2016-1579; T106N-R10W-S14 NENE;
Winona County.

Holden Farms, Inc.
12346 Hall Avenue
Northfield, MN 55057

Dear Holden Farms, Inc.:

This is your preliminary approval to construct a well. We have reviewed your well drilling proposal and determined that the proposed rate and volume may interfere with other water users or have negative impacts on nearby lakes, streams or wetlands.

Basis for recommendation:

State law¹ requires that use of water not cause harm to ecosystems, degrade water quality, or significantly reduce the public water supply. We found that your proposed well has the following potential concerns:

- The proposed well is located within 1.2 miles of a designated trout stream and its tributaries. (Whitewater River, South Branch). It is located within 5 miles of 29 stretches of designated trout streams.
- The well is located within 1.5 miles of 45 WCA wetlands and 3 public water courses.
- The following rare species have been seen within 1.5 miles of the proposed well; Maderate Cliff, Dolomite Subtype, Goldenseal, Short's Aster, Maderate Cliff, Dolomite Subtype, Black Ash - Sugar Maple - Basswood - (Blue Beech) Seepage Swamp, Louisiana Waterthrush, Hubricht's Vertigo, Bluff Vertigo, Pickerel Frog, Acadian Flycatcher, Nodding Wild Onion, Mesic Prairie (Southern), Sugar Maple - Basswood - Red Oak - (Blue Beech) Forest, Squirrel Corn, American Ginseng, Elm - Basswood - Black Ash - (Blue Beech) Forest, Louisiana Waterthrush
- The well is located within 1 mile of a site of biodiversity significance.
- There is a Wildlife Management Area located 1.2 miles away.
- The Utica Wellhead and Drinking Water Protection Areas are located within 1.5 miles of the well.

The attached assessment checklist contains further information about our analysis.

¹ Minnesota Statute 103G.287

² Minnesota Statute 103I

Yellow Level, Well Assessment ID 982, MPARS revision 03-23-2015, printed 08-23-2016.

If you choose to drill this well:

The well contractor or property owner needs to notify the MN Department of Health² before the well is constructed.

Then:

The landowner needs to apply for a DNR water appropriation permit before the well is pumped for production. A permit from the DNR is required for water use above 10,000 gallons per day or 1 million gallons per year. The easiest method to apply for a water use permit is through the Minnesota DNR Permitting and Reporting System (MPARS) at www.mndnr.gov/mpars/signin . Instructions at this website will assist you, step-by-step, through the application process.

To more completely understand the risk to other wells or lakes, streams or wetlands, you may be asked for additional information and testing or monitoring, at your expense. We will use this information to determine how much water can be appropriated.

Please note:

This preliminary approval to construct a well is information you can use to decide whether to proceed in constructing a well and is based largely on information you provided. It is not notification to the MN Department of Health, and is not a DNR water use permit.

Thank you for your attention. We anticipate this process will save money for landowners with water needs near sensitive or limited water resources, and will help avoid water shortages. If you have any questions, please contact me at or mary.coburn@state.mn.us.

Sincerely,

Mary Coburn
Hydrologist

Enclosures



Minnesota Department of Natural Resources
Division of Ecological and Water Resources
MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)

WELL CONSTRUCTION PRELIMINARY ASSESSMENT CHECKLIST

**Re: DNR Well Construction Preliminary Assessment; Tracking No. 2016-1579; T106N-R10W-S14
NENE; Winona County.**

This well construction preliminary assessment is not an appropriation permit. State law requires you to obtain preliminary approval to drill a well that is required to have a DNR water appropriation permit. A water appropriation permit from the DNR is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. DNR Staff have evaluated your project to determine whether the proposed appropriation is likely to meet statutory requirements in Minnesota Statute section 103G.287.

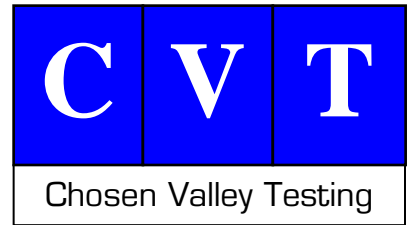
The factors checked below are those that we believe may be impacted by your proposed water use:

- ☐ Calcareous fens
- ☒ Designated trout streams
- ☒ Lakes and rivers, wetlands
- ☒ Rare Species (Threatened, Endangered, Special Concern), Native Plant Communities (S1-3)
- ☒ Minnesota Biological Survey Sites of Biodiversity Significance (High, Outstanding)
- ☐ Known well interference problems
- ☒ Existing water appropriation permits with higher priority as defined in Statute 103G.261
- ☒ Publicly owned lands such as DNR Wildlife Management Areas
- ☒ Municipal Wellhead Protection Areas, Drinking Water Source Management Areas, Source Water Protection Areas
- ☐ Known groundwater contamination
- ☐ Groundwater management areas or areas with declining water levels
- ☐ MDH Special Well and Boring Construction Areas

If any of the factors above are marked with a checkmark, you may be required to install monitoring well(s), perform aquifer test(s), or provide other information to ascertain anticipated impacts to these features. This information will be used to evaluate and make a decision on your water appropriation request. Your water appropriation request may be modified, reduced, or denied based upon site specific information.

Attachment K

Karst Evaluation for Project Sites 1 and 2



Karst Evaluation:

Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Township, Winona County, Minnesota

Prepared for:

Mr. David Plagge
Anez Consulting, Inc.

June 30, 2016
9314.16.MNR

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing • 1410 7th Street N.W. • Rochester, MN 55904 • Telephone (507) 281-0968 • Email rochester@cvtesting.com

Mr. David Plagge
Engineering/Permitting Consultant
Anez Consulting Inc.
1700 Technology Dr. NE, Suite 130
Willmar, MN 56201
david@anezconsulting.com

June 30, 2016

**Re: Karst Evaluation
Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Township, Winona County, Minnesota
CVT Project Number: 9314.16.MNR**

Dear Mr. Plagge:

As authorized, a karst survey has been performed for the proposed farrowing hog barn with an underlying manure pit at the Holden Farm site near St. Charles, Minnesota. The karst walk survey was performed on June 29, 2016. This brief letter, along with the attached karst survey sheets, describes our findings.

Background and Scope

The proposed project consists of the construction of a farrowing hog barn and underlying manure storage structure at the Holden Farm in St. Charles Township, Winona County, Minnesota. Our scope consisted of reviewing available geologic data and performing a walk-over survey of the site to investigate for potential karst features.

Chosen Valley Testing performed three standard penetration test borings at the site on June 15, 2016 to investigate subsurface soil and rock conditions within the footprint of the proposed structure. The borings generally encountered about 1 to 2 feet of topsoil, followed by loessial (wind deposited) clays to depths of approximately 8 to 11½ feet, over glacial clays to termination depths around 21 feet below the surface.

Area of Investigation

The karst investigation was performed around the Holden Farm property located in T106N, R10W, Section 5, NW ¼. This is located in St. Charles Township, Winona County, Minnesota.

Summary of Desktop Findings

Available aerial photography, topographic data, geologic data, and soil survey data were reviewed. Based on the Winona County Surficial Geology Map, the dominant soil types in the area consist of loessial (wind deposited) clays and silts overlying glacial till deposited clay, silt, and sand mixtures. Based on the County

Bedrock Geology Map the underlying bedrock consists primarily of dolomite with thin beds of sandstone and shale of the Shakopee Formation. The geological information is illustrated in the attached “Surficial Geology Sketch” and “Bedrock Geology Sketch”. The attachment labeled “Sinkhole Probability Sketch” shows the location of the site, approximate ½ mile radius line around the structure, 1,000-foot radius line around the structure, 300-foot radius line around the structure, and the published karst features. As shown on this sketch, the closest published karst features are sinkholes about 1 mile southwest and 1¼ mile northeast of the site.

Summary of Site Findings

The karst walk survey was performed on June 29, 2016. The area investigated consisted of approximately a 1,000-foot radius of the proposed structure. The site was located on the edge of a corn field which extended south, east, and northeast; three existing hog barns, house, and tree wind row to the north; bean fields to the west and northwest; and grass covered waterways running through both the corn and bean fields. The corn crops were on the order of 3 to 4 feet tall, bean crops were about 1 to 2 feet tall, and the grass in the water ways was about ½-foot tall or less. The weather weeks prior to the site visit had consisted of primarily seasonal temperatures and rain.

During our karst walk no obvious karst feature characteristics (i.e. depressions, disappearing streams/stream sinks, blind valleys, karst windows, etc.) were observed within a 1,000-foot radius of the site.

Analysis

Based on the results of our desk top study and our subsequent reconnaissance of the site, no obvious karst features were encountered within a 300-foot or 1,000-foot radius of the site, and no published karst features are known to exist within a ½ mile radius of the site.

According to the Minnesota Rules Chapter 7020, manure in a concrete lined pit must be kept at least 5 feet above soluble bedrock, with this rule further dependent on pit size, the use of additional liners and other karst factors. Bedrock was not encountered within 21 feet of the surface at any of the boring locations drilled on site.

The County Feedlot officer or Minnesota Pollution Control Agency (MPCA) should be contacted to determine the type of preparations needed for this facility in consideration of the several factors involved.

Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

Remarks

We appreciate the opportunity to serve you. If you have any questions about our findings, please feel free to contact us at (507) 281-0968.

Sincerely,
Chosen Valley Testing, Inc.

A handwritten signature in black ink, appearing to read "Devin Ehler".

Devin M. Ehler, PE
Geotechnical Engineer

Karst Feature Inventory Reporting Form For a Proposed Liquid Manure Storage Area (LMSA)

The purpose of this form is to provide documentation regarding all karst features identified within ½ mile from the facility. Additional follow-up inspections may be needed by qualified individuals to assess potential karst features. Submit this form and required map(s) along with your plans and specifications for the LMSA.

Proposed LMSA Location

County: Winona Township: St. Charles Sect.: 5 ¼ Sect.: NW

Facility Owner Name: Holden Farms, Inc. – Nick Holden Phone: 507-663-0003

Inspector Information

Name: Devin Ehler, PE Date of Field Inspection: 6/29/2016

Company/Organization: Chosen Valley Testing, Inc. Phone: (507) 281-0968

The site was located on the edge of a corn field which extended south, east, and northeast; three existing hog barns, house, and tree wind row to the north; bean fields to the west and northwest; and grass covered waterways running through both the corn and bean fields. The corn crops were on the order of 3 to 4 feet tall, bean crops were about 1 to 2 feet tall, and the grass in the water ways was about ½-foot tall or less.

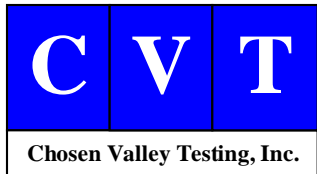
Field Conditions (snow cover, vegetation, etc.): _____

Karst Feature Inventory Documentation

The inspector must conduct a visual inspection of the land within ½ mile from the proposed site, traversing the land closely enough to identify small sinkholes or other karst features. The following documentation is required.

1. Where sinkhole probability maps exist, attach a copy of the map showing the location of the LMSA and all sinkholes within ½ mile.
2. Attach a copy of an aerial photograph showing the location of the LMSA and all karst features within ½ mile. Number each Karst feature on the aerial photograph and provide a description in the table below.
- 3.





Feature Sketch ID and Description	Source of information	Feature size and description	Distance from LMSA & Other information
Ex. <i>Depression in the landscape</i>	<i>Walk-over survey</i>	<i>12 feet in diameter and 1-2 feet deep</i>	<i>Located 500 feet from LMSA</i>
		NONE	






Topographic Sketch

Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Twp, Winona Co, Minnesota
9314.16.MNR

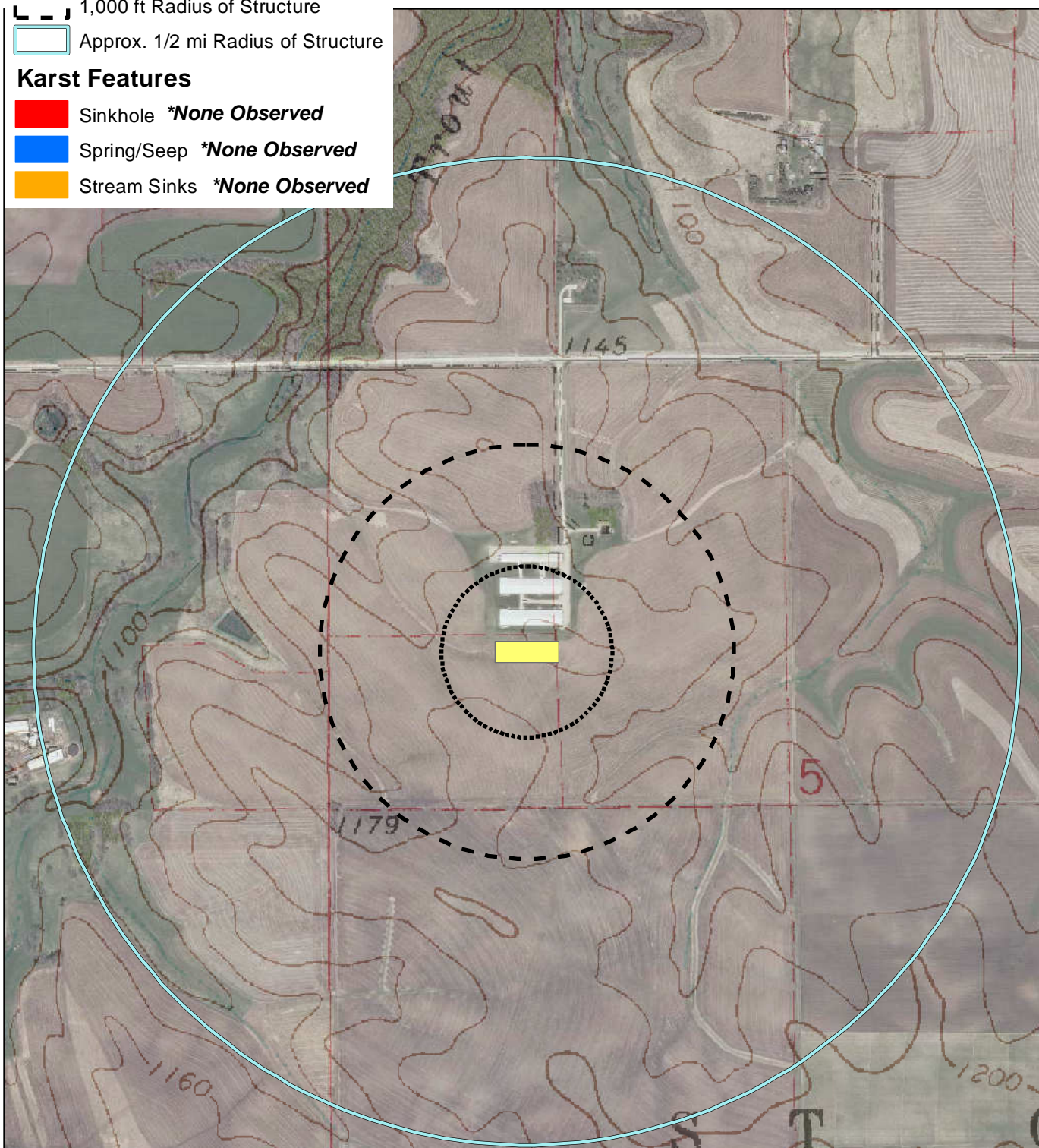

Legend

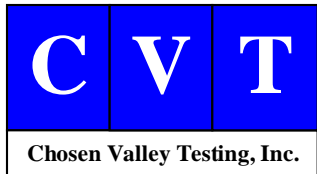
-  Project Area
-  300 ft Radius of Structure
-  1,000 ft Radius of Structure
-  Approx. 1/2 mi Radius of Structure

Karst Features

-  Sinkhole **None Observed*
-  Spring/Seep **None Observed*
-  Stream Sinks **None Observed*

0 500 1,000 2,000 3,000 Feet












LiDAR Sketch

Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Twp, Winona Co, Minnesota
9314.16.MNR

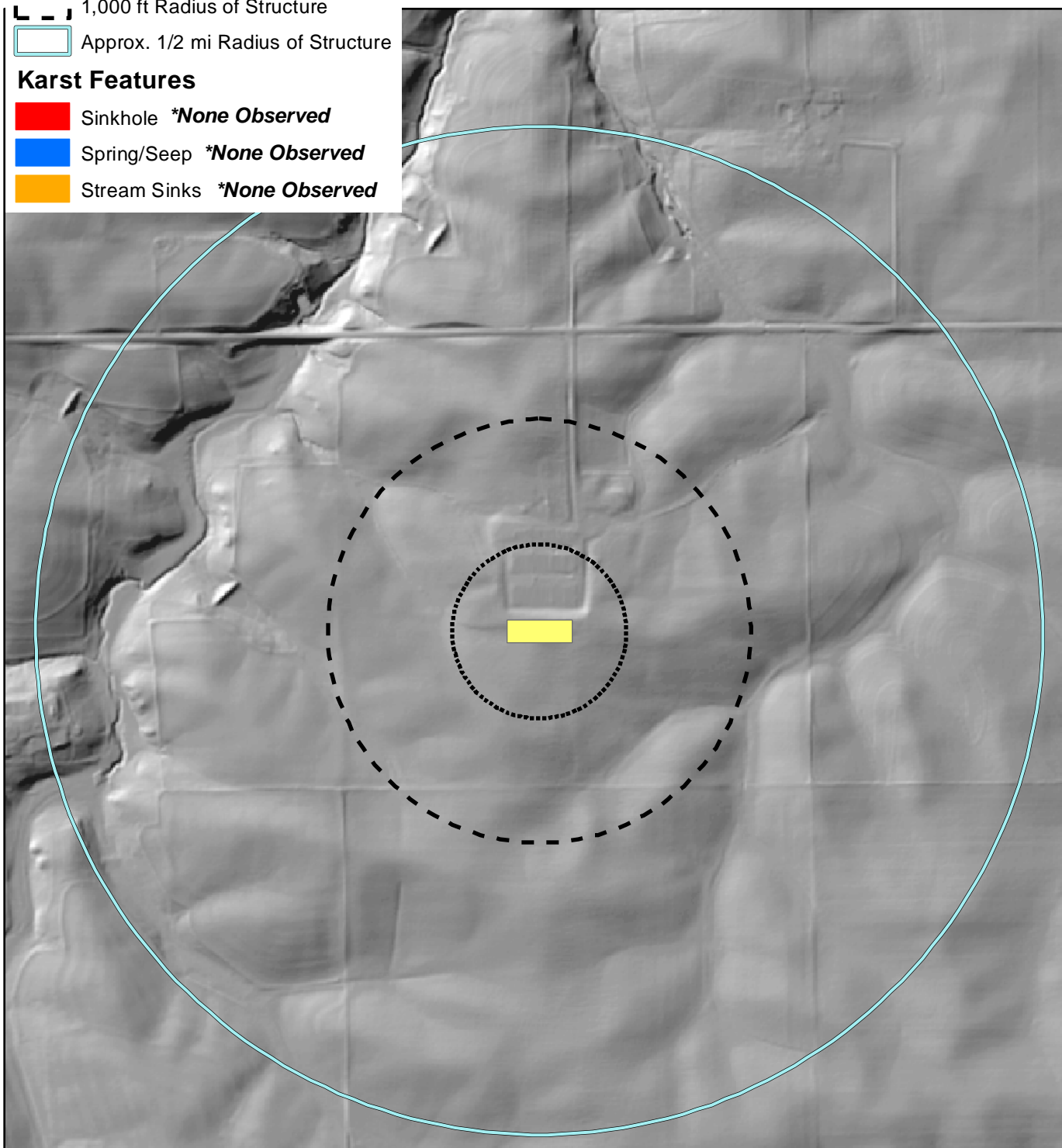

Legend

-  Project Area
-  300 ft Radius of Structure
-  1,000 ft Radius of Structure
-  Approx. 1/2 mi Radius of Structure

Karst Features

-  Sinkhole **None Observed*
-  Spring/Seep **None Observed*
-  Stream Sinks **None Observed*

0 500 1,000 2,000 3,000 Feet





Sinkhole Probability Sketch

Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Twp, Winona Co, Minnesota
9314.16.MNR

Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

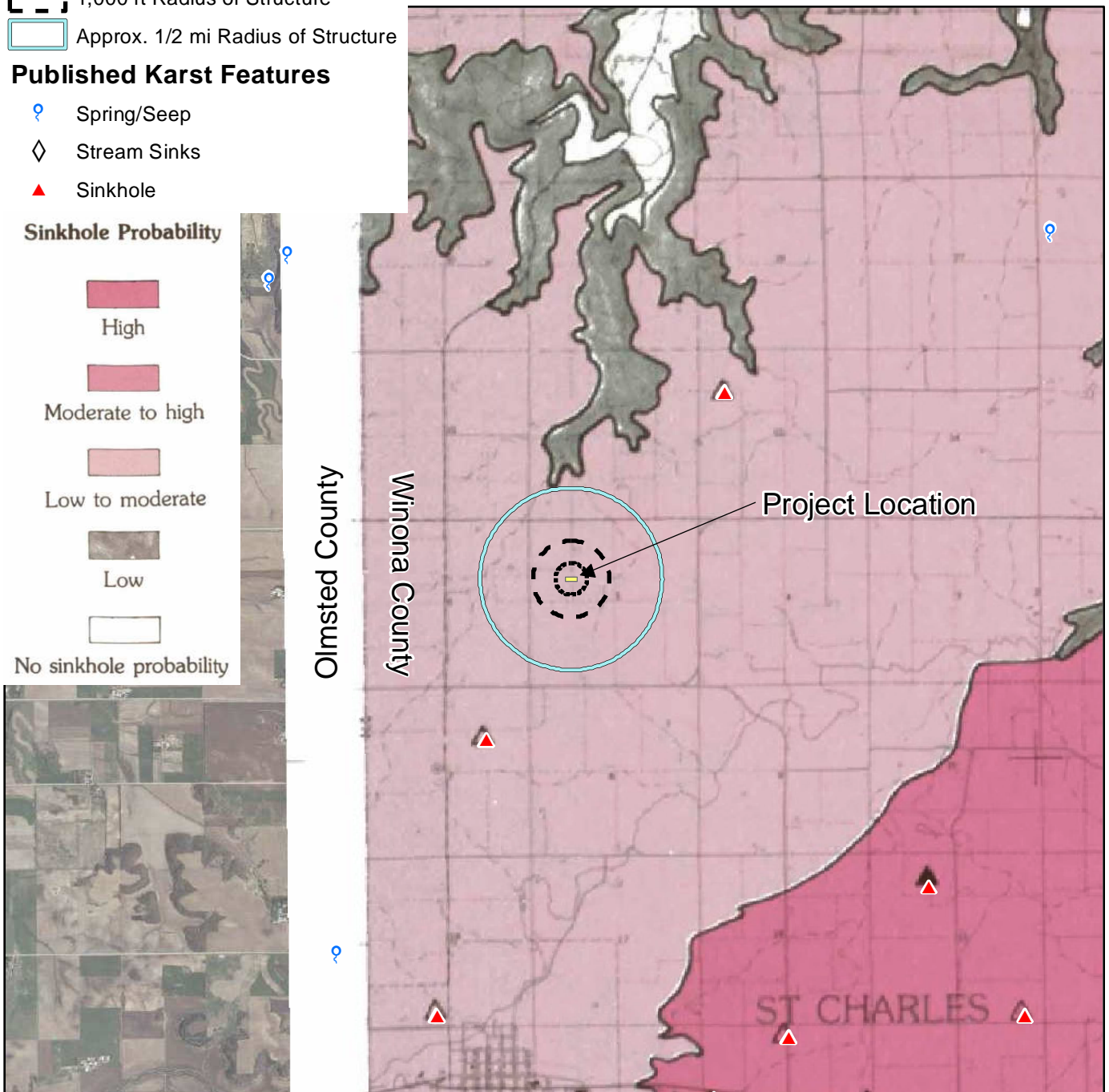
Published Karst Features

- ♀ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole

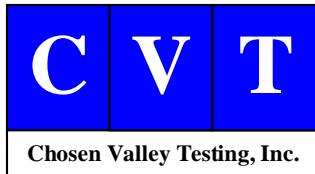
Sinkhole Probability

- High
- Moderate to high
- Low to moderate
- Low
- No sinkhole probability

0 0.5 1 2 3 Miles



1. Dalglesih and Alexander (1984). University of Minnesota Geological Survey, County Atlas Series, Altas C-2, Plate 5, Sinkholes and Sinkhole Probability.
2. Dalglesih and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>



Surficial Geology Sketch

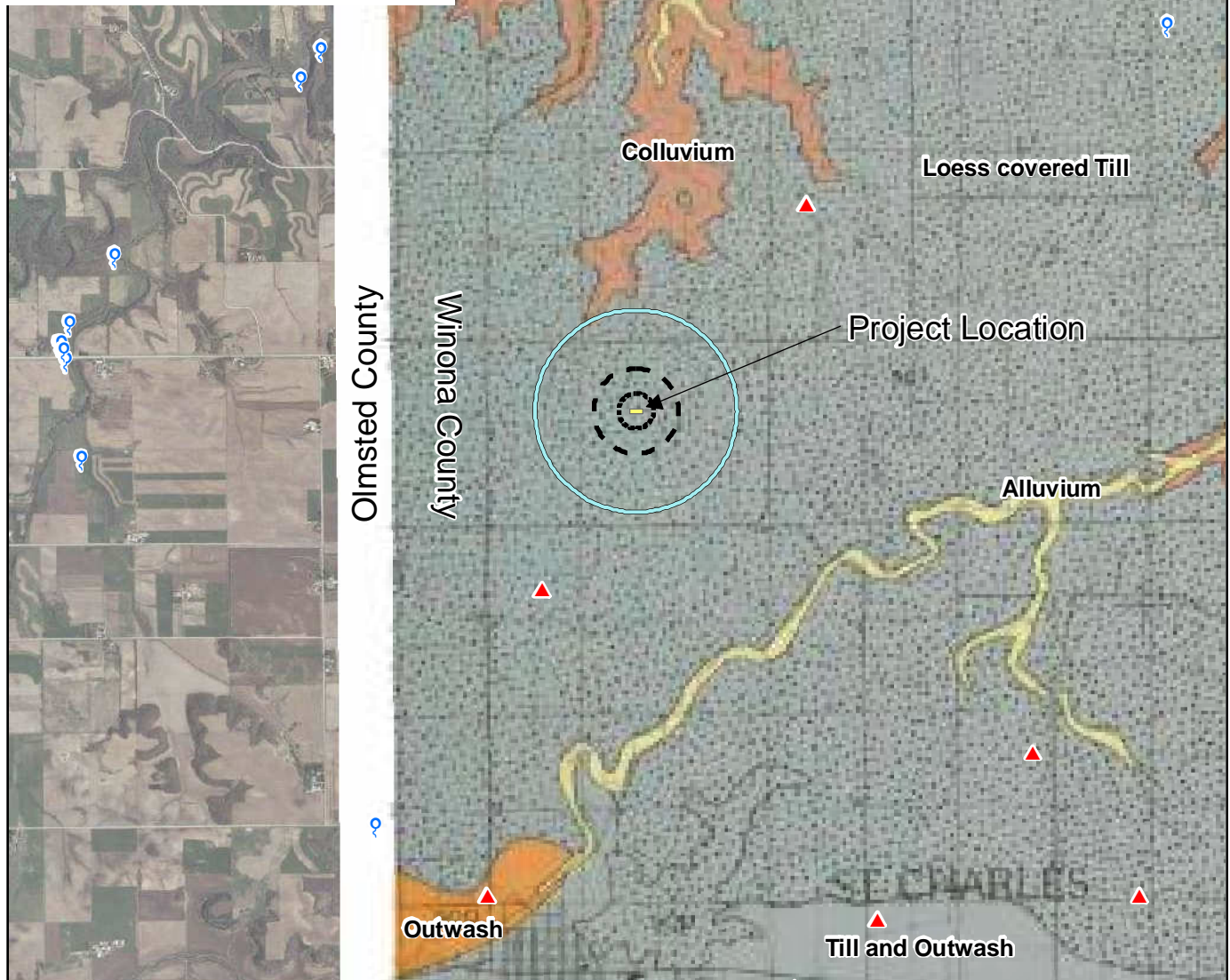
Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Twp, Winona Co, Minnesota
9314.16.MNR

Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

Published Karst Features

- ♂ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole



1. Hobbs, Howard C. (1984). University of Minnesota Geological Survey, County Atlas Series, Altas C-2, Plate 3 - Surficial Geology.
2. Dalglish and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>



Bedrock Geology Sketch

Proposed Farrowing Hog Barn and Manure Pit
T106N, R10W, Section 5 NW ¼
St. Charles Twp, Winona Co, Minnesota
9314.16.MNR

Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

Published Karst Features

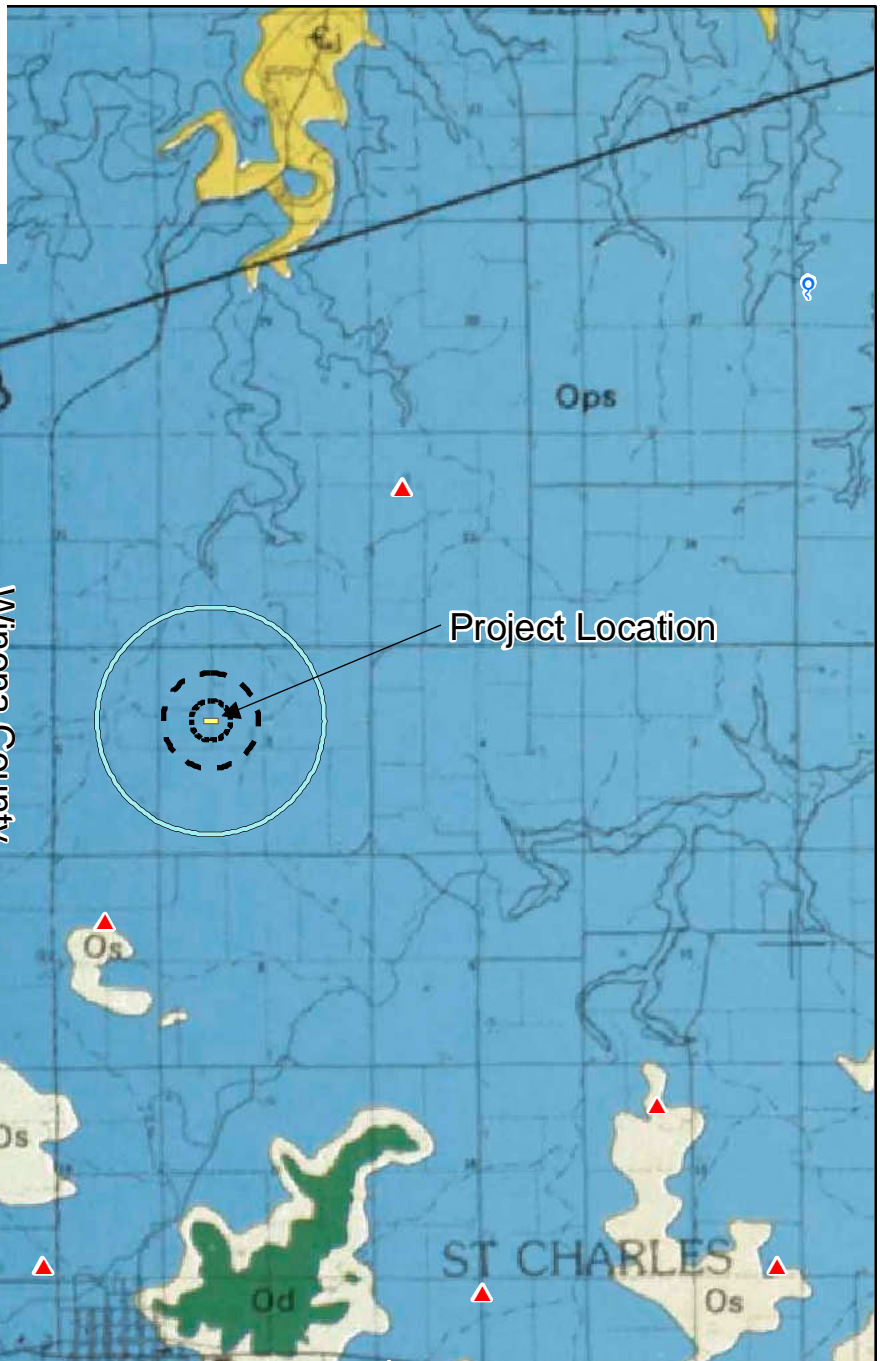
- ♀ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole

Bedrock Geology

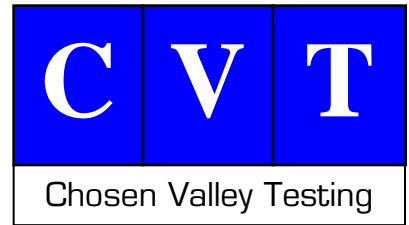
GALENA FORMATION		Og
DECORAH SHALE PLATTEVILLE Fm GLENWOOD Fm		Od
ST. PETER SANDSTONE		Os
PRAIRIE DU CHIEN GROUP	SHAKOPEE FORMATION	Ops
	ONEOTA DOLOMITE	Opo
JORDAN SANDSTONE		Ol

Olmsted County

Winona County



1. Mossler and Book (1984). University of Minnesota Geological Survey, County Atlas Series, Atlas C-2, Plate 2 - Bedrock Geology.
2. Dalglish and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>



Karst Evaluation:

Proposed Breeding and Gestation Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Township, Winona County, Minnesota

Prepared for:

Mr. David Plagge
Anez Consulting, Inc.

June 30, 2016
9316.16.MNR

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing • 1410 7th Street N.W. • Rochester, MN 55904 • Telephone (507) 281-0968 • Email rochester@cvtesting.com

Mr. David Plagge
Engineering/Permitting Consultant
Anez Consulting Inc.
1700 Technology Dr. NE, Suite 130
Willmar, MN 56201
david@anezconsulting.com

June 30, 2016

**Re: Karst Evaluation
Proposed Breeding and Gestation Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Township, Winona County, Minnesota
CVT Project Number: 9316.16.MNR**

Dear Mr. Plagge:

As authorized, a karst survey has been performed for the proposed breeding and gestation hog barn with an underlying manure pit at the Holden Farm site near St. Charles, Minnesota. The karst walk survey was performed on June 29, 2016. This brief letter, along with the attached karst survey sheets, describes our findings.

Background and Scope

The proposed project consists of the construction of a breeding and gestation hog barn and underlying manure storage structure at the Holden Farm in St. Charles Township, Winona County, Minnesota. Our scope consisted of reviewing available geologic data and performing a walk-over survey of the site to investigate for potential karst features.

Chosen Valley Testing performed five standard penetration test borings at the site on June 15, 2016 to investigate subsurface soil and rock conditions within the footprint of the proposed structure. The borings generally encountered about ½ to 1¾ feet of topsoil, followed by loessial (wind deposited) clays to depths of approximately 11½ to 16½ feet, over glacial clays and sands to depths of about 19 ½ to 23 feet, until coming across weathered sandstone to auger refusal depths around 21 ½ to 25 feet below the surface.

Area of Investigation

The karst investigation was performed around the Holden Farm property located in T106N, R10W, Section 14, NE ¼. This is located in St. Charles Township, Winona County, Minnesota.

Summary of Desktop Findings

Available aerial photography, topographic data, geologic data, and soil survey data were reviewed. Based

on the Winona County Surficial Geology Map, the dominant soil types in the area consist of loessial (wind deposited) clays and silts overlying glacial till deposited clay, silt, and sand mixtures. Based on the County Bedrock Geology Map the underlying bedrock consists primarily of St. Peter Sandstone. The geological information is illustrated in the attached “Surficial Geology Sketch” and “Bedrock Geology Sketch”. The attachment labeled “Sinkhole Probability Sketch” shows the location of the site, approximate ½ mile radius line around the structure, 1,000-foot radius line around the structure, 300-foot radius line around the structure, and the published karst features. As shown on this sketch, the closest published karst feature is a sinkhole about ¾ mile southeast of the site.

Summary of Site Findings

The karst walk survey was performed on June 29, 2016. The area investigated consisted of approximately a 1,000-foot radius of the proposed structure. The site was located on the edge of a corn field which extended west, north, and south, along with grass covered water ways running through the fields. An existing hog barn is located just to the east, along with a couple of houses and shed further to the east. The corn crops and grass were on the order of 3 to 4 feet tall. The weather weeks prior to the site visit had consisted of primarily seasonal temperatures and rain.

During our karst walk no obvious karst feature characteristics (i.e. depressions, disappearing streams/stream sinks, blind valleys, karst windows, etc.) were observed within a 1,000-foot radius of the site.

Analysis

Based on the results of our desktop study and our subsequent reconnaissance of the site, no obvious karst features were encountered within a 300-foot or 1,000-foot radius of the site, and no published karst features are known to exist within a ½ mile radius of the site.

According to the Minnesota Rules Chapter 7020, manure in a concrete lined pit must be kept at least 5 feet above soluble bedrock, with this rule further dependent on pit size, the use of additional liners and other karst factors. Bedrock was encountered about 19 ½ to 23 feet below the surface or near elevations 1167 to 1178 ¾ feet

The County Feedlot officer or Minnesota Pollution Control Agency (MPCA) should be contacted to determine the type of preparations needed for this facility in consideration of the several factors involved.

Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

Remarks

We appreciate the opportunity to serve you. If you have any questions about our findings, please feel free to contact us at (507) 281-0968.

Sincerely,
Chosen Valley Testing, Inc.

A handwritten signature in black ink, appearing to read "Devin Ehler".

Devin M. Ehler, PE
Geotechnical Engineer

Karst Feature Inventory Reporting Form For a Proposed Liquid Manure Storage Area (LMSA)

The purpose of this form is to provide documentation regarding all karst features identified within ½ mile from the facility. Additional follow-up inspections may be needed by qualified individuals to assess potential karst features. Submit this form and required map(s) along with your plans and specifications for the LMSA.

Proposed LMSA Location

County: Winona Township: St. Charles Sect.: 14 ¼ Sect.: NE

Facility Owner Name: Holden Farms, Inc. – Nick Holden Phone: 507-663-0003

Inspector Information

Name: Devin Ehler, PE Date of Field Inspection: 6/29/2016

Company/Organization: Chosen Valley Testing, Inc. Phone: (507) 281-0968

The site was located on the edge of a corn field which extended west, north, and south, along with grass covered water ways running through the fields. An existing hog barn is located just to the east, along with a couple of houses and shed further to the east. The corn crops and grass

Field Conditions (snow cover, vegetation, etc.): were on the order of 3 to 4 feet tall.

Karst Feature Inventory Documentation

The inspector must conduct a visual inspection of the land within ½ mile from the proposed site, traversing the land closely enough to identify small sinkholes or other karst features. The following documentation is required.

1. Where sinkhole probability maps exist, attach a copy of the map showing the location of the LMSA and all sinkholes within ½ mile.
2. Attach a copy of an aerial photograph showing the location of the LMSA and all karst features within ½ mile. Number each Karst feature on the aerial photograph and provide a description in the table below.
- 3.

Feature Sketch ID and Description	Source of information	Feature size and description	Distance from LMSA & Other information
Ex. Depression in the landscape	Walk-over survey	12 feet in diameter and 1-2 feet deep	Located 500 feet from LMSA
		NONE	



Topographic Sketch

Proposed B-G Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Twp, Winona Co, Minnesota
9316.16.MNR

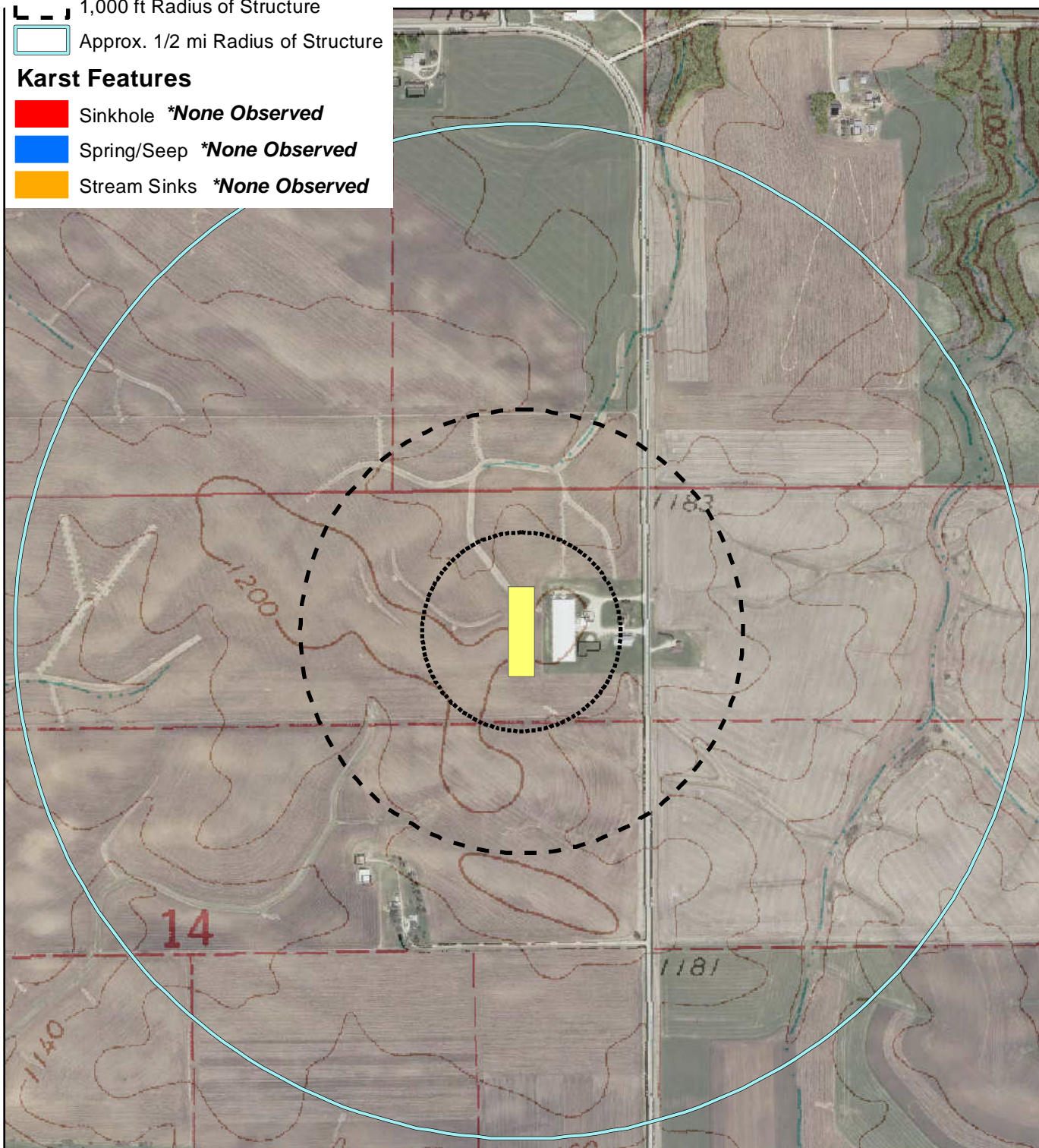
Legend

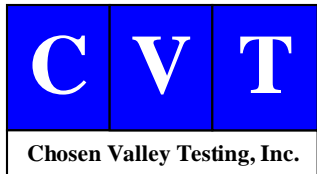
- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

Karst Features

- Sinkhole **None Observed*
- Spring/Seep **None Observed*
- Stream Sinks **None Observed*

0 500 1,000 2,000 3,000 Feet












LiDAR Sketch

Proposed B-G Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Twp, Winona Co, Minnesota
9316.16.MNR

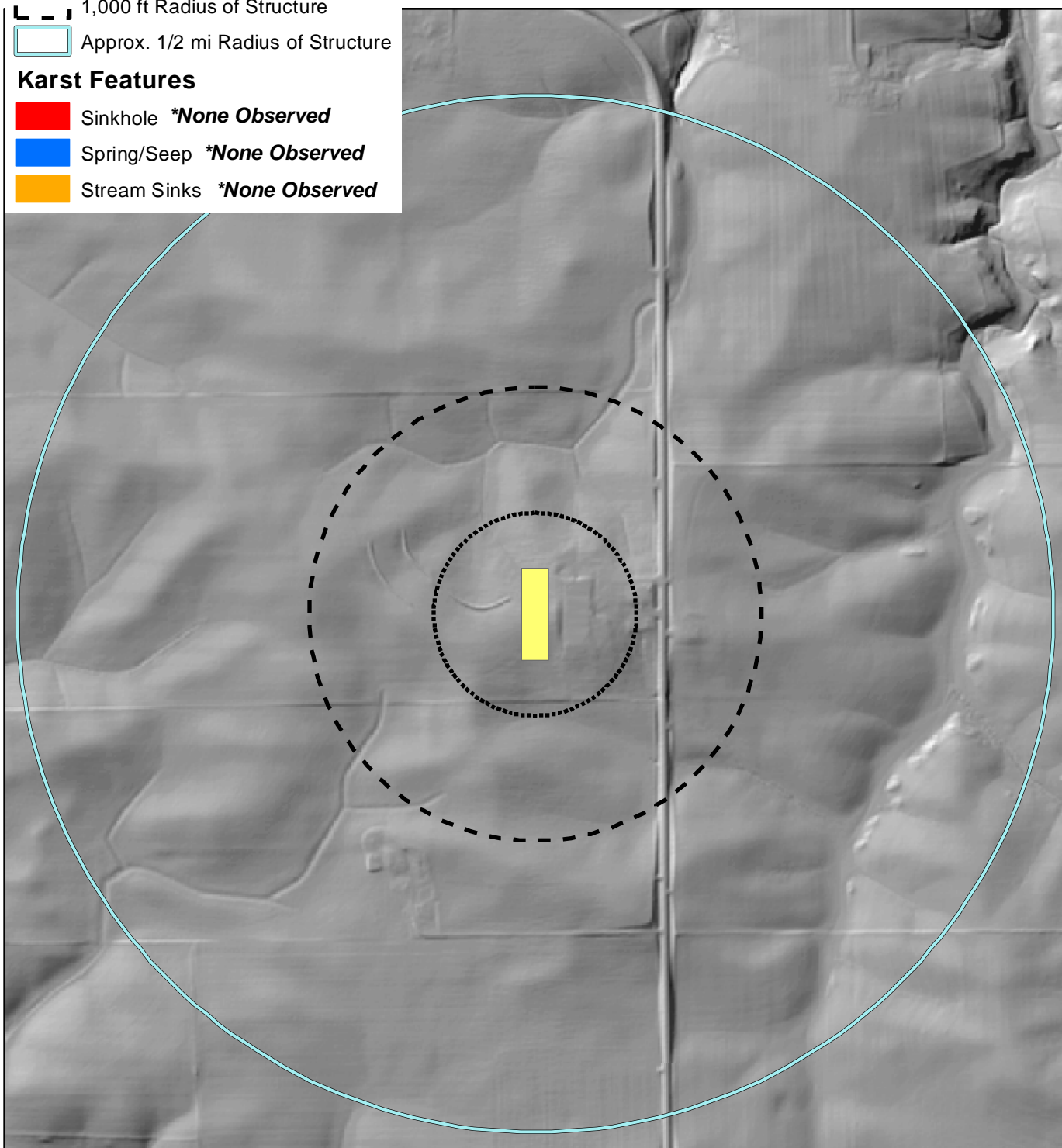

Legend

-  Project Area
-  300 ft Radius of Structure
-  1,000 ft Radius of Structure
-  Approx. 1/2 mi Radius of Structure

Karst Features

-  Sinkhole ****None Observed***
-  Spring/Seep ****None Observed***
-  Stream Sinks ****None Observed***

0 500 1,000 2,000 3,000 Feet





Sinkhole Probability Sketch

Proposed B-G Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Twp, Winona Co, Minnesota
9316.16.MNR

Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

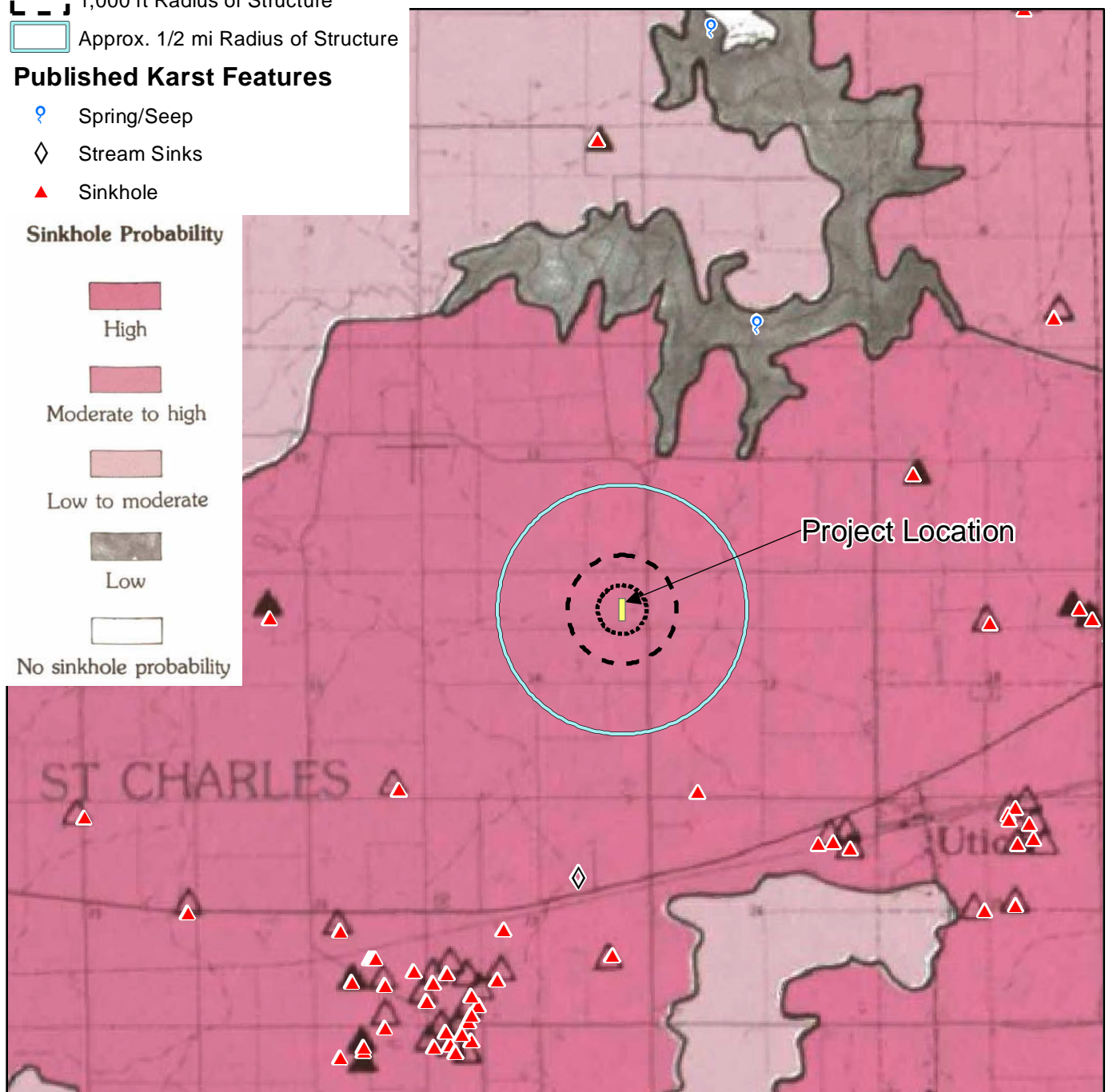
Published Karst Features

- ♀ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole

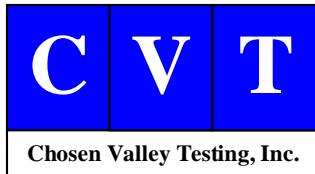
Sinkhole Probability

- High
- Moderate to high
- Low to moderate
- Low
- No sinkhole probability

0 0.5 1 2 Miles



1. Dalglesih and Alexander (1984). University of Minnesota Geological Survey, County Atlas Series, Altas C-2, Plate 5, Sinkholes and Sinkhole Probability.
2. Dalglesih and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>



Surficial Geology Sketch

Proposed B-G Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Twp, Winona Co, Minnesota
9316.16.MNR

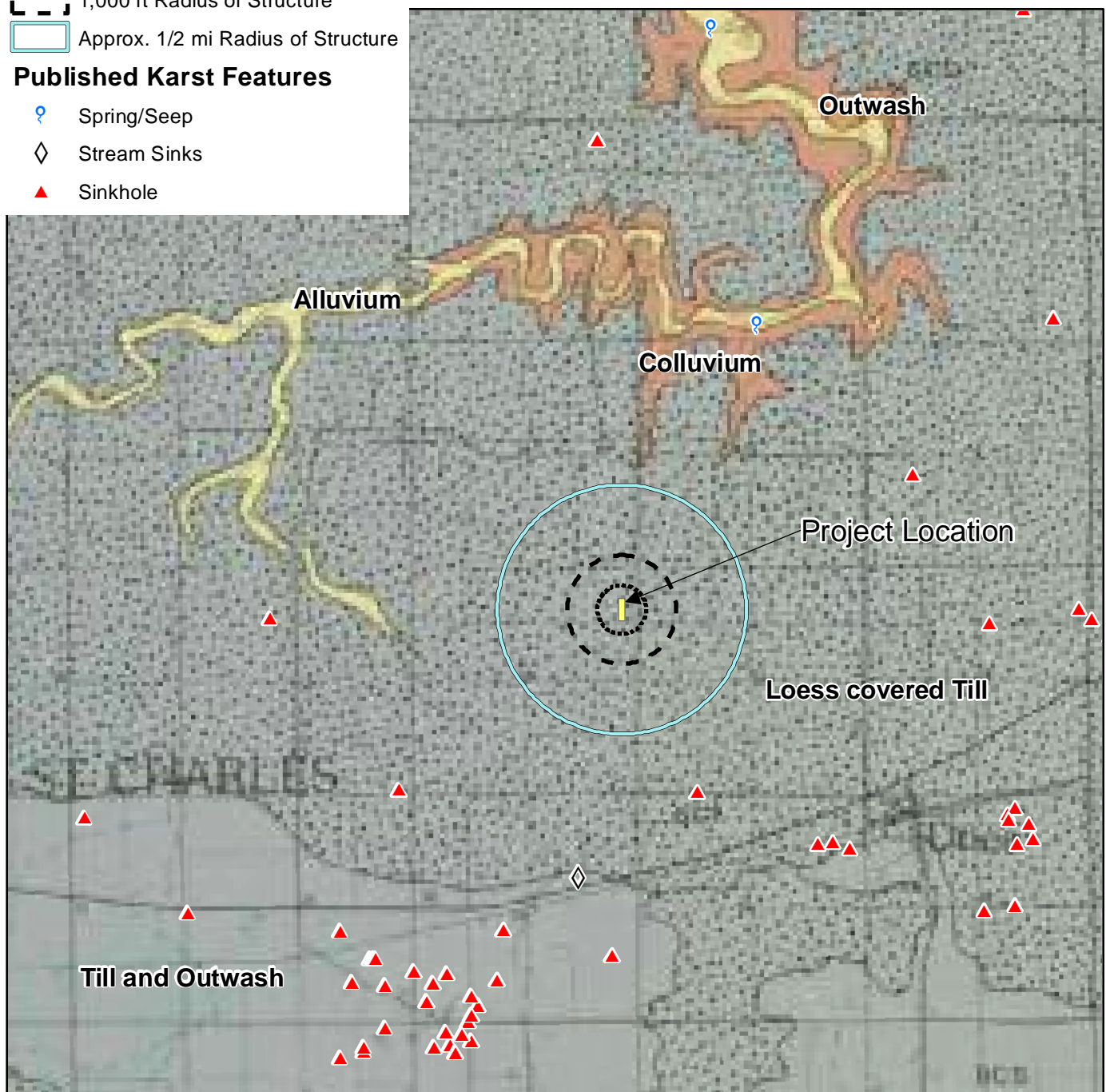
Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

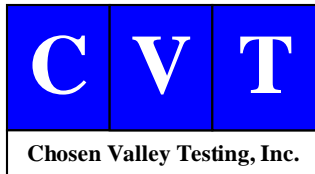
Published Karst Features

- ♀ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole

0 0.5 1 2 Miles



1. Hobbs, Howard C. (1984). *University of Minnesota Geological Survey, County Atlas Series, Atlas C-2, Plate 3 - Surficial Geology.*
2. Dalglish and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), *University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points* - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>



Bedrock Geology Sketch

Proposed B-G Hog Barn and Manure Pit
T106N, R10W, Section 14 NE ¼
St. Charles Twp, Winona Co, Minnesota
9316.16.MNR

Legend

- Project Area
- 300 ft Radius of Structure
- 1,000 ft Radius of Structure
- Approx. 1/2 mi Radius of Structure

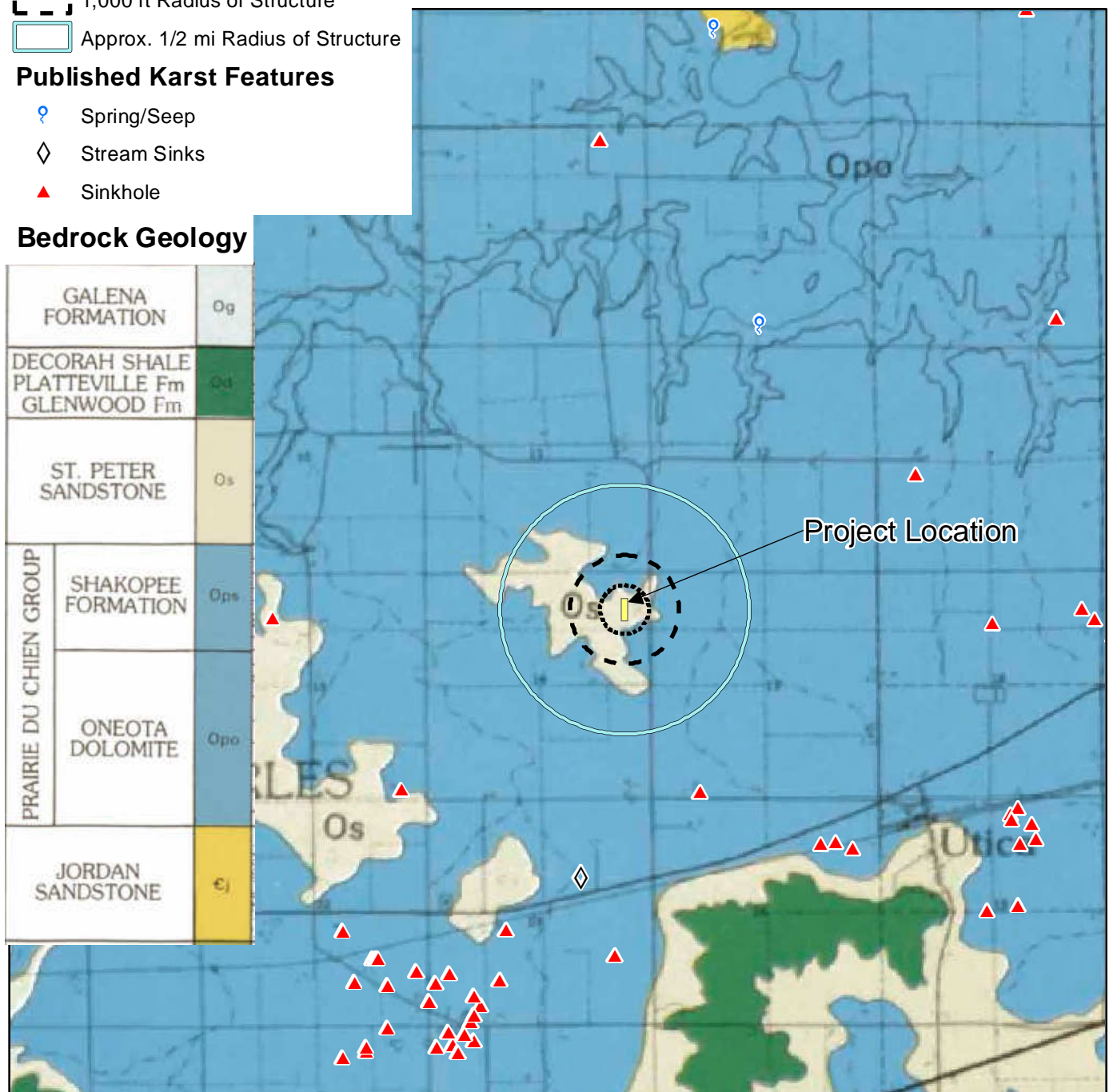
Published Karst Features

- ♀ Spring/Seep
- ◇ Stream Sinks
- ▲ Sinkhole

Bedrock Geology

GALENA FORMATION		Og
DECORAH SHALE PLATTEVILLE Fm GLENWOOD Fm		Od
ST. PETER SANDSTONE		Os
PRAIRIE DU CHIEN GROUP	SHAKOPEE FORMATION	Ops
	ONEOTA DOLOMITE	Opo
JORDAN SANDSTONE		Ol

0 0.5 1 2 Miles



1. Mossler and Book (1984). University of Minnesota Geological Survey, County Atlas Series, Atlas C-2, Plate 2 - Bedrock Geology.
2. Dalglish and Alexander (1984), Alexander and Maki (1988), Witthuhn and Alexander (1995), Green and others (1997), Shade and others (2001), and Tipping and others (2001), University of Minnesota, Department of Geology and Geophysics; Minnesota DNR - Division of Waters: Karst Feature Inventory Data Points - <http://deli.dnr.state.mn.us/> or <http://www.gis.state.mn.us/stds/metadata.htm>