Notice of Availability of an Environmental Assessment Worksheet (EAW)

Flint Hills Resources – Combined Heat and Power (CHP) Cogeneration Project

Doc Type: Public Notice

Public Comment Information

- **EAW Public comment period begins:** December 22, 2014
- **EAW Public comment period ends:** 4:30 p.m. on January 21, 2015
- **Notice published in the EQB Monitor:** December 22, 2014

- **Permit public comment period begins:** December 23, 2014
- **Permit public comment period ends:** 4:30 p.m. on January 21, 2015

Facility Specific Information

- **Facility name and location:**
  - Flint Hills Resources Pine Bend Refinery
  - 13775 Clark Road
  - Rosemount, MN 55068
  - NW ¼, SW ¼, Section 13, T115N, R19W
  - Rosemount Township
  - Dakota County, MN

- **Facility contact:**
  - Flint Hills Resources Pine Bend, LLC
  - Greg Myers
  - Senior Air Permitting Engineer
  - Flint Hills Resources Pine Bend, LLC
  - P.O. Box 64596
  - St Paul, MN 55164-0596
  - Phone: 651-480-2712
  - Fax: 651-437-0581
  - Email: Greg.Myers@fhr.com

MPCA Contact Information

- **MPCA EAW contact person:**
  - Kim Grosenheider
  - Resource Management and Assistance Division
  - Minnesota Pollution Control Agency
  - 520 Lafayette Road North
  - St. Paul, MN 55155
  - Phone: 651-757-2170
  - Fax: 651-297-2343
  - Email: kim.grosenheider@state.mn.us
  - Admin staff phone: 651-757-2100

- **MPCA Permit contact person:**
  - Tarik Hanafy
  - Industrial Division
  - Minnesota Pollution Control Agency
  - 520 Lafayette Road North
  - St. Paul, MN 55155
  - Phone: 651-757-2404
  - Fax: 651-296-8717
  - Email: Tarik.hanafy@state.mn.us

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).

An electronic version of the EAW is available on the MPCA Environmental Review webpage at [http://www.pca.state.mn.us/oxpg691](http://www.pca.state.mn.us/oxpg691). If you would like a copy of the EAW <or Permit> or have any questions on the EAW <or Permit>, contact the appropriate person(s) listed above.
Description of Proposed Project
Flint Hills Resources Pine Bend, LCC proposes to construct a natural gas-based combined heat and power cogeneration facility, generating up to a net 49.9 megawatts of electricity to reduce electricity purchases from the grid and improve the efficiency of steam production at the refinery.
An air emissions permit was prepared and will be posted for public notice on December 22, 2014.

To Submit Written Comments on the EAW and Air Emissions Permit
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 (insert type of) 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
(1) A final decision on the need for an EIS will be made after the end of the comment period.
(2) If a request for an EIS is received during the comment period, or if the MPCA Commissioner (Commissioner) recommends the preparation of an EIS, the MPCA Citizens’ Board (Board) will make the final decision.
(3) If a request for an EIS is not received, the final decision will be made by the Commissioner.

The Board meets once a month, usually the fourth Tuesday of each month, at the MPCA office in St. Paul. Meetings are open to the public and interested persons may offer testimony on Board agenda items. Information on the Board is available at:
http://www.pca.state.mn.us/nwqh406.
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ENVIRONMENTAL ASSESSMENT WORKSHEET

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

1. Project Title: Flint Hills Resources – Combined Heat and Power (CHP) Cogeneration Project

2. Proposer: Flint Hills Resources Pine Bend, LLC
   Contact person: Mr. Greg Myers
   Title: Senior Air Permitting Engineer
   Address: P.O. Box 64596
   City, State, ZIP: St Paul, MN 55164-0596
   Phone: 651-480-2712
   Fax: 651-437-0581
   Email: Greg.Myers@fhr.com

3. RGU: Minnesota Pollution Control Agency
   Contact person: Kim Grosenheider
   Title: Project Manager
   Address: 520 Lafayette Road North
   City, State, ZIP: St. Paul, MN 55155-4194
   Phone: 651-757-2170
   Fax: 651-297-2343
   Email: kim.grosenheider@state.mn.us

4. Reason for EAW Preparation: (check one)
   Required: EIS Scoping
   x Mandatory EAW
   Discretionary: Citizen Petition
                 RGU Discretion
                 Proposer Initiated

This EAW is being prepared because of the two following mandatory categories:

1. Minn. R. 4410.4300, subp. 3 for construction of an electric power generating plant and associated facilities designed for or capable of operating at a capacity of between 25 megawatts and 50 megawatts, the EQB shall be the RGU.

2. Minn. R. 4410.4300, subp. 15(B) for construction of a stationary source facility that generates a combined 100,000 tons or more per year of greenhouse gas emissions expressed as carbon dioxide equivalents, the PCA shall be the RGU.

Based on Minn. R. 4410.0500, subp. 5(B), and with concurrence of Environmental Quality Board (EQB) staff, the Minnesota Pollution Control Agency (MPCA) is the Regulated Governmental Unit (RGU) as the governmental unit with the greatest responsibility for supervising of approving the project as a whole.

Flint Hills Resources, with coordination from the Minnesota Department of Commerce and the MPCA, received confirmation from the Minnesota Public Utilities Commission that this project does not fall under the Power Plant Siting Act for purposes of permitting or environmental review.
5. **Project Location:**

   County: Dakota
   City/Township: Rosemount
   PLS Location (¼, ¼, Section, Township, Range): NW ¼, SW ¼, 13, 115, 19
   Watershed (81 major watershed scale): Mississippi River-Lake Pepin Watershed
   Hydrologic Unit Code (HUC): 07040001
   Tax Parcel Number: 34—01300-75-010

   **Attached to the EAW:**

   Figure 1. Site Location Map
   Figure 2. Site Plan – Aerial Imagery
   Figure 3. Site Plan – USGS Topographic Map
   Figure 4(a). Site Plan Aerial – 13.8 kV Distribution Option Project Details
   Figure 4(a)(i). Site Plan Aerial – Close up of new internal distribution substation (13.8 kV option)
   Figure 4(b). Site Plan Aerial – 115kV Ring Bus Transmission Option
   Figure 4(c). Site Plan Aerial – 115kV External/Grid Transmission Option
   Figure 5. CHP Cogeneration Project Process Flow Schematic
   Figure 6. Site Map – Land Use
   Figure 7. Site Map – Land Cover
   Figure 8. Site Map – Zoning
   Figure 9. City of Rosemount Zoning Map
   Figure 10. Site Map – Soils
   Figure 11. Water Quality Management within Refinery Fenceline
   Figure 12. Stormwater Runoff Map
   Figure 13. Historic Waste Management Areas
   Figure 14. Site Map – Ecological Resources

   Appendix A. Soil Map Unit Description
   Appendix B. DNR NHIS Letter
   Appendix C. SHPO Letter

6. **Project Description:**

   **a. Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words)**

   Flint Hills Resources Pine Bend, LCC, a refinery located in the city of Rosemount, Minnesota proposes to construct a natural gas-based combined heat and power cogeneration facility, generating up to a net 49.9 megawatts of electricity to reduce electricity purchases from the grid and improve the efficiency of steam production at the refinery.
b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Refinery Overview
The Flint Hills Resources (FHR) Pine Bend refinery is located at the intersection of Minnesota State Highway 55 and U.S. Highway 52 in the city of Rosemount, Dakota County, Minnesota (Figure 1). Figure 2 shows an aerial view of the current refinery and the location of the proposed Combined Heat and Power (CHP) Cogeneration Project. Figure 3 is a United States Geological Survey (USGS) map showing the location of the refinery and proposed project.

The refinery primarily processes heavy, sour crude oil, and has the capability to process a variety of different crude oil types. Pipelines currently deliver all of the crude oil to the refinery, where FHR processes it to produce a wide variety of products. These products include gasoline, diesel fuel, heating oil, jet fuel, petroleum coke, asphalt, and elemental sulfur. FHR distributes these products to customers in Minnesota and nationwide via pipelines, trucks, barges, and rail cars. The refinery has an atmospheric crude oil distillation capacity of 339,000 barrels per stream day.

Proposed Project
Currently, the refinery's electrical load is supplied from the grid and purchased from the local utility. FHR wishes to implement self-generation of electricity via a natural gas–based combined-cycle combustion turbine to produce both heat and power at the FHR refinery site as a more efficient and cost effective means of supplying electricity to meet the refinery’s needs. Therefore, FHR is proposing a CHP Cogeneration Project generating up to 49.9 megawatts (MW) of electricity to displace electricity purchases from the grid and up to 290,000 pounds per hour (lb/hr) of steam, depending on the operating configuration, to displace a portion of the steam production at the refinery’s existing boilers.

The efficiency and environmental benefits of CHP and distributed generation are significant. Cogenerating electricity and steam is more efficient than producing them separately. Figure 4 shows project features discussed in detail below. A schematic overview of the process flows for the project is shown on Figure 5.

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1 Crude-oil distillation capacity is reported annually to the United States Energy Information Administration. Reported information can be viewed at [http://www.eia.gov/petroleum/refinerycapacity/](http://www.eia.gov/petroleum/refinerycapacity/).

The cogeneration plant will utilize a 42.9 MW capacity General Electric LM6000-PF gas turbine that will exhaust to a single-pressure heat-recovery steam generator (HRSG). The HRSG will produce steam at 900 pounds per square inch gauge (psig) and 750 degrees Fahrenheit. Depending on power and refinery steam demands and limits, the produced steam will either be regulated to 250 psig and exported to the refinery, or directed to a steam turbine capable of converting the energy in the steam into up to 12 MW of electricity. The combination of electricity generation from both a combustion turbine and an integrated HRSG and steam turbine is known as combined-cycle generation.

The new cogeneration plant will be located within the FHR facility boundary, but south of the existing refinery process units, as shown on Figure 2. Steam export will occur via a new 16-inch steam/condensate pipeline supported aboveground on supports that will run north from the CHP cogeneration facility to interconnect with the existing refinery pipe rack. The gas turbine and steam turbine will generate electrical power at 13.8 kilovolts (kV). The facility is proposing three alternatives for distributing the power to the refinery, pending final engineering and design:

1. Alternative one would route the net power produced into the refinery’s 13.8 kV distribution system via multiple armored cable conductors in a concrete encased underground duct bank and/or an above ground cable tray that will run north from the CHP cogeneration facility and connect into the refinery’s existing 13.8 kV electric distribution system or at an internal distribution substation, noted as the “25 Unit Super-Sub”. The location of the substation is shown in Figures 4(a) and 4(a)(i).

2. Alternative two would step up the power from 13.8 kV to 115 kV using two Generator Step-Up (GSU) transformers, one each for the combustion turbine generator (CTG) and the steam turbine generator (STG). The GSU’s would be located in a transformer yard lying just to the north east of the turbine building. The CTG transformer would be a 75 Megavolt-Amperes (MVA) class transformer and would contain approximately 7,500 gallons of dielectric fluid. The STG Transformer would be a 20 MVA class transformer and will contain approximately 3,500 gallons of dielectric fluid. These volumes are estimates based on preliminary design considerations and may change slightly once final engineering is completed. From this transformer yard, the power would be routed through either an armored below ground duct bank, above ground cable trays, or overhead power lines to the main substation where it would be tied into a ring bus and flow through the existing high voltage system. Depending on final engineering and design, additional transformers may be needed in the substation or another nearby location. The excavation required for these transformers, if necessary, will be small and within the refinery footprint. The transformer yard would also contain up to two station power transformers used to step power down from 115kV to power the CHP facility when the generators are off. These smaller transformers will be 2.5 MVA and contain approximately 1,000 gallons of dielectric fluid each.

The system will be designed with an integrated control system, which will automatically adjust power generation on a short term basis (currently assumed to be one hour or less), to limit net output to 49.9 MW over a 4-hour block average. The steam turbine is sized such that during the summer when the combustion turbine cannot reach 42.9 MW, the steam turbine can be used to generate a larger portion of the difference. This ability is part of a CHP’s overall inherent flexibility and efficiency advantage over utility scale generators and on-purpose steam production.
3. Alternative three also would use the same GSU configuration and design, but instead would tie the power feed from the GSU transformer yard to Xcel Energy’s 115 kV Johnny Cake Transmission Line located directly to the east of the facility.

The combustion turbine will be fueled by natural gas. The natural gas fuel supply will be delivered by the Northern Natural Gas interstate pipeline system to a delivery point located at the refinery. The delivery pressure is expected to vary between 700 to 800 psig, depending on pipeline conditions. Piping will transport the natural gas from the delivery point to the CHP cogeneration facility. The gas turbine will be equipped with dry low nitrogen oxides (NOx) combustors. The natural gas turbine exhaust will be sent directly to the HRSG. No exhaust bypass stack will be used, so the turbine will not be capable of running separately from the HRSG.

The HRSG will have natural gas fired duct burner(s) for supplementary heat input and will also contain an oxidation catalyst for reduction of carbon monoxide (CO) and volatile organic compounds (VOCs), and an aqueous ammonia-based selective catalytic reduction (SCR) system for nitrogen oxides (NOx) reduction.

Aqueous ammonia (19 percent) for the SCR system will be delivered to the CHP cogeneration facility site and stored on-site in an ammonia storage tank. The ammonia tank will be approximately 10 feet in diameter by 20 feet long, with a 12,000 gallon capacity. The tank will have 110 percent containment with a material impervious to the aqueous ammonia solution, consistent with the facility’s aboveground storage tank (AST) permit and spill prevention, control, and countermeasures (SPCC) plan.

The project will not have any associated emergency or auxiliary engines as it is not designed with the ability to start up after a power outage without a feed from the transmission grid, also known as “black start” capability.

Demineralized makeup water for the plant will be supplied by the existing refinery water-treatment system and stored at the plant in an existing demineralized-water storage tank. Condensate will be recycled via a new feedwater line and stored in a new 20,000-gallon condensate storage tank at the CHP cogeneration facility site. Blowdown will be sent to the refinery Cooling Tower #7 basin, with a backup holding tank for trucking water to the refinery’s wastewater treatment facility. Blowdown is the removal of water from a boiler to control boiler water parameters within prescribed limits in order to minimize scale, corrosion, carryover, and other specific problems. Blowdown is also used to remove suspended solids present in the system. These solids are caused by feedwater contamination, by internal chemical treatment precipitates, or by exceeding the solubility limits of otherwise soluble salts. In effect, boiler blowdown removes some of the boiler water and is replaced with clean feedwater.
The proposed CHP cogeneration facility will be constructed on a 1.5-acre plot (approximately 400 feet by 140 feet) on the southeast side of the refinery. The facility will be located in the secured boundary of the current refinery footprint and south of the main refinery process area. The main entrance to the proposed project will be from the east. The existing entrance along Clark Road will be improved in order to upgrade vehicle access to the proposed project area (the turbine building as well as laydown areas). The total disturbed area including proposed roads, grading, drainages, and other improvements to the site could be as large as ten acres when temporary laydown and stockpile areas are considered. Grading and excavation/import of fill will be required for turbine site preparation. A generation building that will house the combustion turbine, HRSG, and steam turbine will be constructed on the site. The new ammonia tank, loading area, and condensate tank will be constructed immediately north of the generation building and the air cooled condenser will be constructed to the east of the generation building. Grading and excavation or import of fill will also be required for the construction of an access road to enter the site from the east off of the existing main refinery access road (Clark Road), and for an access road to the west of the turbine site to connect to the location of the natural gas manifold. Trenching will be required for construction of any new underground electrical lines and for gas lines. Typical construction equipment (e.g., backhoes, compactors, compressors, concrete mixers, dozers, front loaders, generators, graders, excavators, rollers, scrapers) and equipment carrying materials and personnel will be used during construction.

There are no existing structures within the proposed project footprint, therefore demolition or removal of existing structures is not anticipated. The existing refinery boilers will continue to operate and no physical alterations to the existing boiler system will be necessary.

If the 13.8 kV Alternative 1 is used for the transmission/distribution of the electrical power, a new substation would be constructed next to the existing "25 Unit Super-Sub" located in the main refinery process area. This would result in an excavation of approximately 50' by 50'. The location is denoted in Figures 2 and 4(a)(i). As shown in Figure 4(a)(i), this location is currently in the middle of a heavy industrial process unit of the Refinery. The footprint currently contains multiple underground conduits and utilities. The new distribution substation would be built on support columns over the top of these utilities. Alternatively, the power may be routed to the 13.8 ring bus distribution system located adjacent to the main substation.

If Alternatives 2 or 3 are selected, the GSU excavation would add approximately one acre to the CHP site immediately to the north east of the CHP building (Figures 4(b) and 4(c)). As with the CHP building, the GSU transformer yard would be located on ground that has been disturbed by historical gravel supply operations, but is currently vacant. As discussed above, pending final engineering and design, the project may require additional transformers at an as yet to be identified location, but any disturbed area will be small and within the existing refinery footprint.

Construction of the project is anticipated to begin as early as March of 2015, depending on the alternatives selected. FHR anticipates an in service date of fourth quarter 2016, again, depending on the alternatives selected.
Tier 3 Clean Fuels Projects
The MPCA has prepared an Environmental Assessment Worksheet (EAW) for the Tier 3 Clean Fuels Project, currently on public notice. An air permit for the Tier 3 Clean Fuels Project will be placed on public notice on Dec. 22nd. The Tier 3 Clean Fuels Projects involve refinery investments to meet the requirements of the U.S. Environmental Protection Agency (EPA) Tier 3 gasoline sulfur standard, which targets improvements in ambient air quality. In order to produce gasoline meeting the Tier 3 standard, FHR must remove and recover more sulfur from fuel blends, increasing hydrotreating (a process that removes sulfur). FHR also proposes to install a process to convert recovered gas containing sulfur and nitrogen into a salable aqueous liquid fertilizer, ammonium thiosulfate. Additionally, FHR is proposing to improve the refinery’s sour-water skimming and storage and switch to a more efficient amine solution in the existing amine units (for sulfur recovery).

c. Project magnitude:

Project magnitude estimates below are based on the footprint of each of the project elements identified on Figure 4. This reflects current preliminary project design.

<table>
<thead>
<tr>
<th>Total Project Acreage</th>
<th>Approximately 9 acres plus up to 2 additional acre, depending on the Transmission/Distribution Alternative selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear project length</td>
<td>9,007 feet</td>
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<tr>
<td>Number and type of residential units</td>
<td>0</td>
</tr>
<tr>
<td>Commercial building area (in square feet)</td>
<td>0</td>
</tr>
<tr>
<td>Industrial building area (in square feet)</td>
<td>19,441 square feet</td>
</tr>
<tr>
<td>Institutional building area (in square feet)</td>
<td>0</td>
</tr>
<tr>
<td>Other uses – specify (in square feet)</td>
<td>0</td>
</tr>
</tbody>
</table>
| Structure heights | Exhaust stack height = 170 feet
Generation building is two tiers:
Lower tier = 50 feet,
Highest tier = 85 feet |

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

The project seeks to invest in the benefits (efficiency, cost, and emissions profile) of new natural gas-based, CHP systems and distributed generation.

e. Are future stages of this development including development on any other property planned or likely to happen? □ Yes x No

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

f. Is this project a subsequent stage of an earlier project? □ Yes x No

If yes, briefly describe the past development, timeline and any past environmental review.
7. **Cover types**: Estimate the acreage of the site with each of the following cover types before and after development:

Cover type estimates below are based on footprint of each of the project elements identified in Figure 4. This reflects current preliminary project design. Units are in acres.

<table>
<thead>
<tr>
<th>Cover Type</th>
<th>Before</th>
<th>After</th>
<th>Cover Type</th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Wetlands</td>
<td>0</td>
<td>0</td>
<td>Lawn/landscaping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Deep water/streams</td>
<td>0</td>
<td>0</td>
<td>Impervious surface</td>
<td>1.29</td>
<td>1.91</td>
</tr>
<tr>
<td>Wooded/forest</td>
<td>0</td>
<td>0</td>
<td>Stormwater Pond</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brush/Grassland</td>
<td>0.05</td>
<td>0</td>
<td>Other: Sand/gravel pits with 26-50% impervious surface</td>
<td>Up to 2.57</td>
<td>0</td>
</tr>
<tr>
<td>Cropland</td>
<td>0</td>
<td>0</td>
<td>Other: Aggregate lined transformer yard ~50% impervious surfaces</td>
<td>0</td>
<td>Up to 2.00</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>3.91</td>
<td>3.91</td>
<td><strong>TOTAL:</strong></td>
<td>3.91</td>
<td>3.91</td>
</tr>
</tbody>
</table>

8. **Permits and approvals required**: List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. **All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.**

<table>
<thead>
<tr>
<th>Unit of Government</th>
<th>Type of Application</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPCA</td>
<td>Prevention of Significant Deterioration (PSD) Air Emissions Permit</td>
<td>Major permit modification application submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Multi-Sector General Permit</td>
<td>In effect</td>
</tr>
<tr>
<td>MPCA</td>
<td>Construction Stormwater NPDES Permit</td>
<td>Application to be submitted</td>
</tr>
<tr>
<td>MPCA</td>
<td>NPDES Wastewater Discharge Permit</td>
<td>In effect (undergoing a reissuance unrelated to this project)</td>
</tr>
<tr>
<td>Rosemount Fire Marshal</td>
<td>Plan Review and Approval</td>
<td>Application to be submitted</td>
</tr>
<tr>
<td>City of Rosemount</td>
<td>Building Permit</td>
<td>To be obtained when required</td>
</tr>
<tr>
<td>City of Rosemount</td>
<td>Excavation and Grading Permit</td>
<td>To be obtained when required</td>
</tr>
<tr>
<td>Minnesota Public Utilities Commission (MPUC)*</td>
<td>Route Permit</td>
<td>Application to be submitted if the electrical power is transmitted using alternative 2 or 3.</td>
</tr>
<tr>
<td>Midcontinent Independent System Operator (MISO)*</td>
<td>Transmission Study</td>
<td>Two part application, part one to be submitted in mid-November.</td>
</tr>
</tbody>
</table>

*Only required if transmission alternatives 2 or 3 are selected.
9. Land use:
   a. Describe:
      i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

      The FHR refinery is located in the Pine Bend Industrial District, an area of industrial development in the city of Rosemount near the junction of Minnesota Highway 55 and U.S. Highway 52. The Industrial District was formed in 1954 when the Chicago and Northwestern Railroad purchased approximately 6,000 acres in the Pine Bend area. The FHR refinery was the first industrial facility developed in the district, and industrial development has continued over the last five decades. At this time, there are more than 30 companies conducting industrial activities located within a 5-mile radius of the junction of U.S. Highway 52 and Minnesota Highway 55. Figures 6 and 7 show current land use and land cover in the refinery area. There are no parks, trails, or prime or unique farmlands immediately adjacent to the project site. The Mississippi River is located approximately one mile east of the east boundary of the FHR refinery. This stretch of the Mississippi River is part of the Mississippi National River and Recreation Area (MNRRA). Recently, the Mississippi River Regional Trail (MRRT), a paved bike trail that will eventually connect Hastings and South St. Paul, has been extended through the Pine Bend Bluffs Scientific and Natural Area (SNA). This Pine Bend Bluffs segment of the MRRT is located northeast of the refinery along the west side of the Mississippi River.

      The refinery is located approximately eight miles northwest of the city of Hastings (population 22,172), six miles northeast of the city of Rosemount (population 21,980), and six miles south of the city of Inver Grove Heights (population 34,008). Other nearby cities includes Eagan to the northwest (7 miles), Apple Valley to the west (8 miles), and St. Paul to the north (13 miles).

      In addition to the nearby population centers, there are three small residential subdivisions located near the existing refinery site. One of these subdivisions, owned by FHR for employee use, is located two miles southwest of the refinery. The other subdivisions in proximity to the project are located one mile to the northwest and one mile due north of the refinery. As shown in Figure 6, the proposed CHP cogeneration facility and associated electric line and piping will be located entirely within areas currently in industrial and utility use with approximately 1/3 of a mile buffer between the proposed project and the nearest residence, located southeast of the CHP cogeneration facility location (Figure 8).

      ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

      The refinery is located within the city of Rosemount, which has adopted a comprehensive plan. The plan includes the refinery and recognizes it to be part of the 6,000-acre Industrial District.
A portion of FHR’s property extends east of the refinery complex. This allows for pipeline transfer of materials from the refinery to the Mississippi River, along with loading and unloading of material at the river. This stretch of the Mississippi River is part of the MNRRA, and FHR’s planned land uses overlap with MNRRA land use plans along the river corridor. MNRRA’s land use plan includes a requirement that “developments and programs” be “sensitive to the limitations of natural resources.” Any refinery projects in this area must be consistent with this MNRRA requirement; however, none of the elements of the proposed project are located within the MNNRA.

iii. **Zoning**, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The proposed project will lie within the boundaries of the existing refinery complex in an area zoned as heavy industrial. Figures 8 and 9 show the land use zoning of the refinery and nearby properties.

The areas adjacent to the refinery complex to the south and west are zoned as agricultural land and have been in agricultural use throughout the development of the Pine Bend Industrial District.

The project is not located within any water-related land use management districts, including shore land zoning districts, delineated 100-year flood plain, or state or federally designated wild or scenic river land use districts.

b. **Discuss the project’s compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.**

The project is compatible with the city of Rosemount’s current comprehensive plan, which recognizes the refinery as a part of the 6,000-acre Industrial District. The proposed project is consistent with the city of Rosemount’s rules and regulations for areas zoned for heavy and general industrial uses.

As described above, the project is not located within or immediately adjacent to the MNRRA and therefore, is not expected to conflict with the MNRRA’s land use plan.

c. **Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.**

Based on a review of existing land use, zoning, and planning information available for the project area, the proposed project is not expected to conflict with adjacent and nearby land uses.

10. **Geology, soils and topography/land forms:**

a. **Geology** - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for
the project and any effects the project could have on these features. Identify any project
designs or mitigation measures to address effects to geologic features.

Based on the Dakota County Geologic Atlas published by the Minnesota Geological Survey,
surfacial geology in Dakota County includes modern deposits a few feet thick along streams,
rivers, wetlands, and lakes as well as glacial deposits that are tens to hundreds of thousands of
years old and a few tens of feet to several hundred feet thick. Bedrock in Dakota County
includes Paleozoic sedimentary bedrock that is 450 to 520 million years old and 200 to 800 feet
thick as well as Precambrian bedrock, more than one billion years old. The sedimentary bedrock
in the Twin Cities area forms a shallow basin, and the bedrock in the project area dips gently to
the north toward this basin.

Surfacial geology at the project site consists of glacial deposits that are 50 to 100 feet thick and
composed of gravel and sand outwash from the Superior lobe. While the surficial deposits of
gravel and sand in the project area have high permeability, there is no shallow aquifer. The
water table is in the bedrock, likely due to the high permeability of the glacial deposits and the
bedrock, and the proximity of the Mississippi River, which is the regional discharge.

The uppermost bedrock underlying the project site is the Prairie du Chien Group, made up of
dolostone, sandstone, and variations of those two. While the uppermost bedrock includes a
carbonate component, this component is dolomitic which tends to be less soluble than
limestone. No sinkholes, shallow limestone formations or karst conditions are present in the
vicinity of the project based on mapping by Minnesota Department of Natural Resources
(MDNR)\(^4\). There are no mapped faults at or adjacent to the site.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and
descriptions, including limitations of soils. Describe topography, any special site conditions
relating to erosion potential, soil stability or other soils limitations, such as steep slopes,
highly permeable soils. Provide estimated volume and acreage of soil excavation and/or
grading. Discuss impacts from project activities (distinguish between construction and
operational activities) related to soils and topography. Identify measures during and after
project construction to address soil limitations including stabilization, soil corrections or other
measures. Erosion/sedimentation control related to stormwater runoff should be addressed
in response to Item 11.b.ii.

The industrialized part of the site is classified as urban land. Soils present on the refinery
property are primarily sands and loams. No peat soils are present, but one small area contains
ponded aquolls and histols. The soil types within the FHR Pine Bend boundary are: Hubbard
loamy sand, Wadena loam, Estherville sandy loam, Plainfield loamy sand, Mahtomedi loamy
sand, Waukegan silt loam, Urban land-Waukegan complex, Urban land, Gravel pit, Zumbro
loamy fine sand, Chetek sandy loam, Hawick coarse sandy loam, and smaller areas of Antigo silt
loam, Colo silt loam, Lindstrom silt loam, Kennebec silt loam, and Cylinder loam. All of the

\(^4\) Minnesota Department of Natural Resources Geographic Information System (GIS) Data Deli at
upland soils are considered well to excessively drained with moderate to very rapid permeability. Soil types in the project area are shown on Figure 10. Full descriptions of the soil units shown on Figure 10 are provided in Appendix A Soil Map Unit Description.

Soil in the vicinity of the proposed CHP cogeneration facility is classified by the Natural Resources Conservation Service (NRCS) as “Pits, Gravel." This NRCS category applies to areas that have been mined for gravel or sand and the classification indicates the area is actively being mined or was formerly mined. Because of the variability of this component in this map unit, NRCS does not provide interpretation for specific uses.

Potential impacts to erosion and sedimentation considered in this EAW are associated with project construction and stormwater management. Operation of the project is not expected to cause erosion or sedimentation and no control measures are anticipated to be necessary.

The CHP cogeneration facility site slopes at an approximate 4.6 percent grade, with stormwater currently draining to an existing water detention area formerly used for extraction of fill material on the south side of the proposed plant site. The stormwater management plan for the plant is discussed in detail under item 11.b.ii. During site preparation and construction, control measures will be used to manage erosion and sedimentation. Construction activities at the project site will require disturbance of approximately nine acres of land. Based on a preliminary site layout, it is anticipated that an elevation of 878 feet above Mean Sea Level (+/- 5 feet) could be used as a top of concrete elevation for the turbine site. At 878 feet, the earthwork quantities will be approximately 11,000 cubic yards of excavation and 11,000 cubic yards of fill. Proposed plant elevation and earthwork quantities can be determined more accurately after an updated boundary and topographic survey and an updated geotechnical investigation and report have been procured.

Since construction of the proposed project will disturb more than one acre of land, FHR will apply for a construction stormwater permit (National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit) from the MPCA. The permit will require FHR to develop a stormwater pollution-prevention plan (SWPPP) for the project. The SWPPP will include best management practices (BMPs) for site erosion and sediment control.

It is anticipated that the existing water detention area may be used as a temporary detention area during construction. Localized BMPs such as silt fences, area inlet protection, concrete washout areas, and construction entrances will also be utilized. The SWPPP and design drawings will also include a requirement for the contractor to stabilize areas quickly after being disturbed. All excavated materials will be used in project-related or subsequent construction at the refinery.

11. Water resources:
   a. Describe surface water and groundwater features on or near the site in a.i. and a.ii., below.
      i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA
303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Figure 11 shows hydrologic features in the vicinity of the refinery. The location of the proposed project components does not coincide with any National Wetland Inventory (NWI) wetlands or Public Waters Inventory watercourses. As noted above, a portion of FHR’s property extends to the east allowing for pipeline transfer of materials to the Mississippi River. However, none of the components of the proposed project will impact this area.

The existing water detention area on the south side of the proposed project is currently used as an outlet for the South Warehouse Building stormwater-pond overflow in a 100-year event. Based on a historical aerial photograph survey, this site was not historically a wetland, but rather was formed from the excavation of material such as sand or gravel that was sold by a previous owner for use as fill.

There are no water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within one mile of the project.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

The depth to groundwater in the vicinity of the project is estimated to be 150 feet on average, with a measured minimum depth of 70 feet based on soil borings in the project area.

County Well Index (CWI) well locations within the FHR facility boundary are summarized below and shown in Figure 11.

<table>
<thead>
<tr>
<th>Unique ID</th>
<th>Well Name</th>
<th>Easting</th>
<th>Northing</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>00752110</td>
<td>FLINT HILLS RESOURCES NO. 10</td>
<td>497043.953</td>
<td>4956248.84</td>
<td>CWI</td>
</tr>
<tr>
<td>00594998</td>
<td>TK505-BW3A</td>
<td>496787.094</td>
<td>4957175.554</td>
<td>CWI</td>
</tr>
<tr>
<td>00509068</td>
<td>KOCH REFINING RW-4</td>
<td>497194</td>
<td>4957407</td>
<td>CWI</td>
</tr>
<tr>
<td>00612663</td>
<td>W-35</td>
<td>497175.934</td>
<td>4957394.214</td>
<td>CWI</td>
</tr>
<tr>
<td>00208391</td>
<td>GREAT NORTHERN OIL CO. 5</td>
<td>496464</td>
<td>4957233</td>
<td>CWI</td>
</tr>
<tr>
<td>00208393</td>
<td>GREAT NORTHERN OIL NO. 2</td>
<td>496670</td>
<td>4956984</td>
<td>CWI</td>
</tr>
<tr>
<td>00612014</td>
<td>TK88/EW-2</td>
<td>496130.167</td>
<td>495760.901</td>
<td>CWI</td>
</tr>
<tr>
<td>00509070</td>
<td>KOCH REFINING RW-6</td>
<td>497197</td>
<td>4957430</td>
<td>CWI</td>
</tr>
<tr>
<td>00509066</td>
<td>KOCH REFINING RW-3</td>
<td>497194</td>
<td>4957382</td>
<td>CWI</td>
</tr>
<tr>
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<td>KOCH REFINING RW-1</td>
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<td>CWI</td>
</tr>
<tr>
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<td>BDP/EVW-3</td>
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<td>4957618.61</td>
<td>CWI</td>
</tr>
<tr>
<td>00666490</td>
<td>FLINT HILLS REFINERY</td>
<td>497115.411</td>
<td>4957471.605</td>
<td>CWI</td>
</tr>
</tbody>
</table>
None of the elements of the proposed project are located within a Minnesota Department of Health (MDH) wellhead protection area.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Sanitary wastewater is generated by FHR’s employees and sent to the city of Rosemount’s publicly owned treatment works (POTW). The project will result in minimal additional sanitary wastewater from the approximately 8 to 10 additional employees that will be needed for operation of the CHP facility. This very small amount of additional sanitary wastewater will not have a significant effect on the Rosemount POTW.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.
Wastewater generated from the CHP Cogeneration Project will not be discharged to a subsurface sewage treatment system.

3) **If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.**

Industrial wastewater is generated by a number of industrial processes at the refinery. The refinery operates a wastewater treatment facility to treat its industrial waste as well as onsite stormwater and recovered groundwater from an onsite remediation system. Treated effluent from the facility is either discharged into the Mississippi River or reused in the refinery's firewater and boiler feed water makeup systems.

The refinery's wastewater facility treats an average of 4 million gallons per day (MGD) of wastewater and has a calculated design maximum flow rate of 5.2 MGD. The facility is subject to operating requirements and effluent limits specified in its NPDES/SDS permit, no. MN0000418.

Under normal operations, the project will not result in increased process wastewater flows to the refinery's wastewater treatment facility. As discussed in Item 6, blowdown, approximately 5 gallons per minute (gpm), will be pumped to a refinery cooling tower basin.

The project will have a blowdown holding tank for use during cooling-tower malfunction or when the cooling tower is undergoing a maintenance turnaround. The blowdown would be trucked to the facility's wastewater treatment plant and then treated. The tank's capacity of 20,000 gallons represents 0.5 percent of the daily average flow to the treatment plant and less than 0.4 percent of the plant's capacity. It is anticipated that the holding tank would be used on very rare occasions (once every few years).

**ii. Stormwater** - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

The proposed CHP cogeneration facility will be located within the refinery's existing stormwater watershed. Runoff from the refinery's stormwater watershed is managed according to the requirements of FHR's SWPPP and FHR's NPDES/SDS permit, No. MN0000418. See Figure 12 for a map of stormwater flow at the facility.

Stormwater runoff from the refinery process areas is collected by FHR’s stormwater ponds. Any water collected in FHR’s existing stormwater ponds is treated in FHR's wastewater treatment facility. The treated water is then discharged to the Mississippi River near FHR’s
barge dock facilities (see Figure 11) or reused. However, stormwater from the proposed project will be generated in the vicinity of the new turbine site and will not tie into the existing storm sewer at the refinery site. The project site currently drains from north to south with stormwater collected in an existing water detention area on the south side of the project site. Stormwater collected in this area infiltrates to the surficial aquifer or evaporates.

The industrial stormwater management plan for the plant will include diversion swales to direct upstream area runoff around the CHP cogeneration facility. Reinforced concrete pipes will be designed to pass the 1 in 100 year rainfall event without flooding project roads. Area inlets may be utilized within the plant island to collect stormwater. This runoff will travel generally south through reinforced concrete pipe to the existing water detention area. Industrial stormwater from the project is not expected to cause a net change in the quantity or quality of infiltrating runoff to the detention area. Because of this, a separate or new stormwater-retention pond to control stormwater quantity or quality is not anticipated to be necessary. However, during detailed design an improved pond may be necessary in order to meet or exceed permitting requirements.

During construction, localized BMPs such as silt fences, area inlet protection, concrete wash out areas, and construction entrances will be utilized. The SWPPP and design drawings will include a requirement for the contractor to stabilize areas quickly after being disturbed. All excavated materials will be used in project-related or subsequent construction at the refinery. During construction it is anticipated that the existing water detention area may be used as an infiltration basin. The construction stormwater general permit indicates that projects that create new impervious area that exceeds one acre must be designed so as to treat “the water quality volume of one inch [of rainfall]” (Section III.D of MPCA NPDES/SDS Construction Stormwater General Permit). It is anticipated that the existing water detention area will meet this requirement.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

In order to minimize fresh water use, FHR will utilize air-cooled condensers (fin fans) rather than cooling water to meet the cooling requirements of the project. Use of air cooling reduces overall water consumption that would occur if cooling water were used because there will be no evaporative losses of water. Evaporative cooling would consume approximately 300 gpm, which is avoided by the use of air-cooled condensers (fin fans).

A total volume of approximately 5 gpm of clean water will be needed as an input for operation of the CHP cogeneration facility. Water needs for this project can be accommodated under FHR’s existing water-appropriations permit, No. 1954 0071. FHR Pine
Bend currently uses approximately 94 percent of the refinery’s limit each year, leaving capacity to accommodate the very small water needs of the proposed project within the existing appropriation limits.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

As noted above, an existing water detention area formerly used for extraction of fill material is located on the south side of the project site. Non-contact stormwater currently collects in this area and infiltrates to the surficial aquifer. The proposed project is not expected to cause a net change in the quantity or quality of infiltrating runoff to this area. The project will not involve draining, filling, or dredging of this area and will not require vegetative removal.

Historical aerial photograph survey indicates that this site was not historically a wetland, but rather was formed from the excavation of material such as sand or gravel that was sold by a previous owner for use as fill. Based on an initial desktop review of this area, no areas mapped within the NWI, no public waters, and no areas mapped with hydric soils were identified. This initial review indicates that the water detention area is an incidental wetland not regulated under the Minnesota Wetland Conservation Act.

b) Other surface waters - Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

The project will not involve any physical modifications to surface waters.

12. Contamination/Hazardous Materials/Wastes:

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-
project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

The MPCA's "What's in My Neighborhood" database and leaking underground storage tanks records of environmental hazards indicate no potential conflicts involving environmental hazards in the project vicinity due to past uses at the proposed turbine site.

Petroleum contaminated soils exists along FHR’s 12th Street, which runs in an east-west direction approximately 500 feet north-northwest of the turbine island and along the Tank 6 and 7 dike wall, approximately 500 feet immediately north of the turbine island (see Figure 13). Another area of petroleum contaminated soils to north of FHR’s 12th Street and west of the project area is actively being treated. Given the distance between this area and the project site, it is anticipated that disturbance of contaminated areas can be avoided during construction. The MPCA will be contacted if any minor disturbance is required—for example, for the placement of footings or supports for piping or transmission between the project site and the refinery. Operation of the proposed project will not affect conditions at this site.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Typical construction waste, including scrap metal, welding rods, etc., is anticipated to be generated during the construction phase of this project. If any excavation of the material located in the historic waste-management area discussed above is disturbed for footings or foundations, it will be managed according to Resource Conservation and Recovery Act (RCRA) requirements.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

The FHR Pine Bend Refinery processes and refines crude oil. The Refinery produces large volumes of various petroleum products including: gasoline, diesel fuels, asphalts, kerosene, aviation fuel, liquefied petroleum gas (LPG), butane, and coke. In addition to end products, the refining process generates numerous flammable or combustible intermediate products. The proposed project will include the storage of aqueous ammonia and dielectric fluid, discussed in the paragraphs below.
A new 12,000 gallon AST will store aqueous ammonia (19 percent) for use in the SCR system used for NOx reductions. The SCR control equipment is designed to convert NOx into atmospheric nitrogen (N₂) and water vapor; however it does have the potential for some ammonia air emissions (referred to as "ammonia slip"). Health risk concerns from ammonia slip are addressed in the EAW's question 16.a. stationary source air emissions section. The tank will be approximately 10 feet in diameter by 20 feet long. The tank will be located outside next to the condensate tank, just north of the HRSG. Aqueous ammonia is a "regulated substance" under the MPCA tank rules. The tank will be registered with the state and subject to the facility's AST permit requirements for design and operation, including 110 percent containment with a material impervious to the aqueous ammonia solution.

If transmission alternatives 2 or 3 are chosen, the project would require the construction of a transformer yard with four transformers, two GSU transformers and up to two station power transformers. The largest GSU will hold approximately 7,500 gallons of dielectric fluid with the smaller GSU holding approximately 3,500 gallons. The station power transformers would hold approximately 1,000 gallons each. These numbers are preliminary engineering estimates as the final transformer design is not completed nor has any equipment supplier been selected. Thus the final dielectric fluid volumes and MVA ratings are subject to change pending detailed engineering and final specifications. These transformers are subject to the federal SPCC rules but are exempted from the Minnesota Above Ground Storage Tank program under the provisions of the facility's AST permit and Minn. R. 7151.1300, subp. 2.B. because they are "electrical equipment" that contain "substances for operational purposes". The transformer yard will be fenced, gated, and locked. Consistent with the existing electrical yard located on site and owned by Xcel Energy, the transformers will be located on engineered concrete foundations, but the yard surface will be aggregate. It is a general practice that aggregate is used as a base in transformer yards as a safety precaution. If there were a loss of primary containment of the dielectric fluid, an impervious surface would cause the oil to pool and could lead to or exacerbate a fire creating risk to the electrical distribution system. In the rare event that there are any leaks or drips that occur during service, the impacted aggregate would be removed and properly disposed of and replaced with clean material. Additionally, pending final engineering and design, the project may require the installation of transmission transformers at the main substation or other location within the refinery footprint. These transformers would be similar in size and design as the larger GSU transformers mentioned above and would be installed in the same manner. Transmission alternative 1 would not require the construction of the transformer yard.

The refinery has emergency-response planning systems in place that will be updated as necessary to address any safety-related issues associated with this project. The plan will be updated and is periodically shared with the MPCA, Dakota County, and city of Rosemount emergency response officials.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.
No hazardous waste is anticipated to be generated during the construction and/or operation of this project. The refinery has emergency-response planning systems in place that will be updated as necessary to address any safety-related issues associated with this project. The plan will be periodically shared with the MPCA, Dakota County, and city of Rosemount emergency response officials.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features):

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

Because the FHR facility is heavily developed, fish and wildlife resources and habitats are not abundant within the project area or within the immediate vicinity of the project. However, agricultural land adjacent to the north, west, and south portions of the FHR facility, is utilized by wildlife species typically associated with old field communities. Commonly occurring species include pheasants and white-tailed deer. In addition, there are a variety of rodents, songbirds, and predators such as red fox, raccoon, and skunks.

High-quality fish and wildlife resources and habitats are present east of the FHR facility within the East Rosemount Minnesota Biological Survey (MBS) Site of Biological Significance (SBS; high biodiversity significance); the Pine Bend SNA and Inver Grove Heights SBS (outstanding biodiversity significance); within the Mississippi River; and along the Mississippi River bluff area (Figure 14).

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number and/or correspondence number from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

Barr Engineering Company, the project proposer’s consultant, has a license agreement (LA-674) with the MDNR to access the Natural Heritage Information System (NHIS) database. Barr queried the NHIS database in October of 2013 (Natural Heritage letter from MDNR is included as Appendix B). According to the NHIS database, no endangered, threatened, or special concern species have been documented in the immediate project area. Rare and sensitive ecological resources in the vicinity of the project area are shown on Figure 14.

The U.S. Fish and Wildlife Service (USFWS) technical assistance website\(^5\) lists two federally listed species, the Higgins’ eye pearly mussel (Lampsilis higginsii; federally and state-endangered) and the prairie bush clover (Lespedeza leptostachya; federally and state-threatened), and one species proposed for listing, the northern long-eared bat (Myotis septentrionalis; proposed federally endangered and state-special concern), as occurring in Dakota County. According to the NHIS database, none of these species have been documented within one mile of the FHR facility. Suitable habitats, which consist of large rivers for the Higgins’ eye pearly mussel, native prairie for the prairie bush clover, and caves, mines, and upland forests for the northern long-eared bat are not present within the refinery or adjacent to the FHR facility boundary. The

USFWS Information, Planning and Conservation System (IPaC) includes another federally listed species for Dakota County, the Minnesota dwarf trout lily (Erythronium propullans; federally and state-endangered). The Minnesota dwarf trout lily was added to the IPaC list in 2013 following a joint MDNR/USFWS soil type study indicating that although the Minnesota Dwarf Trout lily is not known or believed to occur within Dakota County, the soils in the very southern portion of the county might support its growth. According to the NHIS database, the dwarf trout lily has not been documented within one mile of the FHR facility. Suitable habitat, which includes northern-facing slopes of rich hardwood forests dominated by maple and basswood and floodplains dominated by elm and cottonwood, is not present within the FHR facility or adjacent to the FHR facility. The MDNR Rare Species Guide (www.dnr.state.mn.us/rsg/index.html) also includes three federally listed mussel species for Dakota County: the sheepnose mussel (Plethobasus cyphyus; federally and state-endangered), the spectaclecase mussel (Cumberlandia monodonta; federally and state-endangered), and the winged mapleleaf mussel (Quadrula fragosa; federally and state-endangered). According to the NHIS database, none of these species have been documented within one mile of the FHR facility. Suitable habitat, which consists of large rivers, is not present within the FHR facility or adjacent to the FHR facility.

The NHIS database indicates a 2011 observation of the presence of a pair of peregrine falcons (Falco peregrinus; state-special concern) and a nest within the FHR facility boundary. According to the NHIS database, the state-endangered loggerhead shrike (Lanius ludovicianus) has been documented in the farmlands and rural areas adjacent to the FHR facility within the past four years. Loggerhead shrike generally prefer broad open areas such as croplands, lawns and pastures, with adjacent perching sites in small trees and shrubs. Therefore, the species is unlikely to occur within the developed FHR facility. Undeveloped and agricultural lands on the south side of the FHR facility include cropland, dry grassland, short grass, and maintained tall grass cover types which may support loggerhead shrike. However, because of the limited footprint of the project within the refinery, and the abundance of suitable habitat outside of the project area, it is unlikely that loggerhead shrike would utilize the specific project area within the developed refinery. According to the NHIS database, occurrences of the fox snake (Elaphe vulpina; formerly of state special concern but as of August 2013 no longer state-listed) and the bull snake (Pituophis melanoleucus; state special concern) have been reported about 0.5 miles to the east of the refinery. Both reports, however, are more than 70 years old and no recent sightings have been reported in the area. It is not likely that either species will be present on or in the immediate vicinity of the refinery due to highly industrialized land use. Both snake species generally prefer wooded and open-field river-bluff habitat. Habitat of this type is located east and northeast of the FHR facility in the Mississippi River Valley. The closest potential habitats are located in the Pine Bend Bluff SNA northeast of the FHR facility and further south and east along the Mississippi River bluffs. According to the NHIS database, several rare species and rare ecological communities have been documented within the East Rosemount Minnesota Biological Survey Site of Biological Significance, the Pine Bend SNA, the Inver Grove Heights SBS, the Mississippi River, and along the Mississippi River bluff area. All of these ecologically sensitive areas are outside of the project area and FHR facility boundary.
c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

The proposed project will have a limited footprint within the FHR facility boundary. Given this limited project footprint and the general lack of suitable habitat within the facility boundary, no direct impacts to endangered, threatened or special concern species, or rare communities are anticipated. The proposed project will also not involve conversion of habitats preferred by rare species. Because of the industrial land use within the project area, and the routine maintenance activities at the facility, there will be limited opportunity for the introduction of invasive species during construction and operation. Additional impacts during construction and operation are not expected as operational controls and safeguards, such as stormwater management and dust control, will be in place to minimize or eliminate negative impacts on fish, wildlife, or other ecologically sensitive resources. The construction and operation of the proposed project is covered by the existing emergency response planning systems in the refinery.

There is no suitable habitat within the FHR facility or areas adjacent to the FHR facility boundary for the federally listed species occurring in Dakota County (see response to question 13b). The four federally listed mussels are aquatic species, and habitat for these species is not present in the FHR facility. The prairie bush clover requires high-quality prairie with specific associated species not present within the FHR facility or project area. In addition, the rich hardwood forest habitat and soil types necessary to support the growth of Dwarf trout lily do not occur in the part of Dakota County where the project is located. No caves, mines, or upland forests are present within the FHR facility or adjacent areas to provide habitat for the northern long-eared bats.

The limited footprint of the project combined with the general lack of suitable habitat within the facility boundary make it highly unlikely that there would be project-related impacts to the state listed species with documented occurrences within one mile of the facility boundary. Impacts to peregrine falcon individuals or populations are not anticipated because the specific project area is not in the immediate vicinity of the previously documented nest within the FHR facility boundary. Moreover, construction activities will not occur in the immediate vicinity of the site where the nest was observed. Finally, there has been no documentation of peregrine falcon activity on the site since the 2011 observation.

There will be no impacts to loggerhead shrike. This is because the proposed project activities will be located within the FHR facility boundary and not in high-quality habitat areas typically utilized by loggerhead shrike.

While several rare species and rare ecological communities have been documented within the East Rosemount SBS, the Pine Bend SNA, the Inver Grove Heights SBS, the Mississippi River, and the Mississippi River bluff area, these documented NHIS records are outside the project area and FHR facility boundary. The project is not expected to impact rare species or communities within these areas.

Elevated noise levels from the proposed project activities may normally have the potential to disrupt wildlife behavior and utilization of the higher-quality habitats in the vicinity of the FHR facility. However, the existing FHR facility has generated periodic elevated noise level events since operation of the facility commenced. Wildlife species in the area are therefore likely to be habituated to
periodic elevated noise levels. Moreover, the FHR facility is separated from the highest-quality wildlife habitats to the east and northeast by U.S. Highway 52, which also contributes to elevated noise levels in the area. Considering the existing combined noise levels generated by the current FHR facility and the U.S. Highway 52 traffic, it is not expected that the proposed project will significantly increase noise to levels that disrupt wildlife behavior. More information regarding noise is provided in response to Section 17.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

As discussed above, operational controls and safeguards, such as stormwater management and dust control will be in place to minimize or eliminate negative impacts on fish, wildlife, or other ecologically sensitive resources. Because no adverse impacts are expected as a result of the proposed project, no additional measures need be taken to minimize impacts, and no additional survey work has been conducted.

14. Historic properties:
Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

The Minnesota Historical Society was contacted with respect to the existence of known historic properties in the vicinity of the FHR Pine Bend refinery. There are no reported historic properties in the potential project area (see Appendix C).

15. Visual:
Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The onsite equipment for the proposed project will have an industrial appearance consistent with existing facilities at the refinery. While the project components will introduce new visual elements to the south of the existing facility, these project components are visually consistent with the adjacent refinery. Additionally, FHR is taking the additional step of enclosing the combustion turbine, steam turbine, and HRSG in a building, an approach which is more aesthetically pleasing than the alternative. As such, the project will not create significant visual impacts, either from new structures or lights on structures.

There are no scenic vistas on or near the refinery which require special attention with regard to adverse visual impacts. The project is not expected to alter scenic vistas in the MNRRA as these vistas face eastward, away from the project area. The project will not significantly alter views from the MRRT as the project components are consistent with the existing industrial elements in the viewshed in this area.
16. Air:  
a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used to assess the project’s effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

Air Emission Sources  
The proposed project will result in air emissions of criteria pollutants and hazardous air pollutants (HAPs) primarily as a result of natural gas combustion. The table below summarizes the new air emission units associated with the proposed project. Potential emission rates are discussed in the following section.

<table>
<thead>
<tr>
<th>Emission Unit</th>
<th>Add-On Control Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Turbine</td>
<td>Selective Catalytic Reduction (SCR), NOx Control CO and VOC Catalyst, CO and VOC Control</td>
</tr>
<tr>
<td>Duct Burners</td>
<td>SCR, NOx Control CO and VOC Catalyst, CO and VOC Control</td>
</tr>
</tbody>
</table>

The proposed project will also result in fugitive emissions from equipment in natural gas service. No existing emission units at the refinery will be modified as a result of the proposed project. Nor will the proposed project result in any air emission increases at existing emission units.

Project Air Emissions  
The potential air emissions from the project have been calculated based on performance specifications and estimates from manufacturers of the combustion turbine, duct burners, and control equipment, as well as EPA factors for emissions from combustion of natural gas. Following MPCA guidance on calculating air emission increases for EAW applicability and the method described by Minn. R. 7007.1200, subp.3, the calculations for this EAW conservatively assume year-round operation at maximum, worst-case operating conditions. The proposed project will result in changes to the refinery’s limited potential to emit (PTE) as indicated in the table below.

---

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Total Refinery Pre-Project (TPY)</th>
<th>CHP Cogeneration Facility (TPY)</th>
<th>Total Refinery (Post-Project TPY)</th>
<th>Percentage Change Due to Project (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>3,952.6</td>
<td>27.7</td>
<td>3,980.3</td>
<td>0.7%</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO2)</td>
<td>3,770.0</td>
<td>4.1</td>
<td>3,770.0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>2,391.0</td>
<td>66.9</td>
<td>2,457.9</td>
<td>2.8%</td>
</tr>
<tr>
<td>Particulate Matter (PM)</td>
<td>1,032.7</td>
<td>16.8</td>
<td>1,049.5</td>
<td>1.6%</td>
</tr>
<tr>
<td>Particulate Matter &lt;10 microns (PM10)</td>
<td>641.1</td>
<td>16.8</td>
<td>657.9</td>
<td>2.6%</td>
</tr>
<tr>
<td>Particulate Matter &lt;2.5 microns (PM2.5)</td>
<td>627.6</td>
<td>16.8</td>
<td>644.4</td>
<td>2.7%</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOCs)</td>
<td>2,610.4</td>
<td>28.0</td>
<td>2,638.4</td>
<td>1.1%</td>
</tr>
<tr>
<td>Greenhouse Gases (GHG)</td>
<td>7,837,536</td>
<td>345,263</td>
<td>8,182,799</td>
<td>4.4%</td>
</tr>
<tr>
<td>Hazardous Air Pollutants (HAPs)</td>
<td>854.6</td>
<td>6.8</td>
<td>861.4</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

1Current total refinery PTE is based on the values in the FHR’s Title V Permit Technical Support Document (TSD) dated 9/9/13 and 4/15/14. GHG values from a June 26, 2013 letter from FHR to Mr. Tarik Hanafy of the MPCA, updated to reflect current global-warming potentials for CH₄ and N₂O plus those GHG values from new EU’s permitted in 03700011-011.

2Limited PTE of CHP Cogeneration Project, including combustion turbine, duct burner, and fugitive emissions.

3Limited PTE of total refinery (current facility plus proposed CHP cogeneration project).

4The CHP project will result in a small amount of SO2 emissions, however these emissions will not require the refinery to increase its SO2 air permit emission cap.

5GHG contains the following pollutants: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). These values are expressed as carbon dioxide equivalents (CO₂e).

### Air Emission Permitting

**Title V**
The refinery is currently a permitted major air emissions source under Title V of the federal Clean Air Act Amendments. The proposed project will result in increased criteria pollutant emissions, most significant of which are particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM₂.₅), and greenhouse gas emissions (GHG). FHR has applied for a major amendment to its permit (Air Emissions Permit No. 03700011-011) in order to implement its proposed CHP cogeneration facility project.

**Prevention of Significant Deterioration (PSD)**
The current refinery is a major source under federal PSD regulations in 40 CFR 52.21 because its facility-wide PTE is greater than 100 tons per year (TPY) for several criteria pollutants. The potential emissions of PM₁₀, PM₂.₅ and greenhouse gas (GHG) from the proposed project exceed significant emission rate thresholds under PSD regulations. Therefore, the proposed project is subject to PSD review for these pollutants.
A major modification subject to PSD review is required to ensure that best available control technology (BACT) is used for each pollutant for which there is a significant net emissions increase (PM$_{10}$, PM$_{2.5}$ and GHG for this proposed project). BACT is the maximum degree of emission reduction that can be achieved when determined on a case-by-case basis, taking into account energy and environmental and economic impacts. The controls resulting from the project’s BACT analysis are included in the mitigation discussion later in this section. An air quality analysis is also required under PSD regulations, and it is summarized in the air modeling section.

**Other Emissions Standards**

The proposed CHP cogeneration facility will be subject to the New Source Performance Standards (NSPS) for stationary combustion turbines (40 CFR Part 60, Subpart KKKK), and will meet the applicable standards for nitrogen oxides (NO$_x$) and sulfur dioxide (SO$_2$) by use of SCR, low NOx burners, and low sulfur fuel (natural gas).

The proposed project would generate electricity and steam using a gas-fired, well controlled, and highly efficient system. Natural gas is considered a clean fuel with intrinsically low emission rates for criteria and hazardous air pollutants. Furthermore, the combustion turbine’s design specifications are highly efficient, minimizing fuel use and associated emissions. As such, there are a number of regulations that do not apply to the proposed project:

- EPA has proposed a NSPS for GHG from electric generating units. The project is anticipated to meet this performance standard. However, under the rule as it is currently proposed, the project would not be subject to this NSPS because it would not sell its electricity to the grid.
- The proposed project will be subject to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for stationary combustion turbines (40 CFR Part 63, Subpart YYYY). The proposed project is only subject to the notification requirements of subpart YYYY, however as the emissions standards for gas-fired turbines under this NESHAP have been stayed.

The project includes the use of gaseous fuels (natural gas) and the installation and operation of oxidation catalyst to minimize HAP emissions. Emission monitoring will include a stack carbon monoxide Continuous Emissions Monitoring System (CEMS) to monitor stack CO emissions as well as health of the oxidation catalyst.

**Air Emissions Mitigation**

As indicated below, FHR’s air emissions permit will include requirements designed to minimize the amount of air emissions from the proposed project, both from the emission units themselves, as well as from fugitive emissions (e.g., leaks).

**Stack Sources**

*Criteria Pollutants/HAPs*

Both the combustion turbine and duct burner will exhaust through a single stack. Selective catalytic reduction (SCR) will be used to control NO$_x$ emissions, while the oxidation catalyst will be used to control CO, VOC, and organic HAP emissions during the combustion turbine and duct burners’ operations.
No add-on control equipment is available or feasible to reduce emissions of the other pollutants. However, the proposed project includes many design features that minimize air emissions. The project will use natural gas, which is considered a clean fuel with intrinsically low emission rates for criteria and hazardous air pollutants. Furthermore, as discussed in response to Question 6, the project uses the efficient and well-demonstrated GE LM6000 turbine in a combined-cycle configuration with the cogeneration of electricity and steam. Finally, the exhaust stack is well engineered to minimize downwash and provide good dispersion characteristics. These design specifications are highly efficient, minimizing fuel use and associated emissions, and thus reducing off-site impacts. The potential efficiency and environmental benefits of cogeneration are significant, reducing emissions by 40 percent or more, the use of clean fuel and efficient design, represent BACT for PM$_{10}$ and PM$_{2.5}$. It also reduces emission rates of other products of combustion. Furthermore, the proposed project is expected to offset use of existing onsite boilers, replacing boiler firing with more efficient steam production.

Greenhouse Gases (GHG)
As noted above, the project uses a highly efficient combustion turbine in a combined-cycle configuration, minimizing fuel use and associated GHG emissions. CHP’s inherent higher efficiency and elimination of transmission and distribution losses result in reduced primary energy use and lowers GHG emissions. Use of low-carbon fuel and efficient design represents BACT for GHGs for this project.

Fugitive Sources – Equipment in Natural Gas Service
This project will be installing various piping, valves, and flanges that will be in natural gas service and have the potential for fugitive emissions of natural gas. Methane is not a VOC but is considered a GHG subject to regulation and is the primary component of natural gas. As a result, this equipment is included in the project’s GHG BACT analysis, which concludes that the control measures described below represent BACT.

Fugitive methane emissions from natural gas service equipment will be regulated and controlled as specified in the refinery’s existing leak detection and repair (LDAR) program which is incorporated in the Consolidated LDAR Program in FHR’s existing Title V air emissions permit. The LDAR program is designed to ensure that leaks are detected and repaired in a timely manner. Application of the LDAR program represents BACT for fugitive emission sources.

Ambient Air Quality Evaluation
Under PSD regulations, air dispersion modeling is required for the pollutants for which the project-related emission increases exceed significance thresholds and for which national ambient air quality standards (NAAQS) are established. For the proposed project, PM$_{10}$ and PM$_{2.5}$ meet these criteria, and therefore an ambient air quality modeling analysis was carried out for these pollutants.

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In order to facilitate the assessment of the project’s potential impacts on ambient air quality, the EPA has established de minimis thresholds known as significant impact levels (SILs). Generally, if an air dispersion analysis of the project shows that its impacts are below applicable SILs, then the project has demonstrated that it will not cause or contribute to exceedances of air quality standards and no further modeling analysis is required. Under EPA’s latest guidance for PM$_{2.5}$ modeling, this SIL modeling approach is only available for a NAAQS analysis for sources that can demonstrate that existing ambient background PM$_{2.5}$ concentrations are more than one SIL value less than the NAAQS. FHR has reviewed background PM$_{2.5}$ concentrations and as shown in the table below, has determined that there is sufficient difference between those concentrations and NAAQS for SIL modeling to be a valid approach for a NAAQS analysis.

<table>
<thead>
<tr>
<th>PM$_{2.5}$ 24 Hour and Annual Apple Valley Monitor Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor ID</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>2013 98th % Value</td>
</tr>
<tr>
<td>2012 98th % Value</td>
</tr>
<tr>
<td>2011 98th % Value</td>
</tr>
<tr>
<td>Average (2011-2013)</td>
</tr>
<tr>
<td>NAAQS</td>
</tr>
<tr>
<td>Difference (2011-2013)</td>
</tr>
<tr>
<td>SIL</td>
</tr>
<tr>
<td>Greater than SIL</td>
</tr>
</tbody>
</table>

The modeled stack parameters for the combustion turbine and duct burner stack SIL modeling represent a theoretical, worst-case scenario. As stated in the Air Quality Dispersion Modeling Protocol (AQDM-01) developed for the PSD SIL modeling and submitted to the MPCA, this theoretical, worst-case scenario, covers all potential operating scenarios of the combustion turbine stack and provides the most conservative PM$_{10}$ and PM$_{2.5}$ modeled air concentrations.

As shown in the table below, using the theoretical worst-case scenario, the project’s modeled impacts are well below the SIL for PM$_{10}$ and PM$_{2.5}$, therefore the project does not have the potential to cause or contribute to significant deterioration in air quality.

<table>
<thead>
<tr>
<th>Pollutant (Averaging Period)</th>
<th>NAAQS/MAAQS (µg/m$^3$)</th>
<th>SIL (µg/m$^3$)</th>
<th>Project Modeled Impact (µg/m$^3$)</th>
<th>Percentage of SIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Matter &lt;10 µm (PM$_{10}$) (24-hr)</td>
<td>150</td>
<td>5</td>
<td>0.54</td>
<td>11%</td>
</tr>
<tr>
<td>Particulate Matter &lt;2.5 µm (PM$_{2.5}$) (24-hr)</td>
<td>35</td>
<td>1.2</td>
<td>0.37</td>
<td>31%</td>
</tr>
<tr>
<td>PM$_{2.5}$ (annual)</td>
<td>12</td>
<td>0.3</td>
<td>0.042</td>
<td>14%</td>
</tr>
</tbody>
</table>

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In the PM$_{2.5}$ modeling guidance referenced above, EPA also indicated that, in addition to a SILs analysis, a permitting agency must ensure that a project subject to PSD for PM$_{2.5}$ does not have the potential to cause or contribute to an exceedance of PSD increment levels for PM$_{2.5}$. Increments are a part of the PSD program where emissions from a project are considered with other relevant projects to ensure that the combined effects do not lead to a significant deterioration in air quality in the area. In this case, MPCA performed a detailed screening analysis and determined that this project would not cause or contribute to an exceedance of PM$_{2.5}$ increment levels.

In addition to the air dispersion evaluation performed for PSD purposes, modeling was also conducted pursuant to draft MPCA guidance intended to assess potential air impacts for environmental review purposes. The MPCA's draft guidance provides that projects subject to environmental review can demonstrate no significant effects on ambient air quality by showing that the sum of the monitored background concentration plus the SIL is less than 90 percent of the ambient air quality standard for each pollutant being evaluated and that the modeled impacts are then less than the SILs.

FHR’s Pine Bend refinery is likely the most heavily monitored source in the state of Minnesota, surrounded by four ambient air quality monitors funded by FHR and fully maintained and operated by the MPCA. The monitors record ambient air quality concentrations for a number of criteria and hazardous air pollutants as determined relevant by the MPCA and the refinery’s Community Advisory Council (CAC) over more than a decade of operations. The data from this monitoring network coupled with project-related emission estimated from the proposed project provides the basis for demonstrating that the project will not adversely affect ambient air quality. As shown in the figures below, SO$_2$, NO$_2$, and CO levels at the monitor immediately east of the refinery (Monitor 420) are well below their respective NAAQS. This monitoring data best represents the potential impact of the existing refinery operations.
NOTE: Concentrations reported in form of the respective Standard:
  NO₂ - 98th percentile of 1-hour daily maximum concentrations
  SO₂ - 99th percentile of 1-hour daily maximum concentrations
The table below shows that estimated potential emission increases from CHP project represent a small percentage of the FHR Pine Bend facility’s limited potential to emit. Given the overall emissions from this project and the current monitored results, no adverse effects on ambient standards would be expected from this project.

<table>
<thead>
<tr>
<th></th>
<th>PM (tpy)</th>
<th>PM\textsubscript{10} (tpy)</th>
<th>PM\textsubscript{2.5} (tpy)</th>
<th>NO\textsubscript{x} (tpy)</th>
<th>SO\textsubscript{2} (tpy)</th>
<th>CO (tpy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Heat and Power Project</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>28</td>
<td>4</td>
<td>67</td>
</tr>
<tr>
<td>FHR Pine Bend Refinery Limited Facility Potential to Emit\textsuperscript{1}</td>
<td>1033</td>
<td>641</td>
<td>628</td>
<td>3953</td>
<td>3770</td>
<td>2391</td>
</tr>
<tr>
<td>Project Compared to the Existing Refinery Potential to Emit</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>1%</td>
<td>0.1%</td>
<td>3%</td>
</tr>
</tbody>
</table>

\textsuperscript{1}The FHR Pine Bend total refinery limited potential to emit is taken from Table 6 of the Technical support document from the most recent permit amendment (03700011-010) dated 09/11/13 plus the potential to emit from EU’s permitted in 03700011-011.
Nevertheless, FHR has prepared an analysis consistent with the MPCA’s draft guidance for assessing potential air impacts for environmental review purposes through SIL modeling. More detailed information on modeling is available in the Air Quality Dispersion Modeling Protocol (AQDM-01) developed for this EAW and submitted to the MPCA. The results of the SIL modeling are provided in the tables below. The first table demonstrates that the Regulatory SIL plus ambient background is less than 90 percent of the NAAQS. The second table shows that the CHP project’s modeled impacts are less than the Regulatory SIL.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Background Concentration (µg/m³)</th>
<th>Regulatory SIL (µg/m³)</th>
<th>Background + SIL (µg/m³)</th>
<th>NAAQS/MAAQS (µg/m³)</th>
<th>Less than 90% of NAAQS/MAAQS (Y/N)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1-hour</td>
<td>3795</td>
<td>2000</td>
<td>5795</td>
<td>40000</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>1912</td>
<td>500</td>
<td>2412</td>
<td>10000</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>44</td>
<td>5</td>
<td>49</td>
<td>150</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>24</td>
<td>1</td>
<td>25</td>
<td>50</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-hour</td>
<td>21</td>
<td>1.2</td>
<td>22.2</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual</td>
<td>9</td>
<td>0.3</td>
<td>9.3</td>
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Flint Hills Resources – Combined Heat and Power (CHP)  
Cogeneration Project  
Rosemount, Minnesota
<table>
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<th>Pollutant</th>
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<th>Regulatory SIL (µg/m³)</th>
<th>Less than SIL (Y/N)?</th>
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<td>Annual</td>
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1 The MPCA draft guidance is intended to apply on a project-specific basis. In the cumulative potential effects analysis under Question 19, FHR has combined this project evaluation with the Tier 3 Clean Fuels Projects (the subject of a separate EAW) and demonstrated that both projects combined also meet the criteria of the MPCA’s draft guidance.

The FHR refinery is also subject to a State Implementation Plan (SIP) which requires SO₂ modeling if the facility’s permitted SO₂ increases by 2.28 pounds per hour or more. The potential SO₂ air emission increase associated with the proposed CHP project is 0.97 pounds/hour, which is below the SIP modeling threshold and therefore no modeling is required for this project under the SIP. However, because a SIP modification is required for the Tier 3 Clean Fuels Projects, the SO₂ emissions from this project are included in that modeling demonstration.

**Health Risk Evaluation**

Emissions from the project are primarily associated with natural gas combustion, although some ammonia slip will result from the use of selective catalytic reduction (SCR) to control NOₓ emissions. As the air emissions discussion above indicates, the incremental emissions increases due to the proposed project are less than one percent of the existing facility emissions of NOₓ, SO₂, and HAPs, and approximately one percent of the existing facility emissions of VOCs.

As shown above, modeled concentrations of NO₂, SO₂, and PM₂·₅ associated with the project are below the SILs of their respective NAAQS. For NO₂, the SIL represents less than two percent of the MPCA acute health benchmark indicating ambient NO₂ concentrations resulting from project-related NOₓ emissions are well below guideline levels.

Past analyses of potential health risks associated with the refinery operations have focused on evaluating monitored ambient air concentrations around the FHR Pine Bend refinery and have concluded that potential health risks associated with the refinery are below guideline values.10 11

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11 MPCA, 2006. Environmental Assessment Worksheet: #3 Crude Unit Expansion Project.
In addition, a source-receptor study conducted by Gradient (1996)\(^\text{12}\) identified that refinery emissions contribute little to the ambient air concentrations monitored at nearby sites. Since that time, refinery air emissions have decreased by greater than 50 percent\(^\text{13}\). The MPCA (2003; 2009)\(^\text{14, 15}\) also identified that air concentrations in the Pine Bend area were similar to monitored air concentrations elsewhere in the Minneapolis-St. Paul metropolitan area.

The SCR control equipment has the potential for some ammonia emissions (referred to as “ammonia slip”). These emissions have not been addressed by the studies and analyses referenced above. Thus, a screening level analysis of the potential for inhalation health effects from ammonia emissions related to the project was conducted using the SCREEN3 model and converting the modeled results to a hazard quotient, or HQ\(^\text{16}\). Ammonia has non-cancer toxicity benchmark values, but it is not a carcinogen, so cancer will not be discussed here. The estimated HQs were 0.002 for acute exposure and 0.005 for chronic exposure. A hazard quotient is not a measure of risk probability but an indication of whether the potential exposure exceeds the level at which sensitive populations may experience health effects (threshold value)\(^\text{17}\). MPCA evaluates the potential non-cancer impacts by adding the HQ values across all pollutants sharing a common toxicity endpoint and across all sources including the project, the total facility, and all other sources. This summation of HQs is called a hazard index (HI). The MPCA uses a guideline HI value of one for noncancer effects. Using this methodology the incremental effect of a given project and/or pollutant can be assessed alongside the cumulative pre-existing conditions from all sources.

The CHP ammonia emissions result in an HQ three orders of magnitude below one\(^\text{18}\). The fact that previous monitored ambient air concentrations of potential health risks from the refinery have shown risks below guideline levels\(^\text{19, 20}\) and the proposed project emissions are a small fraction of the existing refinery emissions indicates that potential incremental risk from the project is expected to be low.

In summary, it is expected that any incremental risks from the project would be below one for inhalation noncancer chronic and acute risks, respectively based on the following:

- Relatively low levels of air toxics emissions are associated with natural gas combustion

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\(^{13}\) Air emission reductions based on a comparison of total criteria pollutants that were reported by FHR in the 1996 and 2013 MPCA annual air emission inventory reports.


\(^{20}\) MPCA, 2006. Environmental Assessment Worksheet: #3 Crude Unit Expansion Project.
- The demonstration of modeled NO₂, SO₂, PM₁₀, and PM₂.₅ concentrations are below the respective SILs
- Past assessments indicate that the FHR Pine Bend refinery is not the major contributor to the monitored ambient air concentrations of air toxics at nearby monitoring sites
- The ammonia screening model demonstrates an HQ three orders of magnitude below the HQ level of 1

Therefore, no significant increase in potential adverse health effects are expected to result from this project.

b. **Vehicle emissions** - Describe the effect of the project’s traffic generation on air emissions. Discuss the project’s vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Traffic associated with the operation of the CHP plant will contribute primarily to traffic on Minnesota Highway 55 and U.S. Highway 52 which are adjacent to the refinery’s eastern boundary. Average daily traffic volume information available for 2012 from Minnesota Department of Transportation (MnDOT) indicates that the relevant sections of Minnesota Highway 55 and U.S. Highway 52 have average daily traffic volumes of 13,300 and 32,500, respectively.

On average throughout the year, the proposed project will increase traffic on these roads by less than 0.001 percent based on the anticipated trip generation rates (see Question 18a). Given the relatively small increase in total daily traffic volume that the project is expected to generate, impacts on air quality from project-related vehicle traffic are expected to be negligible.

c. **Dust and odors** - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Due to the fact that the project involves the construction and operation of a natural gas fueled CHP facility, it is expected to have little or no odors impact.

Dust impacts are expected to be minimal as a result of operations; however, site preparation and construction activities may produce fugitive dust emissions. If necessary, fugitive dust emissions from construction activities will be minimized through control measures including watering or applying dust suppressants. Dust suppressants may be applied to exposed soil surfaces and unpaved roads. It is possible that soil may need to be removed by trucks during ground preparation for construction. If so, dust controls may also be used for that activity. Other control options include planned selective grading and staged development, timely job site cleanup and haul-road maintenance. Construction may be halted during periods of high winds to minimize fugitive dust emissions.
17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Existing noise from the refinery is typical for a refinery site, with noise generated primarily by petrochemical furnaces and their air cooled heat exchangers and centrifugal compressor systems. Other notable noise sources in the area include other industrial activities in the district and traffic noise from U.S. Highway 52 and Minnesota Highway 55. Noise levels monitored at a nearby site (UMore Park site) with noise characteristics that are generally representative of the area range from 45 to 76 dBA\(^2\). No existing issues with noise at nearby residential areas have been identified. During the operation of the CHP cogeneration facility, noise will be generated by the steam turbine generator, combustion turbine generator, combustion turbine air inlet, and the air cooled condenser. Noise associated with operation will be minimized by locating the steam turbine generator and combustion turbine generator inside of the generator building. From outside of the building, noise from these sources is expected to be negligible. While the combustion turbine air inlet and the air cooled condenser will be located outdoors, low noise designs will be utilized to minimize the compressor and air inlet noise levels.

Figure 8 identifies residences in the vicinity of the refinery. As shown in Figure 8, the nearest residence to the CHP Cogeneration Project site is approximately 1/3 mile southeast of the CHP cogeneration plant site. At this distance, compressor and air inlet noise levels are expected to be in the range of 32-41 dBA, well below Minnesota’s residential noise level standards and less than existing conditions.

Any construction-related effects on noise will be short term, temporary effects and are expected to be minor.

Given the industrial nature of the area, existing noise exposures at nearby receptors, and the project’s relatively minor effect on noise, no noise-related change in quality of life is anticipated.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

The proposed project will result in an increase in construction-related traffic to and from the refinery for a period of approximately 12 months. This additional traffic is expected to be small compared to the amount of traffic already on roads in the project area.

FHR expects to hire approximately 8-10 new employees to operate the equipment associated with the project. FHR anticipates that no additional parking areas will be needed as part of the project.

Additional truck traffic will be associated with ammonia delivery to the cogeneration site. Based on expected ammonia usage rates and typical truck capacity, the proposed project will generate approximately 40 vehicle trips per year, and a maximum peak hourly trip rate of two.

Traffic associated with the operation of the CHP plant will contribute primarily to traffic on Minnesota Highway 55 and U.S. Highway 52 which are adjacent to the refinery’s eastern boundary. Average daily traffic volume information available for 2012 from MnDOT indicates that the relevant sections of Minnesota Highway 55 and U.S. Highway 52 have average daily traffic volumes of 13,300 and 32,500, respectively.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project’s impact on the regional transportation system.

The traffic that will be generated by new employees and additional truck traffic for ammonia delivery will be small in comparison to the amount of traffic already on roads in the project area. No measurable impact to traffic congestion on nearby roads is anticipated as the result of the project.

A traffic impact study is not required as the peak hour traffic generated is less than 250 vehicles and the total daily trips are less than 2,500.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

As no project-related transportation effects are anticipated, no measures are proposed to minimize or mitigate impacts.

19. Cumulative potential effects: (Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

Minn. R. pt. 4410.1700, subp. 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Cumulative potential effects result when impacts associated with the proposed project are superimposed on, or added to, impacts associated with past, present, or reasonably foreseeable future projects within the area affected by the proposed project. Analysis of cumulative potential effects accounts for the possibility that, added together, the minor impacts of many separate projects may be significant. This cumulative potential effect analysis considers resources that are expected to be impacted by the proposed project and assesses past, present, and reasonably foreseeable projects to identify any...
geographic and temporal overlap in impacts. For past projects, Minn. R. 4410.0200, subp. 11a states that "it is sufficient to consider the current aggregate effects of past actions." In most cases, the existing conditions in the environmentally relevant area provide an equivalent representation of the past actions.

The project's main potential environmental effects evaluated are an increase in permitted air emissions and noise impacts associated with operation of the CHP cogeneration facility. Other potential environmental effects from the project include minor impacts to stormwater, water appropriation, and transportation.

The environmentally relevant area for evaluating cumulative potential effects varies in size depending on the types of resources and potential impacts being considered. Air-quality and noise impact analysis associated with the project, for example, extend somewhat beyond the immediate project area. Where other potential impacts from the proposed project have been identified, they are more geographically concentrated in the immediate vicinity of the project.

The timeframe of potential impacts from the proposed project ranges from short-term temporary construction-related impacts on noise levels, stormwater, and air quality, to longer-term potential impacts to air quality, noise levels, water appropriation, and transportation.

The table below summarizes the relevant geographic and temporal scale of potential impacts from the project as well as the expected magnitude and nature of these impacts.
<table>
<thead>
<tr>
<th>Resource/Impact</th>
<th>Timescale</th>
<th>Geographic area of impact</th>
<th>Nature/Extent of impacts</th>
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<td>Immediate project vicinity (nearest receptors at a distance of approximately 1/3 mile)</td>
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<td>Construction Stormwater</td>
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<td>Immediate project vicinity</td>
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<tr>
<td>Air Quality (construction-related impacts)</td>
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<td>Immediate project vicinity</td>
<td>Minor; fugitive dust; managed via implementation of BMPs</td>
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<td>Long term/ project life</td>
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<td>Traffic</td>
<td>Long term/ project life</td>
<td>Immediate project vicinity (nearby stretches of Highway 55 and 52)</td>
<td>Minor</td>
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</table>

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

In addition to the proposed CHP Cogeneration Project, FHR is seeking agency approval for several additional but separate projects at the refinery. Each of these projects meets the criteria for establishing a basis of expectation. Those projects are described below along with an analysis of whether they warrant further consideration for cumulative potential effects. Also, in 2013, the MPCA issued permits for other projects being implemented at the refinery: the #3 Crude/#3 Coker Improvement Projects and the Propylene Storage and Distribution Project. The Propylene Storage and Distribution Project required an EAW and the impacts of the #3 Crude and #3 Coker projects were considered as part of that evaluation.

In order to address the “cumulative potential effects of related or anticipated future projects” this review also includes other potential future projects identified by contacting the community development directors for Rosemount and Inver Grove Heights. FHR contacted the community development directors from Rosemount and Inver Grove Heights to determine whether there are other entities that are planning activities that could result in potential cumulative effects. The identified projects are located approximately 0.5 to 1.5 miles away from the CHP Cogeneration Project. These projects were evaluated based upon information from the community development directors and upon information in publicly available permit documents.
2013 – SKB Landfill expansion
SKB Landfill located at 140th Street E, Rosemount, Minnesota, east of the project has been granted approval to expand the landfill capacity. Based on the SKB’s EAW filed with the city of Rosemount, this project will increase disposal capacity, but will not add any additional traffic or other operations at the landfill beyond what currently occurs. The landfill is separated from the project by approximately 1.5 miles. Due to the distance and the fact that the landfill expansion will only increase total storage capacity, but not daily traffic, there will be no potential for cumulative environmental effects with the CHP.

2013 Schlomka Services Shop Building
Schlomka Services constructed a shop service building in late 2013 at 11496 Courthouse Boulevard, Inver Grove Heights, Minnesota. The shop will be used for maintaining equipment and trucks. Based on information from the city of Inver Grove Heights, the facility will not have air emissions other than from comfort heating and water heating. As a mainly commercial building there will be no potential for cumulative environmental effects with the CHP.

Consequently, these two projects do not contribute to cumulative potential environmental effects with the CHP project.

FHR is also otherwise aware of the following project through discussions with the owners of the project as well as publically available documents.

2014 – Northern Natural Gas; Rosemount Loop and Rosemount Loop Meter Station Project
Northern Natural Gas is in the process of permitting a new natural gas branch line beginning at a new takeoff facility in the city of Coates, Minnesota, and ending at the Flint Hills refinery. This proposed project, the “Rosemount Loop and Rosemount Loop Meter Station Project”, is located in Sections 5 and 6, Township 114 North, Range 18 West (Sections 5 and 6, T114N, R18W); Sections 30, 31 and 32, T115N, R18W; and Sections 24, 25 and 36, T115N, R19W, Dakota County, Minnesota.

According to permit documents filed with the city of Rosemount, the Northern Natural Gas Rosemount Loop, and Rosemount Loop Meter Station project will provide service at a new delivery point. The proposed alternate feed will consist of a new regulated measurement station and approximately 4.14 miles of 12-inch-diameter pipeline with feeds from the existing 24-inch-diameter B-Line and 30-inch-diameter C-Line. The new 12-inch-diameter lateral will tap into the existing B-Line and C-Line south of County Road 46. A new 100- by 100-foot lot will be required east of Donnelly Avenue for a takeoff valve and B-line over-pressure protection. The route was mostly agricultural lands and was completed with a combination of open-cut excavation and horizontal directional drilling.

Impacts associated with the Northern Natural Gas Rosemount Loop and Rosemount Loop Meter Station project are likely primarily minor wildlife habitat impacts associated with construction and clearing of vegetation in the pipeline right-of-way. Given the timing of the project, the distance between the majority of the pipeline route and the proposed CHP Cogeneration Project location, and the different nature of the anticipated impacts from the projects, there is minimal potential for overlapping impacts between the Northern Natural Gas Rosemount Loop and Rosemount Loop Meter Station project and FHR’s CHP project.
The following are other projects undertaken by FHR for which a basis of expectation exists.

FHR Projects

2013 – Tier 3 Clean Fuels Projects
The MPCA has also prepared an EAW and a draft air permit for the Tier 3 Clean Fuels Projects, both currently on public notice. The Tier 3 Clean Fuels Projects involve refinery investments to meet the requirements of the proposed EPA Tier 3 gasoline sulfur standard which targets improvements in ambient air quality. In order to produce gasoline meeting the proposed Tier 3 standard, FHR must remove and recover more sulfur from fuel blends, increasing hydrotreating (a process that removes sulfur). Thus, FHR also proposes to install a unique process to convert recovered gas containing sulfur and nitrogen into a salable aqueous liquid fertilizer, ammonium thiosulfate. Additionally, FHR is proposing to improve the refinery’s sour water skimming and storage and switch to a more efficient amine solution in the existing amine units (for sulfur recovery).

The Tier 3 Clean Fuels Projects’ main environmental effect will be a small increase in permitted air emissions. Other potential environmental effects from these projects include minor long term effects on stormwater, wastewater, water appropriation, hazardous material storage, and transportation and minor construction-related impacts to noise.

2014 – Spring Lake Collection System Emergency Backup Generators
The Spring Lake Collection System is an environmental remediation system that intercepts and extracts recovered groundwater on and around the Pine Bend refinery for subsequent treatment, recycling, and/or disposal. FHR proposes to provide A/C power redundancy to the Spring Lake Collection System by installing three propane emergency generators at Sump 3, Sump 7, and the Lift Station. The emergency generators will be connected to an automatic transfer switch and will supply back-up power to the pumps at Sump 3, Sump 7, and the Lift Station in the event primary power is lost. The generators will be fueled with commercial-grade propane. The proposed generators at Sump 3 and Sump 7 are each 50 kW (82 BHP) engines; the proposed generator at the Lift Station is a 150 kW (230 BHP) engine, with a catalytic muffler to control CO and VOC emissions. This project provides redundancy to existing groundwater collection systems by adding an additional layer of protection in the event of power loss.

While an air quality permit has been submitted for the Spring Lake Collection System emergency backup generator project, air impacts are expected to be negligible due to the limited operational periods of the new equipment. Other potential environmental effects from this project include minor construction-related impacts to stormwater and noise. Given the distance of over one mile between this project and the CHP Cogeneration Project location, cumulative impacts to stormwater and noise will not occur.

2014 – New Administration/Office Building
FHR is in the process of constructing a new office building to be located on the north end of the refinery near the current North Administration Building (NAB). The three story building will be approximately 140,000 square feet and house approximately 500 employees. It is anticipated to be complete by April 1, 2015, and will also have new parking associated with the building. The building site is approximately 1.3 miles north of the proposed CHP building site. As an office
building with only natural gas fired comfort heating and water heaters, there will be no significant air emissions associated with the building once completed. Construction of the new office building will be completed before construction of the CHP begins, therefore any air emissions associated with construction of the office building will not have any cumulative environmental effects with the CHP construction. Stormwater will be managed in an infiltration basin located near the existing NAB and will not interact with the CHP stormwater. Sanitary wastewater will be treated by the city of Rosemount's POTW, which has adequate capacity for the future occupants of the building and will not affect the refinery's wastewater treatment plant. Consequently, this new office building will have no potential cumulative environmental effects with the project.

2014 – West Contractor Parking Lot
FHR rehabilitated and expanded a parking lot on the west side of the refinery for use by contractors during high-volume work periods such as the Spring 2014 maintenance turnaround and for overflow to the other contractor parking at the refinery. The lot is located on Rich Valley Boulevard/Blaine Avenue, approximately 3,500 feet north of Bonaire Path/132nd Street. The parking lot encompasses approximately 10 acres and utilizes two existing entry/exit points onto Rich Valley Boulevard, therefore no new ditch crossings or road entrances was required. Construction of the new parking lot was completed in April of 2014. Consequently, due to the approximately one mile distance between the parking lot and the CHP project and the fact that construction of the parking lot was completed before construction of the CHP project commences, there will be no cumulative environmental effects with the CHP project.

2014 – Temporary, Portable Thermal Oxidizers in Support of the 2014 Tank 2 Maintenance Turnaround
FHR Pine Bend used temporary, portable thermal oxidizers as a measure to reduce emissions while taking the Crude Tank #2 (Tank 2) offline in 2014 for a scheduled internal maintenance inspection. Tank 2 is a 6.3 million gallon crude oil storage tank located at the refinery. The associated minor permit application sought to authorize operation of one or more portable, temporary thermal oxidizers with a maximum total heat input of up to but not exceeding 40 MMBtu/hr to control residual gases from the tank. These thermal oxidizers were temporary units and are no longer onsite, therefore no potential for cumulative impacts is expected with these units and the proposed CHP project.

c. **Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.**

The cumulative potential effects analysis assesses the degree to which past, present, and reasonably foreseeable future projects may have an impact on the same resources potentially affected by the proposed project. The analysis that follows identifies where overlap in the same geographic area and over the same timescales may result in some degree of cumulative impacts on these resources. The analysis below indicates that there is some minor cumulative potential effect for noise, stormwater, hazardous material storage risk, traffic, and air quality.
Noise
The time period of construction for the proposed project will overlap with construction of the Tier 3 Clean Fuels Projects, creating the potential for cumulative noise impacts. However, given the distance of 0.5 to 1.0 miles between the various Tier 3 construction sites and the CHP site as well as the low likelihood of exact overlap in timing of the most noise intensive stages of construction, cumulative noise impacts are not expected to be significant.

Noise impacts due to CHP cogeneration facility operation are expected to be minimal. Therefore, cumulative effects during operation are not anticipated to be significant.

Construction Stormwater
Construction of the proposed project will overlap with construction of the Tier 3 Clean Fuels Projects. Both projects have a very minor impact on construction stormwater. Given the distance between the location of the CHP Cogeneration Project and the Tier 3 Clean Fuels Projects components, no overlap in construction stormwater impacts between these projects is expected. Significant cumulative impacts are not expected.

Air Quality
Operation of the CHP project will overlap with operation of the Tier 3 Clean Fuels Projects. Estimated emissions from the proposed Tier 3 Clean Fuels Projects are very small (<2 percent of existing facility emissions). Estimated emissions from the CHP Cogeneration Project are also very small, ranging from less than 1 percent for \( \text{SO}_2, \text{NO}_2 \), and HAPs to 4.4 percent for \( \text{CO}_2 \). Modeling of air emissions from both projects demonstrates that the combined impacts are less than the SILs, as described below.

As described in Question 16, in response to MPCA draft guidance, air dispersion modeling has been performed specifically for this EAW. While the response to Question 16 demonstrated that the Regulatory SIL plus ambient background is less than 90 percent of the NAAQS and that the CHP Cogeneration Project alone is less than the Regulatory SIL, in this cumulative potential effects analysis, FHR has evaluated the impact of the CHP emissions along with the emissions from the Tier 3 Clean Fuels Projects for comparison against the SILs. The table below shows that impacts from the combined projects are less than the Regulatory SILs.
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Maximum Modeled Concentration (µg/m³)</th>
<th>Regulatory SIL (µg/m³)</th>
<th>Less than SIL? (Y/N)</th>
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<tr>
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<td>NO₂</td>
<td>1-hour</td>
<td>6.44</td>
<td>7.5</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>0.19</td>
<td>1</td>
<td>Y</td>
</tr>
<tr>
<td>SO₂</td>
<td>1-hour</td>
<td>4.63</td>
<td>7.9</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>4.22</td>
<td>25</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>1.24</td>
<td>5</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>0.09</td>
<td>1</td>
<td>Y</td>
</tr>
<tr>
<td>H₂S</td>
<td>1-hour</td>
<td>2.06</td>
<td>2.1</td>
<td>Y</td>
</tr>
</tbody>
</table>

As the table demonstrates, the combined emissions from both projects are below applicable levels established by the MPCA guidance to screen projects for the potential for significant cumulative environmental effects.

**Water appropriations**

As described in Section 11.B.3.iii, the CHP will minimize water consumption by the utilization of air cooled condensers. The CHP Cogeneration project and Tier 3 Clean Fuels Projects require very small volumes of input water. Together, through water conservation measures, the projects will require less than 100 gpm of clean water. Water needs for both projects can be accommodated under FHR's existing water appropriations permit and are not likely to impact water resources available for appropriation.

**Traffic**

Cumulative potential effects to traffic are expected to be minor. While the Tier 3 Clean Fuels Projects and the CHP cogeneration facility will both contribute to minor increases in traffic, the combined project impact will be minor in comparison to the average daily traffic volumes on the nearby sections of U.S. Highway 52 and Minnesota Highway 55.
20. Other potential environmental effects: If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

The project is not expected to cause any additional environmental effects not addressed by items 1 to 19.

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

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

Signature: ___________________________ Date: ____________

Dan R. Card, P.E., Supervisor
Environmental Review Unit
St. Paul Office
Resource Management and Assistance Division
Figure 2
SITE PLAN
AERIAL IMAGERY
Flint Hills Pine Bend, LLC
Rosemount, Minnesota
Figure 4(a)(i)
SITE PLAN AERIAL - CLOSE UP OF NEW INTERNAL DISTRIBUTION SUBSTATION (13.8 kV OPTION)
Flint Hills Pine Bend, LLC
Rosemount, Minnesota
Figure 5. CHP Cogeneration Project Process Flow Schematic

Note: Figure adapted from United States Environmental Protection Agency (http://www.epa.gov/chp/basic/)
Figure 6
SITE MAP
LAND USE
Flint Hills Pine Bend, LLC
Rosemount, Minnesota
The Zoning Designations on this Map should be interpreted in light of the accompanying text and policies contained in the complete Rosemount Zoning Ordinance. Zoning Designations subject to change as part of the City's ongoing planning process.

Data Sources:
Dakota County Land Surveyors and Office of Geographic Information Systems
City of Rosemount Community Development and Engineering/Public Works Departments

Figure 9

CITY OF ROSEMOUNT ZONING MAP
Flint Hills Pine Bend, LLC
Rosemount, Minnesota
Background Data: City of Rosemount Zoning Map
CHP Cogeneration Plant Site

1,200 Feet

Soil Map Unit Name

- Dickinson sandy loam, 0 to 2 percent slopes
- Chetek sandy loam, 8 to 15 percent slopes
- Estherville sandy loam, 2 to 6 percent slopes
- Kanaranzi loam, 0 to 2 percent flooded
- Kalmarville sandy loam, frequently flooded
- Kingsley sandy loam, 8 to 15 percent slopes
- Kingsley-Madison complex, 15 to 25 percent slopes
- Kingsley-Madison-Spencer complex, 3 to 6 percent slopes
- Kingsley-Madison-Spencer complex, 8 to 15 percent slopes
- LeSuer silt loam, 1 to 4 percent slopes
- Mahomet sandy loam, 15 to 25 percent slopes
- Mahomet sandy loam, 3 to 8 percent slopes
- Mahomet sandy loam, 8 to 15 percent slopes
- Mendota silt loam, 1 to 6 percent slopes
- Mesquite silt loam, 1 to 6 percent slopes
- New Distribution Substation
-地下电力
-新分布集电装置
-CHP cogeneration plant site

SITE MAP
SOILS
Flint Hills Pine Bend, LLC
Rosemount, Minnesota

Data Source: USDA NRCS SSURGO Database (g3SSURGO)
WATER QUALITY MANAGEMENT WITHIN REFINERY FENCeline
Flint Hills Pine Bend, LLC
Rosemount, Minnesota

Figure 11

Imagery: DigitalGlobe - 2012

© 2012 DigitalGlobe

FHR Facility Boundary

Proposed Site Features

Wells (County Well Index Wells within FHR Facility Boundary)

Wetlands (National Wetlands Inventory)*

Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake

* Modified based on aerial imagery to reflect current refinery site operations.
Figure 12

STORMWATER RUNOFF MAP
Flint Hills Pine Bend, LLC
Pine Bend, MN

Gate Valve
Berm
Conveyance/Structural Control
Flow Arrows
Property Boundary
Waters of the State
Detention Basin
Retention Basin
Waters of the State Drainage Areas
Runoff Area

Feet

0
500
1,000
1,000
500
0
Figure 13
HISTORIC WASTE MANAGEMENT AREAS
Flint Hills Pine Bend, LLC
Rosemount, Minnesota
Figure 14
ECOLOGICAL RESOURCES
Flint Hills Pine Bend, LLC
Rosemount, Minnesota

* Possible Range and/or Geographic Uncertainty for Species Sighting
Map Unit Description

Dakota County, Minnesota

[Minor map unit components are excluded from this report]

Map unit: 7B - Hubbard loamy sand, 1 to 6 percent slopes

Component: Hubbard (90%)

The Hubbard component makes up 90 percent of the map unit. Slopes are 1 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 7C - Hubbard loamy sand, 6 to 12 percent slopes

Component: Hubbard (90%)

The Hubbard component makes up 90 percent of the map unit. Slopes are 6 to 12 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6s. Irrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 27A - Dickinson sandy loam, 0 to 2 percent slopes

Component: Dickinson (90%)

The Dickinson component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map unit: 27B - Dickinson sandy loam, 2 to 6 percent slopes

Component: Dickinson (90%)

The Dickinson component makes up 90 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 39A - Wadena loam, 0 to 2 percent slopes

Component: Wadena (85%)

The Wadena component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.
Map Unit Description

Dakota County, Minnesota

Map unit: 39B - Wadena loam, 2 to 6 percent slopes

Component: Wadena (85%)

The Wadena component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 39B2 - Wadena loam, 2 to 6 percent slopes, eroded

Component: Wadena, eroded (90%)

The Wadena, eroded component makes up 90 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 39C - Wadena loam, 6 to 12 percent slopes

Component: Wadena (85%)

The Wadena component makes up 85 percent of the map unit. Slopes are 6 to 12 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 39D - Wadena loam, 12 to 18 percent slopes

Component: Wadena (85%)

The Wadena component makes up 85 percent of the map unit. Slopes are 12 to 18 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 41A - Estherville sandy loam, 0 to 2 percent slopes

Component: Estherville (90%)

The Estherville component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.
Map Unit Description

Dakota County, Minnesota

Map unit: 41B - Estherville sandy loam, 2 to 6 percent slopes
Component: Estherville (90%)

The Estherville component makes up 90 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.

Map unit: 49B - Antigo silt loam, 1 to 8 percent slopes
Component: Antigo (90%)

The Antigo component makes up 90 percent of the map unit. Slopes are 1 to 8 percent. This component is on outwash plains. The parent material consists of Loess over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 94C - Terril loam, 4 to 12 percent slopes
Component: Terril (100%)

The Terril component makes up 100 percent of the map unit. Slopes are 4 to 12 percent. This component is on toes on moraines. The parent material consists of Colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 98 - Colo silt loam, occasionally flooded
Component: Colo, occasionally flooded (85%)

The Colo, occasionally flooded component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during April. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2w. This soil meets hydric criteria.

Map unit: 129 - Cylinder loam
Component: Cylinder (85%)

The Cylinder component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.
Map unit: 150B - Spencer silt loam, 2 to 6 percent slopes

Component: Spencer (90%)

The Spencer component makes up 90 percent of the map unit. Slopes are 2 to 6 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 155B - Chetek sandy loam, 3 to 8 percent slopes

Component: Chetek (85%)

The Chetek component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 155C - Chetek sandy loam, 8 to 15 percent slopes

Component: Chetek (85%)

The Chetek component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 155E - Chetek sandy loam, 15 to 25 percent slopes

Component: Chetek (85%)

The Chetek component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map unit: 189 - Auburndale silt loam

Component: Auburndale (90%)

The Auburndale component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Glaciofluvial sediments over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during March, April, May. Organic matter content in the surface horizon is about 7 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.
Map Unit Description
Dakota County, Minnesota

Map unit: 250 - Kennebec silt loam
Component: Kennebec (100%)

The Kennebec component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during April. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria.

Map unit: 252 - Marshan silty clay loam
Component: Marshan (90%)

The Marshan component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats on outwash plains. The parent material consists of Glaciolacustrine sediments over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during April, May. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 2w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 279B - Otterholt silt loam, 1 to 6 percent slopes
Component: Otterholt (85%)

The Otterholt component makes up 85 percent of the map unit. Slopes are 1 to 6 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 279C - Otterholt silt loam, 6 to 15 percent slopes
Component: Otterholt (85%)

The Otterholt component makes up 85 percent of the map unit. Slopes are 6 to 15 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 283A - Plainfield loamy sand, 0 to 2 percent slopes
Component: Plainfield (95%)

The Plainfield component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 283B - Plainfield loamy sand, 2 to 6 percent slopes
Component: Plainfield (95%)

The Plainfield component makes up 95 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3e. This soil does not meet hydric criteria.
Map Unit Description
Dakota County, Minnesota

Map unit: 283B - Plainfield loamy sand, 2 to 6 percent slopes

Component: Plainfield (95%)

Parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 301B - Lindstrom silt loam, 1 to 4 percent slopes

Component: Lindstrom (100%)

The Lindstrom component makes up 100 percent of the map unit. Slopes are 1 to 4 percent. This component is on hills. The parent material consists of Loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 313 - Spillville loam, occasionally flooded

Component: Spillville, occasionally flooded (100%)

The Spillville, occasionally flooded component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during April. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Map unit: 342B - Kingsley sandy loam, 3 to 8 percent slopes

Component: Kingsley (85%)

The Kingsley component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 342C - Kingsley sandy loam, 8 to 15 percent slopes

Component: Kingsley (85%)

The Kingsley component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 342E - Kingsley sandy loam, 15 to 25 percent slopes

Component: Kingsley (85%)

The Kingsley component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.
Map Unit Description

Dakota County, Minnesota

Map unit: 342E - Kingsley sandy loam, 15 to 25 percent slopes

Component: Kingsley (85%)

Movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 344 - Quam silt loam

Component: Quam (90%)

The Quam component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Glaciolacustine sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during March, April, May, June. Organic matter content in the surface horizon is about 11 percent. Nonirrigated land capability classification is 6w. This soil meets hydric criteria.

Map unit: 411A - Waukegan silt loam, 0 to 1 percent slopes

Component: Waukegan (90%)

The Waukegan component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on outwash plains. The parent material consists of Glaciofluvial sediments over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Map unit: 411B - Waukegan silt loam, 1 to 6 percent slopes

Component: Waukegan (90%)

The Waukegan component makes up 90 percent of the map unit. Slopes are 1 to 6 percent. This component is on outwash plains. The parent material consists of Glaciofluvial sediments over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 415A - Kanaranzi loam, 0 to 2 percent slopes

Component: Kanaranzi (100%)

The Kanaranzi component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 415B - Kanaranzi loam, 2 to 6 percent slopes

Component: Kanaranzi (100%)

The Kanaranzi component makes up 100 percent of the map unit. Slopes are 2 to 6 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.
Map unit: 415B - Kanaranzi loam, 2 to 6 percent slopes

Component: Kanaranzi (100%)

Drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 415C - Kanaranzi loam, 6 to 12 percent slopes

Component: Kanaranzi (100%)

The Kanaranzi component makes up 100 percent of the map unit. Slopes are 6 to 12 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Map unit: 454B - Mahtomedi loamy sand, 3 to 8 percent slopes

Component: Mahtomedi (85%)

The Mahtomedi component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on moraines, outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Map unit: 454C - Mahtomedi loamy sand, 8 to 15 percent slopes

Component: Mahtomedi (85%)

The Mahtomedi component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 454E - Mahtomedi loamy sand, 15 to 25 percent slopes

Component: Mahtomedi (85%)

The Mahtomedi component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map unit: 465 - Kalmarville sandy loam, frequently flooded

Component: Kalmarville, frequently flooded (100%)

The Kalmarville, frequently flooded component makes up 100 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during...
## Map Unit Description

### Dakota County, Minnesota

**Map unit:** 465 - Kalmarville sandy loam, frequently flooded

**Component:** Kalmarville, frequently flooded (100%)

*April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.*

**Map unit:** 540 - Seelyeville muck

**Component:** Seelyeville (100%)

*The Seelyeville component makes up 100 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during March, April, May, June. Organic matter content in the surface horizon is about 62 percent. Nonirrigated land capability classification is 6w. This soil meets hydric criteria.*

**Map unit:** 611C - Hawick coarse sandy loam, 6 to 12 percent slopes

**Component:** Hawick (90%)

*The Hawick component makes up 90 percent of the map unit. Slopes are 6 to 12 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.*

**Map unit:** 611D - Hawick coarse sandy loam, 12 to 18 percent slopes

**Component:** Hawick (90%)

*The Hawick component makes up 90 percent of the map unit. Slopes are 12 to 18 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.*

**Map unit:** 611E - Hawick loamy sand, 18 to 25 percent slopes

**Component:** Hawick (100%)

*The Hawick component makes up 100 percent of the map unit. Slopes are 18 to 25 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.*

**Map unit:** 611F - Hawick loamy sand, 25 to 50 percent slopes

**Component:** Hawick (100%)

*The Hawick component makes up 100 percent of the map unit. Slopes are 25 to 50 percent. This component is on outwash plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content*
Map Unit Description

Dakota County, Minnesota

Map unit: 611F - Hawick loamy sand, 25 to 50 percent slopes

Component: Hawick (100%)

in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.

Map unit: 857A - Urban land-Waukegan complex, 0 to 1 percent slopes

Component: Urban land (90%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Waukegan (10%)

The Waukegan component makes up 10 percent of the map unit. Slopes are 0 to 1 percent. This component is on outwash plains. The parent material consists of Glaciofluvial sediments over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Map unit: 857B - Urban land-Waukegan complex, 1 to 8 percent slopes

Component: Urban land (90%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Waukegan (10%)

The Waukegan component makes up 10 percent of the map unit. Slopes are 1 to 8 percent. This component is on outwash plains. The parent material consists of Glaciofluvial sediments over outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Map unit: 861C - Urban land-Kingsley complex, 3 to 15 percent slopes

Component: Urban land (65%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Kingsley (35%)

The Kingsley component makes up 35 percent of the map unit. Slopes are 3 to 15 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Map unit: 895B - Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes

Component: Kingsley (45%)

The Kingsley component makes up 45 percent of the map unit. Slopes are 3 to 8 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water
Map Unit Description

Dakota County, Minnesota

Map unit: 895B - Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes

Component: Kingsley (45%)

Movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Mahtomedi (23%)

The Mahtomedi component makes up 23 percent of the map unit. Slopes are 3 to 8 percent. This component is on moraines. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Component: Spencer (22%)

The Spencer component makes up 22 percent of the map unit. Slopes are 3 to 8 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 895C - Kingsley-Mahtomedi-Spencer complex, 8 to 15 percent slopes

Component: Kingsley (45%)

The Kingsley component makes up 45 percent of the map unit. Slopes are 8 to 15 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Mahtomedi (23%)

The Mahtomedi component makes up 23 percent of the map unit. Slopes are 8 to 15 percent. This component is on moraines. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Spencer (22%)

The Spencer component makes up 22 percent of the map unit. Slopes are 8 to 12 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 896E - Kingsley-Mahtomedi complex, 15 to 25 percent slopes

Component: Kingsley (60%)

The Kingsley component makes up 60 percent of the map unit. Slopes are 15 to 25 percent. This component is on moraines. The parent material consists of Till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.
Map Unit Description

Dakota County, Minnesota

Map unit: 896E - Kingsley-Mahtomedi complex, 15 to 25 percent slopes

Component: Kingsley (60%)

Movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Mahtomedi (30%)

The Mahtomedi component makes up 30 percent of the map unit. Slopes are 15 to 25 percent. This component is on moraines. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: 1029 - Pits, gravel

Component: Pits, gravel (100%)

Gravel pits are areas that have been mined for gravel or sand. This map unit is actively being mined or is an abandoned pit. Because of the variability of this component in this map unit, interpretation for specific uses are not available. Onsite investigation is needed.

Map unit: 1039 - Urban land

Component: Urban land (100%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Map unit: 1055 - Aquolls and Histosols, ponded

Component: Aquolls, ponded (50%)

The Aquolls, ponded component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Mineral sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 7 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

Component: Histosols, ponded (50%)

The Histosols, ponded component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 62 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria.

Map unit: 1072 - Udorthents, moderately shallow

Component: Udorthents, moderately shallow (100%)

Generated brief soil descriptions are created for major soil components. The Udorthents is a miscellaneous area.
## Dakota County, Minnesota

### 1815 - Zumbro loamy fine sand

**Component:** Zumbro, non-flooded (100%)

The Zumbro, non-flooded component makes up 100 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of Outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

### 1816 - Kennebec variant silt loam

**Component:** Kennebec (90%)

The Kennebec component makes up 90 percent of the map unit. Slopes are 0 to 4 percent. This component is on moraines. The parent material consists of Colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during April. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

### 1821 - Algansee sandy loam, occasionally flooded

**Component:** Algansee, occasionally flooded (95%)

The Algansee, occasionally flooded component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

### 1824 - Quam silt loam, ponded

**Component:** Quam, ponded (90%)

The Quam, ponded component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on moraines. The parent material consists of Glaciolacustine sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 11 percent. Nonirrigated land capability classification is 8w. This soil meets hydric criteria.

### 1902B - Jewett silt loam, 1 to 6 percent slopes

**Component:** Jewett (85%)

The Jewett component makes up 85 percent of the map unit. Slopes are 1 to 6 percent. This component is on moraines. The parent material consists of Loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.
Map Unit Description
Dakota County, Minnesota

Map unit: W - Water

Component: Water (100%)

This map unit consists of natural occurring bodies of water or water that has been impounded by structures in natural waterways. They range in size from 1.5 acres to tens of thousands of acres. This map unit is not soil, no interpretations assigned.
Map Unit Description
Washington County, Minnesota

Map unit: 329 - Chaska silt loam

Component: Chaska (90%)

The Chaska component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of Alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during March, April. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 7 percent.

Map unit: W - Water

Component: Water (100%)

This map unit consists of natural occurring bodies of water or water that has been impounded by structures in natural waterways. They range in size from 1.5 acres to tens of thousands of acres. This map unit is not soil, no interpretations assigned.
Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.
March 27, 2014

Lisa Joyal
Environmental Review Coordinator
Minnesota Department of Natural Resources
Box 25
500 Lafayette Road
Saint Paul, MN 55155

Re: Flint Hills Resources: Combined heat and power cogeneration facility project

Dear Ms. Joyal:

Barr Engineering Company (Barr) is assisting Flint Hills Resources Pine Bend, LCC (FHR) with the environmental review (Environmental Assessment Worksheet) for a proposed combined heat and power cogeneration facility at the Pine Bend Refinery (Refinery) in Dakota County, Minnesota (Figure 1). Barr requests your review of the proposed Project for potential effects on rare natural resources.

FHR proposes to construct a natural gas based combined heat and power cogeneration facility (proposed Project), generating up to a net 49.9 megawatts of electricity to reduce electricity purchases from the grid and up to 290,000 pounds per hour of steam to improve the efficiency of steam production at the Refinery. The Refinery is located in the Pine Bend Industrial District, an area of industrial development near the junction of U.S. Highway 52 and Minnesota Highway 55 (Figure 1). The proposed Project will be constructed on a 1.2 acre plot (approximately 370 feet by 140 feet) on the southeast side of the refinery. The facility will be located in the secured boundary of the current refinery footprint (Figure 2). The total disturbed area including proposed roads, grading, drainages, and other improvements to the site could be as large as 9 acres when temporary laydown and stockpile areas are considered. Typical construction equipment (e.g. backhoes, compactors, compressors, concrete mixers, dozers, front loaders, generators, graders, excavators, backhoes, rollers, scrapers) and equipment carrying materials and personnel will be used during construction.

Barr has a license agreement (LA-674) with the MDNR for access to the Natural Heritage Information System (NHIS) database, which was queried to determine if any sensitive ecological resources would be affected by the proposed Project. The following species have been documented within the vicinity of the proposed Project: loggerhead shrike (*Lanius ludovicianus*; state-endangered), peregrine falcon (*Falco...*
Loggerhead shrikes have been documented in the farmlands and rural areas adjacent to the proposed Project area within the past four years. Because loggerhead shrike generally prefer broad open areas such as croplands, lawns and pastures, with adjacent perching sites of small trees and shrubs, this species is unlikely to occur within the developed Project area. The NHIS database indicates a 2011 observation of the presence of a pair of peregrine falcons (*Falco peregrinus*; state-special concern) and a nest within the FHR facility boundary. Impacts to peregrine falcon individuals or populations are not anticipated because the proposed Project area is not in the immediate vicinity of the documented nest within the FHR facility boundary. Moreover, construction activities will not occur in the immediate vicinity of the site where the nest was observed. Occurrences of the bull snake and fox snake have been reported to the east of the proposed Project area. Both reports, however, are more than 70 years old and no recent sightings have been reported in the area. Because both snake species generally prefer wooded and open field river bluff habitat, it is not likely that either species will be present on or in the immediate vicinity of the proposed Project area due to highly industrialized land use.

According to the NHIS database, several rare species and rare ecological communities have been documented within the East Rosemount MBS SBS, the Pine Bend SNA, the Inver Grove Heights SBS, the Mississippi River, and along the Mississippi River bluff area. All of these ecologically sensitive areas are outside of the proposed Project area and FHR facility boundary.

Due to the industrial nature of the proposed Project area and the absence of suitable habitat for state-listed species, it has been determined that the proposed Project would not impact state-listed species or their associated habitats. Your concurrence with this determination is requested.

If you have any questions feel free to contact me by phone (952-832-2694) or email (jbutler@barr.com).

Sincerely,

Jessica Butler  
Ecologist  
Barr Engineering Company  
Enclosures: Figure 1 – Project Area; Figure 2– Site Map
I have reviewed your assessment of the potential for the above project to impact rare features, and concur with your assessment. In addition, please note that associated activities (e.g., drainage) should be carefully designed as to avoid any negative impacts to the ecologically significant areas that are located east of the proposed project.

The reference number for this correspondence is ERDB #20140336.

Thank you for notifying us of this project, and for the opportunity to provide comments.

Sincerely,

Lisa Joyal

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Lisa Joyal
Endangered Species Review Coordinator
NHIS Data Distribution Coordinator
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
St. Paul, MN  55155

phone: 651-259-5109
lisa.joyal@state.mn.us
www.mndnr.gov/eco
May 7, 2014

Mr. Greg F. Myers  
Sr. Air Permit Engineer  
Flint Hills Resources Pine Bend  
PO Box 64596  
St. Paul, MN 55164  

RE: EPA air permit to allow construction of a Combined Heat and Power Cogeneration Facility at the  
Rosemount refinery  
T115 R19 S24 NE  
Rosemount, Dakota County  
SHPO Number: 2014-1580

Dear Mr. Myers:

Thank you for the opportunity to comment on the above project. It has been reviewed pursuant to the  
responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966  
and implementing federal regulations at 36 CFR 800, and to the responsibilities given the Minnesota Historical  
Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

Based on available information, we conclude that no historic properties listed in or eligible for the National  
Register of Historic Places will be affected by the proposed project.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of  
this project.

Sincerely,

Sarah J. Beimers, Manager  
Government Programs and Compliance