intensity of the electric field is related to the voltage of the line, and the intensity of the magnetic field is related to the current flow through the conductors.

Shadow flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset.

Hazardous Materials / Hazardous Waste

The Project Area is located in a relatively rural area of North Dakota. Potential hazards may exist in rural areas from old gasoline facilities, landfill sites, and private activities. Hazardous wastes from large industrial or commercial activities are not likely.

The U.S. Environmental Protection Agency (USEPA) Superfund National Priorities List database was reviewed to determine the potential for major hazardous material issues within the Project Area. The database also lists sites registered under other EPA programs including Conditionally Exempt Small Quantity Generators (CESQG) and Toxic Release Inventory Sites (TRIs). No National Priorities List sites are present within the Project Area (USEPA CERCLIS 2013). No CESQG, TRI, or any other EPA-listed sites occur within or near the Project Area. NDDOT maps were also consulted as they often identify known dumps in the area; there are no known dumps in the Project Area. Basin Electric's Antelope Valley Generating Station and the adjacent Beulah Great Plains Gasification Plant are both registered as hazardous waste generators and handlers and have air emissions permits. There are no other hazardous waste handlers or toxic release inventory sites located within the Project Area or within 5 miles of the Project Area (National Atlas 2003).

Potentially hazardous materials associated with the Project include gear box oil, hydraulic fluid, and gear grease for the turbines, and mineral oil used for the transformers.

5.8.2 Potential Impacts

Telecommunication Interference

A beam path study was conducted to identify all non-federal microwave telecommunication systems, as well as AM, FM, cellular, and television tower locations. There are no microwave beam pathways within the Project Area, therefore the Project would not interfere with microwave communications.

With the switch to digital television in 2009 throughout the United States, the concern of ghost images and flickering that may be caused by wind turbine interference with analogue signals are no longer an issue.

The Long Range Radar Screening Tool indicates that there would be no impacts to Air Defense and Homeland Security radars or to Weather Surveillance Radar or Doppler Radar. When the notice of proposed construction to the FAA is filed (see Section 4.16), the FAA will conduct an aeronautical study that will include an assessment of potential impacts to radar systems.

Electromagnetic Fields

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be the subject of research and debate. Low-level power frequency EMF will occur around the wind turbine generators (in the nacelles), around the GSU transformers, along the collector lines and at the Project substation. All Project facilities would be set back from residences as required by state and county regulation. At these distances EMF levels would not be above background levels. The only exposure will be brief exposure to maintenance workers, primarily at the substation. Because the Project will be constructed to meet NESC standards, electromagnetic fields will be limited to acceptable industry standards; with this and the limited exposure times of workers, no adverse impacts to public or worker health and safety will be created.

Shadow Flicker

Shadow flicker impacts are not regulated in applicable state or federal law, and there is no permitting trigger or established threshold of significance with regard to hours per year of anticipated shadow flicker impacts to a receptor from a wind energy project.

The British Epilepsy Foundation states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. Since the Project's wind turbine blade pass frequency is approximately 0.9 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

A shadow flicker study was conducted for the wind turbine models being considered for the Project using WindPro (Appendix A). The analysis included both the primary and alternative turbine locations for the turbine layouts analyzed. The anticipated shadow flicker impacts are shown in the attached technical memo and are not expected to be significant.

Antelope will maintain a minimum setback of 1,320 feet from occupied residences as recommended by the PSC, exceeding Mercer County's residential setback standard of 1,000 feet. The observance of this setback will minimize potential impacts from shadow flicker.

The analysis of potential shadow flicker impacts from the Project on nearby receptors shows that shadow flicker impacts within the area of study are expected to be minor and well within acceptable ranges for avoiding nuisance and/or health hazards. Effective mitigative measures