5 Potential Impacts of the Proposed Project

The construction of a large electric power generating plant involves both short and long-term impacts. An impact is a change in the status of the existing environment as a direct or indirect result of the proposed action. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later or are further removed in distance, but are still reasonably foreseeable.

Impacts may be negative or positive and temporary or permanent or long-lasting. Short-term impacts are generally associated with the construction phase of the project and can include vegetation damage, soil compaction, and noise from construction activities. Long-term impacts can exist for the life of the project and include land changes, increases in local employment, traffic impacts during operation of a facility and changes to the local tax base. Measures that would be implemented to reduce, minimize, or eliminate potential impacts are discussed under the appropriate topic and highlighted as necessary in this section.

Because of the distributed nature of the Project, the EA discusses potential impacts for the Project as a whole in this section as well as for each proposed facility in Section 6.

The following terms are used in discussion of the potential impacts:

- Preliminary development area means the area where Aurora anticipates the components of the PV facility will be located; and
- Area of site control means the land under Aurora's control at each facility.

It may be possible to mitigate potential impacts by adjusting proposed facility size or layout, using different construction methods or implementing any number of post-construction practices. The Commission can require site permit applicants to use specific techniques to mitigate impacts or require certain mitigation thresholds or standards to be met through permit conditions.

5.1 Description of Environmental Setting

The 24 facilities are located in 16 counties in Minnesota. Descriptions for each facility, including the existing land use and environment is included in the facility descriptions in Section 6.

This section provides some an overview of the natural setting of the facilities prior to agricultural clearing. The Minnesota Department of Natural Resources and the U.S. Forest Service have jointly developed an Ecological Classification System (ECS) for ecological

mapping and landscape classification in Minnesota.[40] Table 7 shows the location of the proposed facilities within the Minnesota ECS.

Table 7: Ecological Classification of Proposed Facilities

ECS Section	Facilities
Minnesota and Northeastern Iowa Morainal Section of the Eastern Broadleaf Province	Albany, Annandale, Chisago, Dodge Center, Eastwood, Hastings, Lake Emily, Lake Pulaski, Lester Prairie, Montrose, Scandia, Waseca, West Faribault, West Waconia, Wyoming
North-Central Glaciated Plains Section of the Prairie Parkland Province	Atwater, Brooten, Fiesta City, Paynesville, Pipestone
Western Superior Uplands Section of the Laurentian Mixed Forest Province	Lawrence Creek, Mayhew Lake
Paleozoic Plateau of the Eastern Broadleaf Forest Province	Pine Island, Zumbrota

The ECS is useful for understanding native plant communities and their distribution. The facility locations, however, are in areas where native vegetation has been disturbed and replaced with cultivated crops or pasture to a great extent. Although trees are present within some locations, they tend to be in shelterbelts or around homesteads and generally near the edge of the preliminary development areas.

EERA staff used the National Land Cover Database (NLCD) to provide overview of vegetative cover at the facility locations and in an area of comparison around each facility. The NLCD uses satellite imagery to display land cover across the United States. NLCD uses 16 classes of land cover. Table 8 provides the NLCD definitions for the land cover classifications used in this document.[41]

[40] Minnesota Department of Natural Resources, Ecological Classification System: Ecological Land Classification Hierarchy, *http://www.dnr.state.mn.us/ecs/index.html*

[41] United States Geological Service. *The National Map: Land Cover*. http://nationalmap.gov/landcover.html and National Land Cover Database 2011: Product Legend http://www.mrlc.gov/nlcd11_leg.php

Table 8: Land Cover Classifications

Classification	Definition
Open Water	All areas of open water, generally with less than 25% cover or vegetation or soil
Developed, Open Space	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
Developed, High Intensity	Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
Barren Land (Rock/Sand/Clay)	Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Grassland/Herbaceous	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
Woody Wetlands	Areas where forest or shrub land vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Table 9 provides a summary of NLCD land cover for the project as a whole. Land cover for each facility is presented in Section 6.

Table 9: Aurora Distributed Solar - Land Cover

Land Cover Classification		Facility Control Area		Preliminary Development Area	
		Acres	Percent	Acres	Percent
Open Water		--	-	-	-
Developed	Open Space	42.5	2.7%	23.1	1.9%
	Low Intensity	16.3	1.0%	12.3	1.0%
	Medium Intensity	2.2	0.1%	0.76	0.1%
	High Intensity	-	-	-	-
Barren Land		-	-	-	-
Deciduous Forest		74.0	4.7%	23.2	1.9%
Evergreen Forest		4.2	0.3%	0.86	0.1%
Mixed Forest		-	-	-	-
Shrub/Scrub		-	-	-	-
Grassland Herbaceous		19.8	1. 3%	9.41	0.8%
Pasture/Hay		269.2	17.2%	125.6	10.5%
Cultivated Crops		1,119.6	71.5%	997.7	83.4%
Woody Wetlands		6.7	0.4%	2.19	0.2%
Emergent Herbaceous Wetlands		11.3	0.7%	1.30	0.1%
Totals		1,565.7	100.0%	1,196.4	100.0%

5.2 Effects on Human Settlement

Construction and operation of new generation facilities have the potential to impact human settlement. These impacts may be short-term, such as an influx of construction jobs, traffic impacts during the construction phase due to increased traffic or oversized loads or construction noise that is noticeable at neighboring residences or recreation facilities. Once constructed there may also be long-term impacts such as changes in land use, displacement of homes or businesses or an increase in the local tax base.

5.2.1 Socioeconomic

In general, the proposed facilities are located in rural areas or on the edges of cities. Table 10 provides an overview of population characteristics in communities where facilities are proposed.

Table 10: Population Characteristics

Facility	Jurisdiction (City or Township)	Population				Median Household Income
		2010 Census	2013 Estimate	% Minority	% Below Poverty	
Benton County		38,451	38,756	5.5%	14.5%	$52,200
Mayhew Lake	Sauk Rapids Township	584	442	1.7%	2.5%	$74,375
Blue Earth County		64,103	64,504	7.2%	19.2%	$49,935
Eastwood	Mankato Township	1,969	1,798	4.1%	3.3%	$83,250
Carver County		91,042	92,770	7.2%	5.0%	$83,773
West Waconia	Young America Township	715	703	1.5%	1.8%	$87,344
Chippewa County		12,441	12,272	6.5%	10.6%	$49,434
Fiesta City	Sparta Township	748	760	3.5%	3.8%	$70,313
Chisago County		53,887	53,691	4.2%	7.5%	$67,157
Chisago	Lent Township	3,091	3,068	3.2%	6.1%	$80,104
Lawrence Creek	Shafer Township	1,048	1,119	4.2%	8.4%	$67,500
Scandia	Franconia Township	1,085	1,902	2.8%	10.9%	$77,125
Wyoming	City of Wyoming	7,791	7,758	3.4%	5.7%	$75,786
Dodge County		20,087	20,159	3.9%	7.4%	$69,301
Dodge Center	Wasioja Township	914	957	4.2%	3.6%	$68,813
Goodhue County		46,183	46,259	5.4%	9.9%	$56,836
Pine Island	City of Pine Island	3,263	3,440	3.4%	8.9%	$62,828
Zumbrota	City of Zumbrota	3,252	3,284	4.2%	12.4%	$46,507
	Minneola Township	629	775	2.7%	1.2%	$80,000
Kandiyohi County		42,239	42,265	7.2%	13.6%	$50,149
Atwater	Gennessee Township	413	426	1.2%	8.2%	$68,750
Le Sueur County		27,703	27,758	4.5%	8.8%	$58,922
Lake Emily	Kasota Township	1,581	1,596	1.2%	6.0%	$72,692
McLeod County		36,651	36,321	4.1%	8.5%	$55,170
Lester Prairie	Winstead Township	968	874	1.0%	3.4%	$69,063
Pipestone County		9,596	9,470	6.5%	10.7%	$46,019
Pipestone	Pipestone City	4,317	4,247	9.8%	15.1%	$42,909
	Sweet Township	324	357	3.1%	2.0%	$59,167
Stearns County		150,642	151,053	8.2%	13.1%	$54,551
Albany	Albany Township	980	903	1.6%	7.1%	$65,982
Brooten	City of Brooten	743	646	1.3%	14.7%	$34,625
Paynesville	Paynesville Township	1,421	1,282	1.4%	3.1%	$66,518
Rice County		64,142	64,585	10.7%	11.6%	$59,915
West Faribault	Warsaw Township	1,320	1,394	2.3%	7.8%	$63,750
Waseca County		19,136	19,046	6.3%	9.4%	$53,657
Waseca	Saint Mary Township	460	397	0.7%	6.8%	$63,125
Washington County		238,136	241,315	12.2%	5.7%	$81,540
Hastings	Denmark Township	1,737	1,684	4.5%	3.6%	$100,703
Wright County		124,700	126,142	5.0%	6.5%	$71,598
Annandale	Corinna Township	2,322	2,218	2.0%	4.4%	$71,313
Lake Pulaski	Buffalo Township	1,804	1,967	1.4%	2.4%	$81,484
Montrose	Woodland Township	1,082	973	3.4%	3.3%	$63,250

None of the proposed facilities is located in areas of disproportionately high minority populations or low-income populations.

Potential Impacts

Socioeconomic impacts resulting from the project will be primarily positive with an influx of wages and expenditures made at local businesses during the construction of the project, increased tax revenue and increased opportunities for business development.

There will be a short-term influx of contractor employees during construction of the various aspects of the project. Aurora anticipates that approximately 296 jobs will be directly created during the construction phase of the Project.[42] Aurora anticipates that each site will require an average of six unique construction jobs, plus 3.3 jobs per installed MW, for a total construction-related workforce of between 11 and 39 workers per site.[43] In addition to the construction jobs directly related to the Project, Aurora estimates approximately 466 construction-related jobs (e.g. engineering, design, sales, marketing, accounting, etc.) will be required to bring the Project online.[44]

The communities near the project are expected to experience short-term positive economic impacts during the construction phase of the Project through the use of the hotels, restaurants and other consumer goods and services by the various workers, as well as purchase of some materials such as fuel, concrete and gravel from local vendors.

Once the Project becomes operational, Aurora anticipates that 19 permanent full-time equivalent positions will be required to operate and maintain the facilities.[45]

Aurora will pay property taxes on the facilities to local governments in accordance with state and county law. Property tax revenue will vary by facility due to variations in facility acreage, property classifications and mill rates. Property taxes are calculated on the land underlying the facility; the value of the equipment at the facility is not included in the calculation. In lieu of the personal property tax on the equipment, Minnesota has adopted a production tax of $1.20 per MWh. Production taxes are calculated based on energy production, and are paid to the local governments where the facility is located; 80 percent to the county and 20 percent to the city or township[46]. Based on Aurora's estimated annual electricity production of approximately 200,000 MWh, the Project would produce approximately $240,000 annually.

For the most part, the proposed facilities are currently used for agricultural purposes. In aggregate, the Aurora Distributed Solar Project will result in up to approximately 1,120 acres being removed from agricultural production for at least the anticipated 25- year minimum useful life of the Project. Impacts to agriculture are discussed further in Section 5.3.1, but

[42] Application, at p. 47. Appendix C
[43] Application, at p. 27
[44] Application, at p. 47Appendix C
[45] Application, at p. 47
[46] Minnesota Statutes, 272.0295

the change in land use would result in a relatively small annual loss of overall crop production in the surrounding communities (0.026 percent of the approximately 4.3 million acres of agricultural land in the affected counties) and in in the state generally. Aurora will compensate landowners for the land used for the facilities, either through lease payments or purchase of the land.[47]

If a PV facility is abandoned or is not decommissioned properly at the end of its useful life, the responsibility for proper disposal of the project components and restoration may fall on the landowner.

Mitigative Measures

Socioeconomic impacts resulting from construction of the Project would be primarily positive with an influx of wages and expenditures made at local businesses during the construction.

Aurora will compensate landowners for loss of use of the development area through lease payments or purchase of the land.

Section 10 of the *Permit Site Template* addresses decommissioning and site restoration. Section 10.1 of the *Permit Site Template* would require Aurora to file a *Decommissioning Plan* with the Commission prior to operation. Section 10.2 of the *Permit Site Template* would establish Aurora as the responsible party for carrying out decommissioning task and sets out minimum standards for restoration and Section 10.3 of the *Permit Site Template* addresses abandoned solar installations.

5.2.2 Land Use and Zoning

Zoning is a regulatory tool used by local governments (counties, cities and some townships) to geographically restrict or promote certain tips of land uses. Minnesota statues provide local governments with zoning authority to promote the public health and general welfare.

The Aurora Project is subject to permitting under Minnesota's Power Plant Siting Act. With respect to the role of state permitting of large energy facilities, Minnesota Statute 216E.10, subdivision 1 states:

> *To assure the paramount and controlling effect of the provisions herein over other state agencies, regional, county, and local governments, and special purpose government districts, the issuance of a site permit or route permit and subsequent purchase and use of such site or route locations for large electric power generating plant and high-voltage transmission line purposes shall be the sole site or route approval required to be obtained by the utility. Such permit shall supersede and*

[47] SPA, at p. 47

> *preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose government.*

Although Aurora is not required to seek permits or variances from local government to comply with local zoning, impacts to local zoning are clearly impact to current and planned human settlement and the Commission considers impacts to human settlement as a factor in its siting decision.

Most of the facilities are located in areas zoned as agricultural or transitional areas between agricultural and urban areas. Some facilities (Annandale, Eastwood, Mayhew Lake, Montrose, Pipestone and Zumbrota) are located in orderly annexation areas.

Most of the facility locations are zoned by the county, although some fall under city (Brooten and Wyoming), some fall under township authority (Chisago, Annandale) and some are in areas planned for growth (typically designated as orderly annexation areas) where changes in land use, such as that proposed by the Aurora facilities, require annexation into a neighboring city before the change can be effected.

Some jurisdictions, Chisago, Stearns, and Kandiyohi counties, address utility-scale solar facilities in their zoning ordinances, specifying zoning districts where they are compatible or incompatible and in many cases identifying performance standards such as setbacks from property boundaries. Many local ordinances preclude construction of solar facilities within designated shoreland protection areas. Many jurisdictions do have solar ordinances directed to preserving solar access and providing standards for smaller solar installations that are accessory uses for homes or businesses.

Potential Impacts

The development of the facility would change the land use from a generally agricultural use to an industrial use for at least 25 years. After its useful life, the development area could be restored for use as agricultural or other planned land uses. In some cases, this has the potential to re-direct development away from the facility. In other cases, the facility may serve as a useful role in ensuring a productive use of the land until the location is ripe for a more intense land use.

In cases where facilities are located in areas where extension of water, sewer, or other urban services are planned, the planned expansion would most likely bypass the parcel on which the facility is located. Although the facility could be restored at the end of its useful life to allow development served by the utility extension, the city would still need to pay for the infrastructure that bypasses the facility and will remain untapped for at least 25 years.

Mitigative Measures

Many counties have designated shoreland protection areas that require setbacks from the ordinary high water level of surface waters. The Site Permit could require compliance with local shoreland ordinances.

Landscaping plans, described in Section 5.2.7, can be used to minimize visual impacts to adjacent land uses.

5.2.3 Property Values

Property values are influenced by a complex interaction of factors specific to individual parcels. These factors can include, but are not limited to, condition, improvements, acreage, or neighborhood characteristics, as well as proximity to schools, parks, and other amenities. In addition, local and national market conditions often influence property values. The presence of a utility-scale PV facility would become one of many interacting factors that could affect a property's value.

Electrical generating facilities have the potential to impact property values. Often, negative effects from these facilities are the result of impacts that extend beyond the immediate footprint. Examples include noise, emissions and visual impacts. Unlike fossil-fueled electric generating facilities, a PV facility is expected to have would have no emissions and no noise impacts to adjacent land uses during operation of the facility. The installation of PV facilities would create a visual impact, but lacking the height of smokestacks of wind turbines, the visual impact at ground level, or within a neighboring building, would be limited.

A review of the literature found no research specifically aimed at quantifying impacts to property values based solely on proximity to utility-scale PV facilities. As the Aurora Distributed Solar Project would involve the first utility-scale PV facilities across Minnesota, comparable sales data do not exist. As the industry continues to develop comparable data should become available.

For these reasons, the impact to the value of one particular property based solely on its proximity to a utility-scale PV facility is difficult to determine. Widespread negative impacts to property values are not anticipated. In unique situations it is possible that individual property values might be negatively impacted.

Mitigative Measures

Landscaping plans, described in Section 5.2.7, can be used to minimize visual impacts to adjacent land uses.

5.2.4 Public Services and Transportation

Public services in the form of fire, law enforcement and emergency services are provided by the counties, municipalities and townships where the proposed facilities are located.

The existing public road system that services and provides access to the proposed facilities is generally located along section lines and is managed by state and local government units,

Telephone and electric services are delivered by electric utilities, and distribution and transmission lines are typically located along public roads.

Water and sewer services are provided in some areas by municipalities, while at many of the locations water is provided through a private well and sanitary services are provided through private septic systems at rural residences sewer, fire, and police services.

Some of the facilities are located in areas where private wells and septic systems are used at rural residences. The Minnesota Department of Health County Well Index identifies one well within the preliminary development area for the Scandia Facility and one well within the facility land control area of the Lawrence Creek facility.

Potential Impacts

Construction activities may inadvertently disrupt utilities. Underground utilities are particularly vulnerable to disruption, as construction personnel may not be aware of their existence.

Aurora does not anticipate that facilities will be served by city water or sewer. Aurora may install wells and septic systems at some facilities to provide sanitary services and water for maintenance.

In areas where the proposed facilities are located near growing municipalities, construction of a facility may disrupt the orderly expansion of city utilities and require services to be routed around the PV facility. This type of "leapfrog" development can be costly to cities, and disruptive to plans for orderly expansion.

Limited, short-term temporary impacts to electrical service may occur when Xcel Energy interconnects the facilities to Xcel Energy's distribution system.

As none of the facilities is crossed by a railroad, there will be no impact to rail traffic. Potential impacts to air traffic are discussed in Section 5.2.8.

Each facility will be accessed from the public road network. In some cases the Aurora facility will be able to use an existing road access point, while in others the facility will require establishment of a new access point from the existing roadway network. Other than the establishment of facility access, no upgrades or changes to existing roadway systems are necessary for construction or operation of the Project.[48]

[48] Application, at p. 25

Aurora will use existing roadways to deliver construction materials and personnel to facility construction sites. Light-duty trucks would travel to the facility daily during the course of construction. Aurora estimates that for every two MW of installed capacity there will be between 25 and 35 trucks delivering materials to a facility over the course of construction.[49] No impacts to roads would be expected during the operation of the facilities, as minimal traffic would occur during regular maintenance.

Mitigative Measures

As part of the facility design process Aurora will identify the locations of underground utilities and avoid impacts to underground utilities in final facility design. Prior to construction, utility locations will be marked on site plans and on the ground to avoid impacts from construction activities.

Aurora will seek appropriate state and local permits for wells or septic systems installed as part of any facility.

New drives or access roads would require approval by appropriate local or state highway departments.

5.2.5 Displacement

Because of the land requirements, solar facilities are generally sited away homes or business. In some cases, however, construction of solar facilities may require displacement of existing homes or businesses to allow for the efficient use of land.

Potential Impacts

Aurora anticipates that construction of the Project would result in the removal of one home at the Mayhew Lake facility. The landowner rents the home. If the home is occupied when construction begins, the renter would be displaced, and would need to seek new housing.

Construction of the Paynesville facility would result in the removal of the remains of an abandoned farmstead. Because the home is not considered habitable (see Figure 66) removal of the structure is not considered to be displacement.

Mitigative Measures

Aurora has committed to providing sufficient notice of the project schedule with the landowner to allow for notice to the renters.[50] As the removal of the home is part of a voluntary agreement between Aurora and the landowner, no additional measures are identified to mitigate the displacement.

[49] Application, at p. 27
[50] Application, at p. 40

5.2.6 Noise

Noise, typically defined as a loud or unpleasant sound, is measured in units of decibels (dB) on a logarithmic scale. The A weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. For example, a noise level change of 3 dBA is barely perceptible to average human hearing while a 5 dBA change in noise level is noticeable. For the Project, noise would primarily be experienced during the construction phase of the Project and to a lesser extent during the operations phase from the inverters and transformers.

Recognizing that some level of noise is the necessary result of human activity, and that sensitivity to noise can reasonably differ depending upon the activity and site, the Minnesota Pollution Control Agency (MPCA) has established noise limits. Land use activities associated with residential, commercial and industrial land are grouped together into Noise Area Classifications (NAC). Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) noise limits for land use activities within the NAC. Table 9 shows the Minnesota Pollution Control Agency (MPCA) daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a one-hour period; L_{50} is the dBA that may be exceeded 50 percent of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent of the time within one hour.

Typical noise sensitive receptors include residences, churches, and schools. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of farm equipment, wind, rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50 to 60 dBA, would be expected near roadways, urban areas and commercial and industrial properties in the project area.

Table 11: MPCA Daytime and Nighttime Noise Limits

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Potential Impacts

Noise concerns for the Project are related primarily to the construction phase as the result of heavy equipment operation and increased vehicle traffic associated with the transport of construction personnel to and from the work area. Aurora anticipates that construction activities will occur between the hours of 6 a.m. and 7 p.m. on Monday through Saturday,

with the potential for limited low-noise activities on Sundays.[51] The MPCA nighttime noise limits would apply to the first hour of construction activities.

During operation of the Project, the primary source of noise will be from the inverters, and to a lesser extent from the transformers and rotation of tracking systems, located at each facility. All electrical equipment will be designed to National Electrical Manufacturer Association (NEMA) Standards. Noise will depend upon the inverter model selected. Although Aurora has not selected an inverter at this time, manufacturer's data from the models under consideration shows a 50 dBA (the most stringent MPCA standard) noise level would be perceptible at a range of 30 to 224 feet from the inverter.[52]

Preliminary facility design indicates that the closest home would be approximately 180 feet from any solar array. Because the inverters would be located within the solar arrays, noise impacts during operation of the facility are not anticipated at residences and other.

Because the facilities will not be generating electricity at night, the tracking systems would not be rotating and noise from inverters would be at less than peak levels.

Aurora anticipates that most maintenance activities will be performed during the day, although it may be preferable to perform some maintenance activities after the sun is down in order to limit impacts to energy production. Maintenance activities that may potentially create noise will be performed during the day in order to minimize noise impacts to nearby residents.

Noise from the electric collection system and gen-tie lines is not expected to be perceptible.

Mitigative Measures

Section 8.8 of the Site Permit Template would require Aurora to limit construction and routing maintenance activities to daytime working hours as defined in Minnesota Rule 7030.0200.

No mitigation measures are proposed for the operational phase of the project as operational noise levels are not predicted to exceed the state noise limits.

5.2.7 Aesthetics

Aesthetics refer to the natural and built landscape that contribute to the public's experience and appreciation of their environment. Features, such as wetlands, surface waters, landforms, forests and vegetation patterns are among the natural landscape features that define an area's visual character. Buildings, roads, bridges and other structures represent

[51] Application, at p. 44
[52] Application, at p. 43

the built environment imposed upon the natural landscape. The scenic value or visual importance of an area is a subjective matter and depends upon the perception and philosophical or psychological response of the viewer. The level of impact to visual resources is also subjective and generally depends on the sensitivity and exposure of a particular viewer. The perceived impact can vary greatly from one individual to the next.

Potential Impacts

Installation of the proposed solar facilities will result in visible landscape changes as land that is now primarily covered in row crops or pastureland is converted to a solar facility. Based on preliminary facility design, up to 1,200 acres will be converted from its current use, primarily cropland or pasture, for at least 25 years, the minimum estimated useful life of a PV facility. The primary components of a PV solar facility that alter the landscape are solar arrays and the perimeter fencing. Existing solar facilities near Oronoco Minnesota and Lambton County, Ontario are shown in Figures 4 and 5.

Because of their relatively low profile, the facilities will not be visible from great distance. The aesthetic impacts will be experienced primarily by nearby residents and people using the roads adjacent to facilities. Some facilities are located near existing homes and residential areas.

Figure 4: 517 kV Solar Facility - Oronoco MN[53]

[53] Aurora Distributed Solar

Figure 5: 80 Acre Solar Farm, Lambton County Ontario[54]

A limited amount of tree-clearing is anticipated at some facilities. The gen-tie line that connects the facility to the interconnection substation is anticipated to be underground to the edge of Aurora's area of land control in most cases. At the point of interconnection, the gen-tie line will be owned by Xcel Energy. The gen-tie line between the point of transfer and the substation may be either underground or overhead, depending upon specific site conditions. Any overhead gen-tie lines will be similar in appearance to the distribution lines in the existing landscape.

When the PV panels are at a zero degree angle (sun is directly overhead) panels will be approximately four to six feet off of the ground. When panels are at their maximum tilt of 45 degrees (tilted east in the morning and west in the afternoon as the panels follow the sun) the tops of the panels will be approximately eight to ten feet off the ground.

Unlike concentrating solar, which uses mirrors to concentrate the solar energy to create heat energy used to create electricity, PV panels are constructed of dark, light-absorbing material and covered with an anti- reflective coating in order to limit reflection. Because of the materials used, glare and reflection are expected to be minimal.

Each facility will be enclosed by an 8-foot security fence (a seven-foot chain link fence topped by another foot of barbed wire).

[54] Aurora Distributed Solar

Lights will be installed on temporary 18-foot service poles to provide lighting during the construction phase of the Project. After construction the temporary service poles will be removed and permanent motion-activated lighting will be installed near O&M areas, security gates and in perimeter areas. Lighting will be downlit to minimize impacts to adjacent land uses. Aurora anticipates that most maintenance activities will be performed during the day, although it may be preferable to perform some maintenance activities that require activation of facility lighting after the sun is down in order to limit impacts to energy production.

Mitigative Measures

The primary strategy for minimizing aesthetic impacts is choosing sites where solar facilities are in keeping with the existing landscape, not immediately adjacent to homes or shielded from view by terrain or existing vegetation.

Landscaping plans can be developed to identify site-specific landscaping techniques including vegetation screening, berms or fencing to minimize visual impacts to adjacent land uses. Aurora is developing landscaping plans for certain, as yet unidentified, facilities and has committed to filing the plans with the Commission when finalized.

Xcel Energy will seek local permits for the portion of the gen-tie line between the facility and the Xcel substation. Design of those lines will be consistent with local standards for low-voltage distribution lines.

5.2.8 Public Health and Safety Including EMF

Safety issues at PV facilities are largely associated with construction. Safety concerns associated with the operation of a PV facility are limited.

Potential Impacts

The manufacturing process for PV panels does involve the use of hazardous chemicals and proper disposal of the PV panels at the end of the Project is necessary to ensure that leaching of the materials, in particular lead used in the soldering of individual cells onto a module[55].

Unauthorized access to PV facilities, both during construction and operation phases, could result in safety issues. As with any large construction project, there is a potential for construction accidents including falls, vehicle accidents, electrical accidents, and power tool accidents. Unlike wind turbine installations, construction activity occurs close to ground level and special emergency procedures for rescue in tall and confined spaces are not necessary.

[55] Oregon Department of Transportation, *Health and Safety Concerns of Photovoltaic Panels*, http://www.oregon.gov/ODOT/HWY/OIPP/docs/life-cyclehealthandsafetyconcerns.pdf

Compared to other solar technologies such as Concentrating Solar Power, PV installations such as those proposed by Aurora are unlikely to create hazards to aircraft.[56] Aurora conducted the Federal Aviation Administration's (FAA) Notice Criteria screening tool on the eight facilities within three nautical miles of FAA-registered airports (Brooten, Dodge Center, Fiesta City, Lake Pulaski, Lester Prairie, Pipestone, Waseca, and West Faribault) to determine if further aeronautical study or FAA filing is needed. Following the results of the screening tool, FAA determined that no further review of seven of the facilities (Brooten, Dodge Center, Lake Pulaski, Lester Prairie, Pipestone, Waseca, and West Faribault) was required. FAA recommended further study of the Fiesta City facility; potential impacts are discussed in Section 6.8.

Electric and Magnetic Fields

Voltage transmitted through any conductor produces both an electric field and a magnetic field in the area surrounding the wire. The electric field associated with electric transmission lines extends from the energized conductors to other nearby objects. The magnetic field associated with electric transmission lines surrounds the conductor. Together, these fields are generally referred to as electromagnetic fields, or EMF. These effects decrease rapidly as the distance from the conductor increases.

The Aurora Project will not require construction of high voltage transmission lines, but will transfer electricity produced at each facility to the local distribution substation through a low-voltage gen-tie line with a maximum capacity of 34.5 kilovolts (kV). The gen-tie lines are anticipated to be constructed underground within the facilities and may be either underground or overhead at the point of interconnection, generally at a facility's fence line, where electricity is transferred to Xcel Energy.

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with a transmission line extends from the energized conductors to other nearby objects such as the ground, towers, vegetation, buildings and vehicles. The electric field from a transmission line gets weaker as one moves away from the transmission line. Nearby trees and building material also greatly reduce the strength of transmission line electric fields.

The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/M). Transmission line electric fields near ground are designated by the difference in voltage between two points (usually 1 meter). Maximum conductor voltage is defined as the nominal voltage plus five percent. In low-voltage distribution lines of the type anticipated in this project, the maximum operating voltage would be 15 kV for a 13.8 kV line and 36 kV for a 34.5 kV line. Underground construction does provide a shield from electric fields. Based on material from other dockets before the

56 DOE & BLM. Solar Energy Development Environmental Considerations. http://solareis.anl.gov/guide/solar/pv/index.cfm

Commission, electric fields would be very low, perhaps 0.15 kV/M near the centerline, rapidly disappearing to zero for overhead lines and zero for any portion of the line constructed underground.[57]

There is no federal standard for transmission line electric fields. The Commission, however, has historically imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground. The standard was designed to prevent serious hazards from shocks when touching large objects parked under AC transmission lines of 500 kV or greater.

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with a transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as milligauss (mG) and is dependent upon the current flowing through the conductor. In other proceedings before the Commission magnetic fields were estimated at up to 18.8 mG for 13.8 and 34.5 kV distribution line under typical operating conditions (171 Amps).[58]

Mitigative Measures

Section 10 of the Site Permit Template requires that Aurora prepare a *Decommissioning Plan.*

Section 11.4.1 of the Site Permit Template requires compliance with FAA determinations.

Construction will comply with local, state, and federal regulations regarding installation of the facilities and standard construction practices. Established industry safety procedures will be followed during and after construction of the Project.

All facilities will be fenced to prevent unauthorized access to the facility.

Section 8.20 of the Permit Site Template requires Aurora to prepare *an Emergency Response Plan* prior to Project construction. The *Emergency Response Plan* will identify procedures to be followed in the event of an emergency during construction. Because contact information for emergency officials and the location of hospitals would vary by facility, information for each facility should be included in the *Emergency Response Plan.*

Based upon current scientific evidence, no adverse impacts from electric or magnetic fields associated with the Project's gen-tie lines are anticipated.

[57] Department of Commerce, *Environmental Report: Hollydale 115 kV Transmission Project.* February 2013, eDocket ID: 20132-83588-01
[58] Ibid, at p. 60

5.2.9 Recreation

Outdoor recreational opportunities in the area include hiking, biking, camping, boating, hunting, fishing, wildlife viewing, hiking, cross country skiing, snowmobiling. The location of recreational resources relative to individual facilities is discussed in Section 6.

There are no federal, county or state parks within or adjacent to any of the proposed facilities. Several facilities are within one-half mile of county or local parks, including the Pipestone Facility (Westview Park and middle/high school ball fields); Waseca Facility (a city Nature Area and Loon Lake Park), the West Faribault Facility (Spring Greenway), and the Wyoming Facility (Banta Park).

The Minnesota DNR has established Wildlife Management Areas (WMAs) to provide wildlife habitat, improve wildlife production, and provide public opportunities for hunting and trapping. WMAs are open to the public for hunting, fishing, trapping and wildlife viewing but are closed to all-terrain vehicles and horses because of potential detrimental effects on wildlife habitat. There are no WMAs within any of the Project facilities; the Paynesville Facility is located directly west of the Spirit Lake WMA. Five other Project facilities are within one mile of WMAs: the Chisago Facility (Carlos Avery WMA), the Hastings Facility (Rutstrum WMA), the Lake Emily Facility (Ottawa WMA), the Montrose Facility (Malardi Lake WMA), and the Pipestone Facility (Pipestone Indian WMA).

Scientific and Natural Areas (SNAs) are designated to protect rare and endangered species habitat, unique plant communities, and significant geologic features that possess exceptional scientific or educational values. There are no SNAs within one mile of any of the Project facilities.

Waterfowl Production Areas (WPAs) provide habitat for a vast variety of plants and wildlife. WPAs provide opportunities for hunting, wildlife watching and photography. There are no WPAs located within any of the proposed facility locations. WPAs are located just south of the Annandale facility and within one mile of the Pipestone facility.

The Mayhew Lake Facility parcel is located on a private parcel located within the Sauk Rapids-Rice Goose Refuge. Goose Refuges provide habitat and protection for geese, but hunting of other waterfowl is allowed on public lands within the refuge boundaries[59] Refuge Goose Refuge boundaries. The Pipestone Facility is located on a private parcel within the boundaries of the Hiawatha State Game Refuge, where small game hunting is allowed on public parcels. Hunting activities could occur on other parcels within the Refuge boundaries.

There are no National Parks or National Wildlife Refuges identified within one mile of the Project facilities. The Pipestone facility is located approximately half a mile from the southern boundary of the Pipestone National Monument. The Pipestone National Monument

[59] Minnesota Rule, Part 6240.1850 https://www.revisor.leg.state.mn.us/rules/?id=6240.1850&format=pdf

is managed by the National Park Service, and offers an opportunity to explore cultural and natural resources that are unique to the area. The Monument contains active quarry pits where Native Americans continue the traditions of quarrying pipestone. The quarries are surrounded with native tallgrass prairies, and there are trails located within the Monument for the public to explore.[60]

Both the Lawrence Creek and Hastings facilities are located within one mile of the St. Croix National Scenic Riverway. Recreational use of the river includes boaters and rafters.

The Faribo Sno-Go Trail snowmobile trail crosses the preliminary development area of the West Faribault facility. The trail operates through the property with the cooperation of the landowner. The preliminary development areas of several other facilities (Annandale, Lester Prairie, Mayhew Lake, Montrose and Waseca also overlap with snowmobile trails that are located in road ditches.

Potential Impacts

All proposed project facilities will be located on private lands, so no public recreational lands will be directly impacted by construction or operation of the proposed PV facilities. Visual impacts may affect individuals utilizing public or private lands within or near the proposed route. Temporary noise impacts could be experienced by individuals using the recreational resources in the area during construction of the facilities.

No impact to hunting activities is anticipated from the Project. The location of the PV facilities could potentially affect hunting activities in close proximity to the extent that they may constrain shooting directions in the immediate vicinity of the structures.

Given distance between both the Lawrence Creek and Hastings facilities and the St. Croix National Scenic Riverway, the wooded bluffs on the banks of the river, and the low visual profile of the facilities, neither facility is anticipated to be visible to recreational users on this river.

Construction of the West Faribault facility would require a re-routing of the Faribo Sno-Go trail in the area of the facility. Other snowmobile trails located in road ditches near the Annandale, Lester Prairie, Mayhew Lake, Montrose and Waseca facilities are not likely to be impacted and realignment of these trails is not anticipated.

Mitigative Measures

Aurora has stated its intention of coordinating with the local Snowmobile Clubs and trail associations, to identify potential conflicts and, where necessary, realignment opportunities.

[60] National Park Service. Pipestone National Monument: Plan Your Visit
http://www.nps.gov/pipe/planyourvisit/index.htm

Because the snowmobile trails are located on private lands with the agreement of the landowner, nor further mitigation measures are identified.

5.3 Land-based Economies

Installation of a solar PV facility will result in a change of land use. The current land use would be displaced with the PV panels and the roads, fencing, inverters, electrical collection system and other infrastructure necessary to support the operation of the PV facility.

To the extent that the PV facility displaces other economic uses of the land, such as farming, mining or forestry, the facility will impact land-based economies at the site. Impacts on land-based economies on neighboring parcels are not anticipated.

5.3.1 Agriculture

Rural areas, with their relatively large parcels of relatively flat open land, tend to be attractive locations for developers seeking to site ground-mounted PV projects requiring 7 to 10 acres per MW. At least a portion of all the proposed facilities are located on agricultural land based on NLCD classifications.[61]

Table 12: Agricultural Land Cover by County[62]

County	Facility	Acres of Agricultural Land		Percent of County Agricultural Land
		County	Preliminary Development Area	
Benton	Mayhew Lake	183,101.9	20.6	0.011%
Blue Earth	Eastwood	380,704.3	46.2	0.012%
Carver	West Waconia	154,194.4	72.6	0.047%
Chippewa	Fiesta City	317,439.3	25.6	0.008%
Chisago	Chisago	135,576.0	50.4	0.037%
	Lawrence Creek		39.3	0.029%
	Scandia		22.6	0.017%
	Wyoming		56.7	0.042%
	Total - Chisago facilities	**135,576.0**	**169.0**	**0.125%**
Dodge	Dodge Center	232,450.7	50.3	0.022%
Goodhue	Pine Island	304,815.1	41.2	0.014%
	Zumbrota		29.2	0.010%
	Total Goodhue Facilities	**304,815.1**	**70.4**	**0.023%**
Kandiyohi	Atwater	399,099.3	35.4	0.009%
Le Sueur	Lake Emily	224,382.8	42.3	0.019%
McLeod	Lester Prairie	268,111.6	24.1	0.009%
Pipestone	Pipestone	239,807.4	14.5	0.006%

[61] Agricultural land includes NLCD categories “pasture/ hay” and “cultivated crops”.
[62] U.S. Geological Survey, 20140331, NLCD 2011 Land Cover (2011 Edition): U.S. Geological Survey, Sioux Falls, SD)

Rice	West Faribault	228,449.1	51.2	0.022%
Stearns	Albany	625,282.6	105.7	0.017%
	Brooten		13.0	0.002%
	Paynesville		97.8	0.016%
	Total Stearns Facilities	**625,282.6**	**216.4**	**0.035%**
Waseca	Waseca	229,910.5	85.2	0.037%
Washington	Hastings	103,188.5	40.5	0.039%
Wright	Annandale	273,474.7	70.6	0.026%
	Lake Pulaski		55.3	0.020%
	Montrose		33.1	0.012%
	Total Wright Facilities	**273,474.7**	**159.0**	**0.058%**
All Counties	**All Facilities**	**4,299,988.2**	**1,123.3**	**0.026%**

Although much of the land in southern Minnesota has historically been used for agricultural purposes, there are differences in the quality and suitability of land for purposes of agricultural production. The United States Department of Agriculture (USDA) defines prime farmland as follows:

> *Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Examples of soils that qualify as prime farmland are Palouse silt loam, 0 to 7 percent slopes; Brookston silty clay loam, drained; and Tama silty clay loam, 0 to 5 percent slopes.*[63]

Although "prime farmland" characteristics are the same nationwide, the USDA also realizes that certain areas that do not meet the specific characteristics determined by soil classification data, are nevertheless important at a statewide level.

Additional farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the

[63] U.S. Department of Agriculture, Natural Resources Conservation Service. *National soil survey handbook, title 430-VI*. Available online.. Sec. 657.5 Identification of important farmlands. http://www.soils.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054226#ex1

appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some States, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by State law.[64]

Table 13 summarizes prime farmland by facility.

Table 13: Prime Farmland by Facility

Analysis Area	Prime Farmland Classification										Total Acres
	All areas prime farmland		Farmland of statewide importance		Not prime farmland		Prime farmland if drained		Other prime farmland[65]		
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	
Albany											
Control	102.2	44.3%	-	-	62.6	27.2%	65.8	28.5%	-	-	230.6
Development	67.7	63.0%	-	-	10.0	9.3%	29.8	27.6%	-	-	107.4
Study Area	5874.0	46.8%	1001.3	8.0%	1851.6	14.8%	3830.1	30.5%	-	-	12,557
Annandale											
Control	9.9	14.0%	37.4	53.0%	-	-	23.4	33.1%	-	-	70.6
Development	9.9	14.0%	37.4	53.0%	-	-	23.4	33.1%	-	-	70.6
Study Area	1543.7	12.3%	4718.0	37.6%	5199.1	41.4%	1093.7	8.7%	-	-	12,555
Atwater											
Control	32.4	80.9%	1.4	3.5%	2.2	5.6%	4.0	10.0%	-	-	40.1
Development	29.3	80.7%	1.0	2.8%	2.0	5.4%	4.0	11.0%	-	-	36.27
Study Area	4074.4	32.4%	3516.3	28.0%	2525.4	20.1%	2442.1	19.5%	-	-	12,558
Brooten											
Control	-	-	6.6	50.9%	6.4	49.1%	-	-	-	-	12.98
Development	-	-	6.6	50.9%	6.4	49.1%	-	-	-	-	12.98
Study Area	496.8	4.0%	7961.5	63.4%	2982.4	23.7%	1120.0	8.9%	-	-	12,561
Chisago County											
Control	-	-	-	-	62.4	100%	-	-	-	-	62.4
Development	-	-	-	-	60.6	100%	-	-	-	-	60.6
Study Area	401.7	3.2%	1519.7	12.1%	10549	84.0%	81.9	0.7%	-	-	12552
Dodge Center											

[64] U.S. Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.soils.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054226#ex1

[65] Other prime farmland includes "*prime farmland if protected from flooding or not frequently flooded during the growing season*" or "*prime farmland if drained and either protected from flooding or not frequently flooded during the growing season.*"

Analysis Area	Prime Farmland Classification										Total Acres
	All areas prime farmland		Farmland of statewide importance		Not prime farmland		Prime farmland if drained		Other prime farmland[65]		
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	
Control	47.1	68.9%	2.0	2.9%	7.2	10.4%	12.2	17.8%	-	-	68.5
Development	44.0	73.3%	2.2	3.7%	2.1	3.4%	11.8	19.6%	-	-	60.0
Study Area	6666.1	53.1%	343.4	2.7%	682.6	5.4%	4860.0	38.7%	-	-	12552
Eastwood											
Control	8.5	17.0%	-	-	-	-	41.2	83.0%	-	-	49.7
Development	8.5	17.0%	-	-	-	-	41.2	83.0%	-	-	49.7
Study Area	2503.6	20.0%	1016.0	8.1%	1853.5	14.8%	7137.6	56.7%	43.2	0.3%	12553
Fiesta City											
Control	16.7	65.2%	3.3	13.0%	-	-	5.6	21.8%	-	-	25.6
Development	16.7	65.2%	3.3	13.0%	-	-	5.6	21.8%	-	-	25.6
Study Area	5727.9	45.6%	780.6	6.2%	2255.6	18.0%	1758.7	14.0%	2043.5	16.3%	12566
Hastings											
Control	40.3	99.3%	0.3	0.7%	-	-	-	-	-	-	40.6
Development	40.4	99.5%	0.2	0.5%	-	-	-	-	-	-	40.6
Study Area	5028.3	40.5%	1098.3	8.8%	5975.0	48.1%	79.4	0.6%	238.9	1.9%	12419
Lake Emily											
Control	31.3	66.8%	4.8	10.2%	-	-	10.8	23.1%	-	-	46.9
Development	27.7	65.3%	4.3	10.2%	-	-	10.3	24.4%	-	-	42.4
Study Area	3480.7	27.7%	2242.8	17.9%	4298.9	34.2%	2409.9	19.2%	121.5	1.0%	12554
Lake Pulaski											
Control	11.2	14.8%	49.2	64.9%	-	-	15.4	20.3%	-	-	75.8
Development	10.2	16.1%	39.6	62.7%	-	-	13.4	21.2%	-	-	63.2
Study Area	4971.4	39.6%	2389.3	19.0%	2547.3	20.3%	2645.4	21.1%	-	-	12553
Lawrence Creek											
Control	26.8	36.1%	-	-	26.2	35.2%	21.4	28.8%	-	-	74.4
Development	17.6	44.7%	-	-	5.7	14.6%	16.0	40.7%	-	-	39.4
Study Area	3363.9	35.6%	808.3	8.6%	3503.8	37.0%	1775.7	18.8%	-	-	9451
Lester Prairie											
Control	14.2	47.5%	-	-	-	-	15.7	52.5%	-	-	29.9
Development	10.8	41.5%	-	-	-	-	15.2	58.6%	-	-	26.0
Study Area	4632.7	36.9%	1692.9	13.5%	1498.9	11.9%	4729.9	37.7%	-	-	12554
Mayhew Lake											
Control	21.1	58.6%	-	-	12.9	35.8%	2.0	5.7%	-	-	36.0
Development	9.1	41.5%	-	-	11.1	50.9%	1.7	7.6%	-	-	21.8
Study Area	3362.4	26.8%	1809.4	14.4%	4626.8	36.9%	2756.1	22.0%	-	-	12555
Montrose											
Control	19.9	52.8%	0.9	2.3%	-	-	19.9	44.9%	-	-	37.7
Development	17.7	50.9%	0.9	2.5%	-	-	16.2	46.6%	-	-	34.8
Study Area	4056.3	32.3%	2606.1	20.8%	3069.5	24.5%	2746.8	21.9%	75.0	0.6%	12554

Analysis Area	Prime Farmland Classification										Total Acres
	All areas prime farmland		Farmland of statewide importance		Not prime farmland		Prime farmland if drained		Other prime farmland[65]		
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	
Paynesville											
Control	-	-	48.0	21.5%	171.5	76.7%	4.1	1.9%	-	-	223.6
Development	-	-	29.5	27.3%	76.0	70.2%	2.8	2.6%	-	-	108.4
Study Area	1760.2	14.0%	5145.1	41.0%	4516.5	36.0%	1135.9	9.1%	-	-	12558
Pine Island											
Control	18.6	39.6%	0.9	1.9%	0.7	1.5%	22.0	46.9%	4.7	10.1%	46.9
Development	17.5	41.5%	0.5	1.2%	0.0	0.0%	21.1	49.9%	3.1	7.3%	42.2
Study Area	7141.6	56.9%	2323.5	18.5%	2294.8	18.3%	138.2	1.1%	654.3	5.2%	12552
Pipestone											
Control	9.9	63.0%	-	-	0.1	0.6%	5.7	36.4%	-	-	15.8
Development	9.7	67.3%	-	-	-	-	4.8	32.7%	-	-	14.7
Study Area	8589.1	68.3%	9.2	0.1%	740.9	5.9%	3093.2	24.6%	141.8	1.1%	12574
Scandia											
Control	-	-	15.4	63.1%	7.7	31.5%	1.3	5.5%	-	-	24.4
Development	-	-	15.1	64.7%	7.2	30.9%	1.0	4.4%	-	-	23.3
Study Area	3922.1	31.3%	2875.5	22.9%	4447.8	35.5%	1288.7	10.3%	-	-	12534
Waseca											
Control	17.2	19.3%	41.7	46.7%	-	-	30.3	34.0%	-	-	89.3
Development	15.8	18.5%	40.2	47.2%	-	-	29.2	34.2%	-	-	85.2
Study Area	4316.9	34.4%	1278.2	10.2%	2112.0	16.8%	4845.6	38.6%	-	-	12553
West Faribault											
Control	57.0	66.8%	4.6	5.4%	12.0	14.1%	11.8	13.8%	-	-	85.5
Development	41.8	70.3%	2.4	4.0%	5.1	8.5%	10.2	17.2%	-	-	59.4
Study Area	4484.3	35.7%	2829.0	22.5%	4111.7	32.8%	1127.3	9.0%	-	-	12552
West Waconia											
Control	39.2	51.8%	13.5	17.8%	2.4	3.2%	20.6	27.2%	-	-	75.7
Development	40.0	51.3%	13.7	17.5%	2.5	3.2%	21.9	28.0%	-	-	78.1
Study Area	4452.0	35.5%	2982.2	23.8%	2086.6	16.6%	3032.8	24.2%	-	-	12554
Wyoming											
Control	-	-	27.9	41.5%	39.4	58.5%	-	-	-	-	67.3
Development	-	-	23.2	37.4%	38.8	62.6%	-	-	-	-	62.0
Study Area	716.1	5.7%	1910.7	15.2%	9741.6	77.6%	183.8	1.5%	-	-	12552
Zumbrota											
Control	22.4	63.0%	-	-	0.3	0.7%	5.5	15.6%	7.4	20.7%	35.6
Development	20.8	65.1%	-	-	0.0	0.1%	5.5	17.3%	5.6	17.5%	31.9
Study Area	5923.5	47.2%	2828.1	22.5%	2330.9	18.6%	931.8	7.4%	538.2	4.3%	12552
All Facilities											
Control	545.9	34.9%	257.9	16.5%	414.0	26.4%	338.7	21.6%	12.1	0.8%	1565.9
Development	455.2	38.0%	220.1	18.4%	227.5	19.0%	285.1	23.8%	8.7	0.7%	1196.6

Analysis Area	Prime Farmland Classification										Total Acres
	All areas prime farmland		Farmland of statewide importance		Not prime farmland		Prime farmland if drained		Other prime farmland[65]		
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	
Study Area	97490	32.7%	55685	18.7%	85802	28.8%	55245	18.5%	3856	1.3%	298075

The rules governing the siting of power plants provide for up to 0.5 acres of prime farmland be used per MW in most areas unless there is no feasible alternative. Minnesota Rule 7550.4400, Subpart 4:

> *No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoir or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative. Economic considerations alone do not justify the use of more prime farmland. "Prime farmland" means those soils that meet the specifications of Code of Federal Regulations 1980, title 7, section 657.5, paragraph (a). These provisions do not apply to areas located within home rule charter or statutory cities; areas located within two miles of home rule charter or statutory cities of the first, second, and third class; or areas designated for orderly annexation under Minnesota Statutes, section 414.0325.*

The Legislature established the Metropolitan Agricultural Preserves Program (Minnesota Statutes 473H) in 1980 to encourage the preservation of agricultural lands within the seven-county metropolitan area for continued production of food and other agricultural commodities.[66]

Potential Impacts

As shown in Table 12, up to 1,120 acres would be removed from agricultural production. In reality, the proposed impact from the Project will be smaller, as not all of the proposed facilities will be constructed. At the end of each facility's useful life, a minimum of 25 years, the facility would be decommissioned and the land could be restored to agricultural use.

Construction of the facilities has the potential to damage agricultural soils through compaction or erosion if BMPs are not implemented to minimize damage.

Construction may damage drainage tile that has been installed to enhance crop production.

[66] Metropolitan Council, *2012 Metropolitan Agricultural Preserves Program Status Report* (March 2013) http://www.metrocouncil.org/METC/files/53/53f6bd9e-da92-40cb-b485-98326c7b18cf.pdf

As shown in Table 13, only 26.4 percent (414 acres) of the total control area and 19 percent (227.5 acres) of the preliminary development area are not classified as prime farmland. The areas of prime farmland that would be removed from agricultural production are significantly smaller than prime farmland in Minnesota as a whole and the counties where the Project is proposed. The prime farmland exclusion in Minnesota Rule 7850.4400, Subpart 4 does not apply to 14 facilities because they are within statutory cities, within two miles of a first, second or third class city, or are in areas designated for orderly annexation: Annandale, Brooten, Chisago, Eastwood, Hastings, Lake Emily, Lake Pulaski, Mayhew Lake, Montrose, Pine Island, Pipestone, West Faribault, Wyoming and Zumbrota.

Mitigative Measures

As part of the voluntary agreement between Aurora and landowners, Aurora will compensate the owners of the parcels directly affected by Project facilities through the negotiated purchase or lease of the land.

Aurora will implement erosion control best management practices (BMPs). The topsoil will generally be removed and stockpiled where the roads and laydown or graded areas are constructed and then spread back over the disturbed areas.

Section 8.6 of the Site Permit Template would require Aurora to take into account, avoid, repair or replace any drainage tiles broken or damaged during all phases of the Project's life.

Section 8.2 of the Site Permit Template would require Aurora to implement measures to protect and segregate topsoil.

Section 8.3 of the Site Permit Template would require Aurora to implement measures to minimize soil compaction.

5.3.2 Forestry

Although there are forested areas at several of the facility locations, these areas are associated with shelterbelts, homesteads and waterways and are not managed for economic purposes. No economically significant forestry resources will be affected by the Project.

Mitigative Measures

No impacts to forestry resources are anticipated and therefore no mitigative measures are proposed.

5.3.3 Tourism

Tourism in the area of the proposed facility locations are largely associated with the recreational activities discussed in Section 5.2.9. Well known tourism destinations are

located near the Lawrence Creek and Pipestone facilities are discussed in Sections 6.12 and 6.18 respectively.

Impacts to tourism would be expected if the proposed facilities affected the overall experience of visitors to tourism sites, either through aesthetic impacts, noise or degradation of the natural resources such as air or water quality. No impacts to tourism are anticipated from the Project.

Mitigative Measures

No impacts to tourism are anticipated and therefore no mitigative measures are proposed.

5.3.4 Mining

Although there are multiple gravel pits, rock quarries, commercial aggregate sources and registered prospected sources in the general vicinity of many proposed facilities, there are no active gravel pits or other mineral extraction sites located within or directly adjacent to any of the preliminary development areas.

The northern portion of the area under land control for the Paynesville Facility is located south of a sand or gravel operation, and the Mayhew Lake Facility is located across the street from an inactive quarry.

Potential Impacts

Construction or operation of the proposed facilities would not impact any mining or mineral extraction activities. It is unlikely that construction or operation of the Project would limit the potential to expand existing mining activities as market forces would be expected to create a higher economic return for extraction of aggregate or mineral resources for landowners than would be expected through the agreement with Aurora.

Mitigative Measures

As no impacts to mining or mineral extraction are anticipated, no mitigative measures are proposed.

5.4 Archaeological and Historic Resources

Aurora requested a records search of Minnesota State Historic Preservation Office (SHPO) records for the areas surrounding the proposed facility locations. Resources and potential impacts are discussed generally here and in greater detail by facility in Section 6.

The SHPO records search identified records within the parcel boundary of the Mayhew Lake facility and within one mile of eight of the 24 facilities (Atwater, Dodge Center, Hastings, Montrose, Pine Island, Pipestone, West Faribault and Zumbrota). .

An archaeological survey of the 24 facilities was conducted in the summer of 2014. The survey identified four archaeological sites, one each at the Eastwood, Mayhew Lake, Lake Emily and Paynesville facilities.[67] SHPO concurred with the recommendation that none of the identified sites are eligible for inclusion in the NRHP.

In addition to the archaeological sites, the survey report noted, but did not evaluate, potentially historic properties at the Mayhew Lake and Albany facilities.

Potential Impacts

Archaeological and historic resources can be impacted by the construction of a PV facility as soil is disturbed.

As discussed further in Section 5.2.9, The Pipestone facility is located approximately half a mile from the southern boundary of the Pipestone National Monument. The Pipestone National Monument is managed by the National Park Service, and offers an opportunity to explore cultural and natural resources that are unique to the area. The Monument contains active quarry pits where Native Americans continue the traditions of quarrying pipestone. The quarries are surrounded with native tallgrass prairies, and there are trails located within the Monument for the public to explore.[68] Because of its proximity to Aurora provided a viewshed analysis to assess the potential for visibility of the facility from the Monument that may impact the experience of a visitor to the Monument. The Monument's Superintendent concurred with Aurora's assessment that the facility would not create visual impacts to visitors to the Monument.[69]

Mitigative Measures

Avoidance of archaeological and historic architectural properties is the preferred mitigative policy for construction of infrastructure projects.

As with any construction project, there remains a potential for impacts to unidentified archaeological properties in previously undisturbed portions of the facilities. Aurora has stated its intent to develop an Unanticipated Discoveries Plan that will detail the process for communicating and action should any previously unknown archaeological resource or human remains be encountered.

Section 7.2 of the Site Permit Template requires Aurora to coordinate with SHPO in the event that new unrecorded sites are discovered during construction. The procedures outlined in Section 7.2 of the Site Permit Template could be formalized in an *Unanticipated*

[67] Westwood Professional Services, *Phase I and Phase II investigations: Aurora Distributed Solar Project*. August 2014.
[68] National Park Service. *Pipestone National Monument: Plan Your Visit* http://www.nps.gov/pipe/planyourvisit/index.htm
[69] Aurora, *Communication with Pipestone National Monument,* July 22, 2014, eDocket ID: 20148-102084-01

Discoveries Plan to outline the process for resolution should any previously unknown archaeological resource or human remains be encountered.

5.5 Natural Environment

The consideration of the impacts of an electric generation project on the natural environment, including air quality, water resources and flora and fauna is required as part of the environmental review. The range of potential impacts for a PV facility depends upon the characteristics of the facility site, facility design, construction techniques and the ongoing maintenance activities during the facility's operation.

5.5.1 Air Quality

Air quality in Minnesota is generally good, and the trend has been improving for most pollutants. The enactment of the Clean Air Act in 1970 dramatically reduced air emissions from large facilities.[70]

Temporary short-term air quality impacts would occur during the construction phase of the Project. Once operational, the Project would not generate criteria pollutants or carbon dioxide.

Potential Impacts

During construction of the Project temporary short-term air emissions are expected as a result of vehicle exhaust from the construction equipment and from vehicles traveling to and from facility locations. The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment would vary according to the phase of construction but would be minimal and temporary.

In addition to emissions from construction equipment, short-term air quality impacts from fugitive dust due to travel on unpaved roads, grading at some sites and limited amounts of excavation for foundations for inverter boxes, O&M buildings and potentially solar array piers at some locations. Fugitive dust is considered particulate matter under air quality regulations. The concentrations of fugitive dust that is fine particulate matter (P.M. less than 2.5 microns or PM2.5) is generally small, or approximately 3 percent to 10 percent of total particulate matter (USEPA's AP-42, Sections 13.2 and 11.9). Since fine particulate matter has the potential to travel further into the lungs, it is of greater concern than larger particle size ranges.

[70] MPCA, *Air Quality in Minnesota: Emerging Trends.* 2009. http://www.pca.state.mn.us/index.php/view-document.html?gid=5658

Mitigative Measures

Dust from construction traffic can be controlled using standard construction practices such as watering of exposed surfaces, covering of disturbed areas, and reduced speed limits on site.

Emissions from construction vehicles can be minimized by keeping construction equipment in good working order

5.5.2 Soils and Groundwater

Some areas with underlying features, such as shallow limestone formations, unconfined or shallow aquifers, or karst conditions are more susceptible to groundwater contamination. Geotechnical surveys at the proposed Hastings facility location identified the presence of limestone and DNR records show a karst feature within 0.5 miles of the proposed Pine Island facility.[71]

Potential Impacts

Construction of the facilities will disturb up to 1,200 acres. As with any ground disturbance, construction of the Project has the potential for soil compaction, erosion and sedimentation as a result of construction activities.

Preliminary site design anticipates grading to establish a relatively level, non-north facing slope at 19 of the 24 facilities (Albany, Annandale, Atwater, Chisago, Dodge Center, Fiesta City, Lake Emily, Lake Pulaski, Lawrence Creek, Lester Prairie, Mayhew Lake, Montrose, Paynesville, Scandia, Waseca, West Faribault, West Waconia, Wyoming and Zumbrota).

Aurora anticipates that project foundations, both the direct-embedded piers supporting the PV tracking installations, foundations for inverters and for any Operations and Maintenance facilities, will be installed at a depth of approximately 5 to 12 feet, or above the average depth to groundwater of 17 to 167 feet.[72]

Mitigative Measures

The use of BMPs (including, but not limited to containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust) would protect topsoil and minimize the potential for soil erosion

Section 8.13 of the Site Permit Template would require Aurora to develop a Soil Erosion and Sediment Control Plan. The plan may be the same as the Storm Water Pollution Protection Plan (SWPPP) submitted to the MPCA as part of the National Pollutant Discharge Elimination

[71] Application, at p. 67
[72] Ibid.

System (NPDES) permit application. Aurora anticipates obtaining a separate NPDES permit for each facility. As part of the SWPPP, Aurora will be required to prepare a Spill Prevention, Control and Countermeasure (SPCC) Plan to minimize the potential for spills of hazardous materials and their transport to groundwater resources. As part of the SWPPP preparation for each facility, Aurora will identify BMPs to minimize the potential for soil erosion.

Aurora also plans to prepare a Phase I Environmental Site Assessment at all facilities in order to identify any existing hazardous material contamination. Final facility design will avoid disturbance of contaminated areas.

5.5.3 Surface Water

Public waters are wetlands, water basins and watercourses of significant recreational or natural resource value in Minnesota, as defined in Minn. Statutes Section 103G.005; the DNR has regulatory jurisdiction over these waters. The DNR Public Waters Inventory (PWI) identifies lakes, wetlands, and watercourses over which the DNR has regulatory jurisdiction. Minnesota law (Minnesota Statutes Section 84.415 administered through Minnesota Rules Chapter 6135) requires that a license be obtained from the DNR Division of Lands & Minerals for the passage of any utility over, under or across any state land or public waters.

There are no water courses or water basins identified on the DNR PWI within any of the proposed facility locations. PWI surface water features are shown in the figures accompanying each proposed facility location in Section 6. Several of the facility locations are located near surface waters and may be subject to state and local restrictions on shoreland development. Several of the facility locations have nearby PWI watercourses that may require crossing by Xcel Energy's portion of the gen-tie line.

Potential Impacts

During construction, there is the possibility of sediment reaching nearby surface waters and wetlands as the ground is disturbed by excavation, grading and construction traffic. In the case of this Project, the potential for impacts to surface waters is limited due to the facility locations that generally avoid surface water features. Maintenance and operation activities for the PV facilities are not expected to have an adverse impact on surface water quality.

Mitigative Measures

The use of BMPs (including, but not limited to containment of excavated material, protection of exposed soil, stabilization of restored material, and treating stockpiles to control fugitive dust) would protect topsoil and minimize the potential for soil erosion

Section 8.13 of the Site Permit Template would require Aurora to develop a Soil Erosion and Sediment Control Plan. The plan may be the same as the SWPPP submitted to the MPCA as part of the NPDES permit application. As part of the SWPPP, Aurora will be required to prepare a SPCC Plan to minimize the potential for spills of hazardous materials and their transport to streams and other water bodies. Aurora anticipates obtaining a separate

NPDES permit for each facility. As part of the SWPPP preparation for each facility, Aurora will identify BMPs to minimize the potential for soil erosion and sedimentation.

Many local governments have designated shoreland protection areas that require setbacks from the ordinary high water level of surface waters in order to limit impacts to surface waters. The Site Permit could preclude construction within Shoreland Overlay Districts and require compliance with local shoreland ordinances.

5.5.4 Wetlands and Floodplains

Wetlands are important resources for flood abatement, wildlife habitat and water quality. Minnesota uses two systems to classify wetlands:

- The Circular 39 system: This system was developed by the U.S. Fish and Wildlife Service in1956. Under the Circular 39 system, wetlands are divided into eight types based on the depth of water and the characteristics of vegetation.

- The Cowardin system: In 1979 the USFWS developed a more precise tiered system for classifying wetlands. Under the Cowardin system, each tier describes the characteristics of a wetland more specifically than the previous tier.

Aurora conducted wetland delineations at each of the proposed facility locations in the summer of 2014.[73] The delineations classify wetlands based on the Circular 39 classification. Minnesota Statute, Section 103G.005, subdivision 15(a) uses the Circular 39 system for defining wetland types.

The USFWS began producing maps of wetlands based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s; these wetlands are known as the National Wetland Inventory (NWI). It is important to note that NWI wetlands are based on aerial imagery and are not field verified. Nevertheless, NWI wetlands provide a useful starting point for identifying potential wetland areas. NWI wetlands are shown in the figures accompanying the description of individual facilities in Section 6.

Wetlands that are hydrologically connected to the nation's navigable rivers are protected federally under Section 404 of the Clean Water Act. Under the Clean Water Act, Section 401 water quality certification is also required for activities that may result in a discharge to waters of the United States. The MPCA administers Section 401 water quality certification on non-tribal lands in Minnesota. If the USACE authorizes the project under its General Permit/Letter of Permission permitting program, the MPCA waives its Section 401 Water Quality Certification authority. In Minnesota, wetlands are also protected under the Wetland

[73] Appendix C

Conservation Act, which is administered by the Board of Water and Soil Resources (BWSR) and the identified Local Government Unit.

Floodplains are low-lying areas that are subject to periodic inundation due to heavy rains or snowmelt. Floodplain areas are generally found adjacent to lakes, rivers and stream. In their natural state, floodplains provide for temporary water storage during flooding events.

Potential Impacts

Construction and maintenance of the facilities has the potential to result in long-term and temporary loss of wetlands or wetland function.

Direct impacts would occur if construction activities occur within wetlands. Long-term loss of wetlands would occur if roads and inverters are located within wetlands. Conversion of wetland types would occur where forested wetland areas are cleared. Type 7 (wooded swamp) wetlands were identified at the Albany, Dodge Center, Montrose and Zumbrota locations.

The USACE has informed Aurora that solar array and small structural piers, so long as wetlands are not filled with material other than the piers, are not expected to result in jurisdictional fill of wetland under Section 404 of the Clean Water Act.[74] In contrast, grading, access roads and inverters placed in wetlands or other jurisdictional waters would constitute a permanent impact requiring a permit of concurrence under Section 404 of the Clean Water act and the Wetland Conservation Act.[75]

The field delineations conducted in the summer of 2014 identified wetlands at all but six facility locations. Results of delineations are discussed in the individual facility discussions in Section 6. Based on Aurora's preliminary facility design, there is a potential for wetland impacts at all but the Hastings, Lake Emily, Lester Prairie, Pipestone, Scandia and Waseca facilities. Delineated wetlands are shown on the preliminary facility designs for each facility in Appendix D. Aurora is assessing the delineation results and anticipates modifications to the layouts shown in Appendix D to further avoid and minimize wetland impacts.

During construction, there is also the possibility for indirect impacts to wetlands from sediment as the ground is disturbed by excavation, grading and construction traffic.

Indirect impacts may also occur in locations where a solar array is placed over a wetland, potentially altering the wetland plant community at that location due to shading or use of a low-growing wetland seed mix.

[74] Application, at p. 73
[75] Appendix C

Mitigative Measures

The preferred method for minimizing impacts to wetlands is to avoid disturbance of the wetland through project design. Aurora has stated that it will design the layout of arrays, access roads and facilities to avoid and minimize impacts' to the extent practicable. Aurora continues to modify site plans in response to wetland delineation results to further avoid impacts to wetlands.

Section 5.2 of the Site Permit Template provided by Commission staff in this record requires that solar panels and associated facilities not be placed in public waters wetlands, as defined in Minnesota Statutes section 103G.005, subdivision 15(a). Under this definition, public water wetlands are all types 3, 4 and 5 wetlands of 10 or more acres in unincorporated areas or 2.5 acres in incorporated areas.[76] Although the field delineations did identify type 3 (shallow marshes) and type 4 (deep marshes) wetlands at the Albany, Eastwood, Lawrence Creek, Montrose, West Waconia and Wyoming locations, all of the wetlands identified in these delineations are smaller than the statutory standard for meeting a public waters wetland. Field delineations did identify a Type 3 wetland of approximately 13.1 acres (as well as two smaller Type 3 wetlands of approximately 3.7 and 6.7 acres) at the Paynesville location.

Construction within wetlands, including grading, access roads, inverters or fenceposts, will require a permit of *de minimus* or exemption concurrence under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act. If a wetland impact exceeds the facility's allowable *de minimus* or exemption threshold a wetland replacement plan will be required. Under the rules governing administration of the Wetland Conservation Act (Minnesota Rules 8420) replacement of certain wetlands is not permissible:

> *A replacement plan for activities that involve the modification of a rare natural community as determined by the Department of Natural Resources' natural heritage program must be denied if the local government unit determines that the proposed activities will permanently adversely affect the natural community.*[77]

Section 8.13 of the Site Permit Template provided by Commission staff in this record would require Aurora to develop a Soil Erosion and Sediment Control Plan. The plan may be the same as the Storm Water Pollution Protection Plan (SWPPP) submitted to the MPCA as part of the National Pollutant Discharge Elimination System (NPDES) permit application. As part of the SWPPP, Aurora will be required to prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize the potential for spills of hazardous materials and their transport to streams and other water bodies. Aurora anticipates obtaining a separate NPDES permit for each facility. As part of the SWPPP preparation for each facility, Aurora will identify BMPs to minimize the potential for soil erosion and sedimentation.

[76] Minnesota Statutes Section 103G.005, https://www.revisor.mn.gov/statutes/?id=103G.005
[77] Minnesota Rules 8420.0515, subpart 3, https://www.revisor.mn.gov/rules/?id=8420.0515

5.5.5 Vegetation

Land cover is summarized for each proposed facility in Section 6. Where applicable, native plant communities are discussed in for facilities where they are located in Section 6. Consistent with the current agricultural use of the facility locations, native plant communities are generally absent from facility locations and the overwhelming majority of vegetative cover, row crops, pasture and maintained grass areas, has been established and maintained by humans. Non-native invasive species cover is also quite limited due to the intensive weed management associated with agriculture.[78] Aurora has not identified any Reinvest in Minnesota (RIM) or USFWS easements at any of the facility locations.[79]

Potential Impacts

The facility locations have been selected in part to avoid known areas of native plant communities. Construction and operation of the Project would change the vegetative cover of up to 1,200 acres for at least the 25 year expected lifespan of the Project. Areas developed for the Project, mostly now cultivated or in pastureland, would be re-seeded with a low-growing seed mixture. Aurora will select wed-free low-growing seed mixes consistent with each facility's soil type and hydrology.[80]

Construction activities may introduce invasive species. The Minnesota Noxious Weed Law defines a noxious weed as an annual, biennial or perennial plant that the Commissioner of Agriculture designates to be injurious to the public health, the environment, public roads, crops, livestock or other property.[81] The Minnesota Department of Agriculture's Noxious & Invasive Weed Program assists local governments and landowners with resources for managing noxious and invasive weeds throughout Minnesota.

In some locations, trees may be removed from the development area and possibly the larger facility land control area to reduce shading of the PV arrays. In some locations Aurora may seek agreements with neighboring landowners to conduct limited tree trimming on adjacent parcels if shading of the arrays becomes a concern.

Mitigative Measures

Aurora proposes to minimize impacts to vegetation during siting, construction, and operation of the Project by:

- Avoiding impacts to native plant communities, including native prairie remnants, during siting and design, construction and operations;
- Designing facilities to minimize clearing of trees and shrubs;
- Reseeding disturbed areas low-growing, non-invasive plant species;

[78] Application, at p. 75
[79] Application, at p. 76
[80] Appendix C
[81] Minnesota Statutes Section 18.75 – 18.91, https://www.revisor.mn.gov/statutes/?id=18

- Maintaining facilities with regular mowing to control for invasive plant species;
- Avoiding and minimizing disturbance to wetlands and drainage systems;
- Minimizing the area disturbed during construction of the Project;
- Utilizing BMPs during construction and operations to protect topsoil and minimize soil erosion; and
- Avoiding activities within conservation easements held by public agencies or private organizations to the extent practicable. In the event that impacts do occur, Aurora will work with the landowner, DNR, USFWS or other relevant authority to develop appropriate mitigation.

Section 5.3 of the Site Permit Template requires Aurora to prepare a *Prairie Protection and Management Plan* to identify step taken to avoid impacts to native prairie and mitigate unavoidable impacts.

Section 8.12 of the Site Permit Template submitted by Commission staff in this record requires Aurora to minimize tree removal and inform the Commission f removal of groves of trees or shelter belts prior to removal.

Section 8.14 of the Site Permit Template requires Aurora to develop an *Invasive Species Prevention Plan* to prevent the introduction of invasive species on land disturbed by construction activities.

A vegetation management plan, such as required in Commission permits for High Voltage Transmission Lines, can be developed to formalize measures to minimize the disturbance and removal of vegetation for the Project, prevent the introduction of noxious weeds and invasive species and re-vegetate disturbed areas consistent with the safe and reliable operation of the Project.

5.5.6 Wildlife

As discussed in the Vegetation, vegetative cover at the proposed facility locations is dominated by cultivated agricultural field and to a lesser extent by pasturelands. The predominance of non-native cover types are typically used by common wildlife species that are accustomed to agricultural habitats. Examples of such species would include deer, squirrel, raccoons, mice, voles, common perching birds, red-tail hawks, reptiles and amphibians. It is anticipated that these species' use of the proposed facility locations is largely limited to occasional foraging in the fields and shelter within wooded areas that may surround the fields. As no surface waters are present within any of the proposed facility locations, no fish or other aquatic species are present within the facilities.

Potential Impacts

Wildlife that resides within the construction zone will be temporarily displaced to adjacent habitats during the construction process. The wildlife species near the facilities do not generally require specialized habitats and are able to find generally suitable habitat nearby.

Comparable habitat is near the facility locations, and it is likely that these animals would only be displaced a short distance.

Once restoration of the facilities is established after construction, the current non-native habitats that are used by habitat generalists will be replaced by a modified habitat that may be attractive to some species and less attractive to species that use the open farm and pasturelands.

Once construction begins, access to facilities will be limited by a perimeter fence. Although a variety of birds, small mammals, reptiles and amphibians are likely to still be able to gain access to facilities to use the habitats under and around the solar arrays, access will be limited for larger wildlife. Fencing around facilities may also disturb wildlife movement corridors.

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact terrestrial and aquatic wildlife populations as well as snag in maintenance machinery, resulting in costly repairs and delays. Wildlife entanglement in and death from plastic netting and other man-made plastic materials has been documented in birds, fish, mammals and reptiles.[82]

Mitigative Measures

Minimizing the use of overhead transmission lines will minimize impacts to birds.

Siting of facilities in locations that avoid or minimize impacts to known wildlife movement corridors can minimize impacts to wildlife. The Site Permit could require that Biological and Natural Resource Inventories (required in Section 7.1 of the Site Permit Template) include identification of any known wildlife movement corridors.

Avoiding the use of photodegradable erosion-control materials where possible and using biodegradable materials (typically made from natural fibers) instead, preferably those that will biodegrade under a variety of conditions, can minimize the impact to wildlife. The Site Permit could include the use of these materials as a standard condition or as a special condition for facilities where there is greatest concern.

Checking open trenches and removing trapped turtles before filling trenches can minimize impacts to turtles.

[82] DNR. *Wildlife Friendly Erosion Control Fact Sheet.* 2013. http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf

5.6 Rare and Unique Natural Resources

Construction and maintenance of solar facilities might destroy individual plants and animals or might alter their habitat so that it becomes unsuitable for them. For example, trees used by rare birds for nesting might be cut down, soil disturbance from construction activities may destroy rare plant species or communities, or soil erosion may degrade rivers and wetlands that provide required habitat.

Endangered species are species whose continued existence is in jeopardy. Threatened species are likely to become endangered. Species of special concern have some problems related to their abundance or distribution, although more study is required.

The DNR Division of Ecological and Water Resources manage the Natural Heritage Information System (NHIS) which provides information on Minnesota's rare plants, animals, native plant communities and other rare features. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities and other natural features. Its purpose is to foster better understanding and conservation of these features.

Some areas of the state have not been surveyed extensively or recently, so the NHIS database cannot be relied upon as a sole information source for rare species. Nevertheless, the NHIS database provides a starting point for anticipating potential impacts to rare and unique natural species and communities. The DNR NHIS database was queried by the Aurora to obtain the locations of rare and unique natural species. Records identified for each facility are described in Section 6.

Although no instances of the northern long-eared bat (*Myotis septentrionalis*) were identified at any of the facilities, the species is known to occur in suitable forested habitats throughout Minnesota. In October 2013, the USFWS proposed listing the northern long-eared bat as a federally-endangered species; a decision on the listing is expected in early 2015.

Mitigative Measures

The mitigative measures described for Vegetation and Wildlife in Sections 5.5.5 and 5.5.6 are also applicable to minimizing impacts to sensitive species. Avoidance of identified areas of biological significance and rare species is the most effective mitigation strategy to limit direct impacts to the sensitive natural resources.

Section 7.1 of the Site Permit Template provided by Commission staff in this record requires field surveys of sensitive biological areas. Information from field surveys is used to identify areas to be avoided in final site design. Areas to be avoided are typically marked in site plans in order to minimize the potential for inadvertent incursions into these areas during the construction phase.

Aurora has committed to using wildlife-friendly erosion mesh for facilities in the vicinity of protected reptile species such as the Blanding's turtle. Aurora will provide training to construction workers so they can identify and avoid impacts to Blanding's turtles for those facilities that may be located near the species' habitat.

Development of facilities consistent with USFWS guidance would minimize impacts to the northern long-eared bat.