

### 3.17 SAFETY AND HEALTH

This section describes the affected environment for occupational and public safety and health, including worker injuries, transportation safety, community health, and electromagnetic field (EMF) issues. Baseline data for assessing sensitive receptors within a 2-mile (3-kilometer) radius of the West Range Site and East Range Site, and within a 0.5-mile radius of the proposed HVTL and gas pipeline corridors associated with each site are presented. Transportation safety issues are discussed as related to traffic accidents and rail crossings. With respect to EMFs, this section provides a discussion of current standards established for utility lines and the current scientific studies related to potential health concerns associated with EMFs.

#### 3.17.1 Occupational Safety and Health

Worker fatalities and injuries are generally a concern in construction and in industrial facility operation. The OSHA regulates worker safety in both construction and industrial settings. OSHA has promulgated a number of regulations that are codified under Chapter 29 of the CFR that are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to work place hazards (e.g., noise, chemicals). Workplace injuries can and still do occur even with these regulations and protections in place. Table 3.17-1 summarizes safety statistics from the Bureau of Labor Statistics for industry categories that are relevant to the Proposed Action. The rate of recordable injury cases for the construction field is nearly twice that of the utility sector.

**Table 3.17-1. Statistics for Work Place Hazards**

Industry	Total recordable incidents (rate per 100 FTEs) <sup>1</sup>	Lost workday cases (rate per 100 FTEs) <sup>1</sup>	Fatalities (rate per 100,000 FTEs) <sup>2</sup>
Construction	5.8	2.2	14.3
Utilities	3.1	0.9	12.7 <sup>3</sup>

Source: <sup>1</sup>BLS, 2004 <sup>2</sup>BLS, 1999

<sup>3</sup>This fatality statistic is found under the sector "Transportation and Public Utilities." Most fatalities in this group are in the transportation category.

FTE=full-time employee

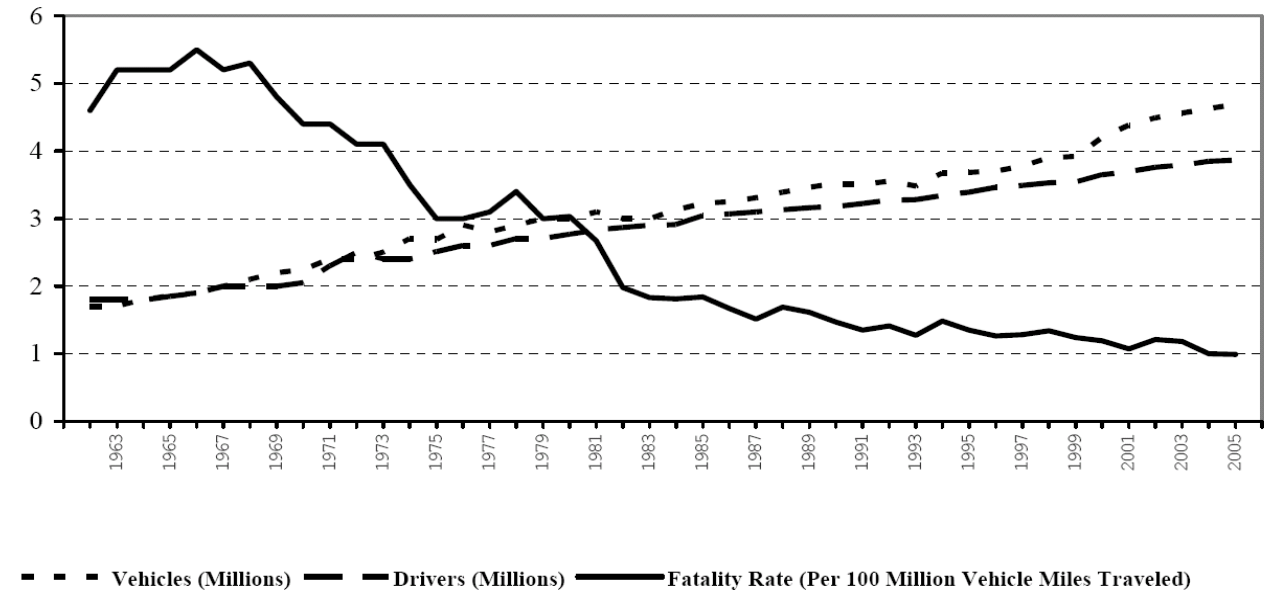
Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National Board of Boiler and Pressure Vessel Inspectors, between 1999 and 2003 there were 1,477 reported boiler accidents, resulting in 143 injuries and 26 deaths (power boilers include utility boilers as well as boilers used by other industries for cogeneration and on-site power production) (Hansen, 2005). Many power plant workers are also routinely exposed to dangerous chemicals such as corrosives (acids and bases), oxidizers, and solvents. Comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment are key to accident prevention, regardless of the hazard (Hansen, 2005).

#### 3.17.2 Transportation Safety

##### 3.17.2.1 Roadway Safety

In 1966 there were 53,041 traffic fatalities in the U.S., or 5.7 for every 100 million vehicle miles of travel (OTS, 2006). In 1968, there were 1,060 traffic fatalities in Minnesota, or 5.3 per 100 million miles of travel. To date, these represent the worst years for traffic fatalities for the country and Minnesota. Since then, both the rate and the number of fatalities have declined in a fairly steady pattern for both the country and the state. In 2005, there were 43,200 traffic fatalities throughout the country and 559 in

Minnesota. The respective rates per 100 million miles of travel were 1.46 and 0.99, and therefore, represent a relatively dramatic decrease since 1966. In general, the vehicle miles of travel fatality rate in Minnesota has shown dramatic improvement in the last three decades. For example, 1990 had a rate of 1.47, 1980 had a rate of 3.03, and 1970 had a rate of 4.41 (see Figure 3.17-1).



Source: OTS, 2006

**Figure 3.17-1. Number of Vehicles, Drivers, and Fatalities in Minnesota from 1962-2005**

The decline in traffic fatalities is in large part the result of conscious decision-making on traffic safety issues in the U.S. The National Highway Traffic Safety Administration (originally called the National Highway Safety Bureau) was established by the DOT in 1967. Since then it has promoted, and Congress has passed, legislation mandating the manufacture of safer cars. At the same time, the Federal interstate highway system has expanded, contributing to a safer roadway environment. Simultaneously there has been an effort to change human behavior factors. Minnesota’s legislature has made significant amendments to the driving while intoxicated law since 1971 and has also passed the child passenger protection law in 1981 and the mandatory seat belt law in 1986. Therefore, although there has been a steady increase in the number of drivers and vehicles, there has been a general steady decrease in the vehicle fatality rate per hundred million miles of travel as evidenced in Figure 3.17-1.

**West Range**

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 729 total vehicular crashes that occurred in Itasca County during 2004, 10 of them were fatal. The year 2005 showed a decrease in accidents with 667 total crashes, four of which were fatal. In general, these represent low numbers relative to the county’s population.

Itasca County’s Transportation Department provided a listing of reported vehicle accidents within a one-mile radius at the US 169 and CR 7 intersection near the project area. The accident reports cover a five-year period (2001 through 2005). The number of accidents occurring in this area is shown in Table 3.17-2.

**Table 3.17-2. Five-Year Traffic Accident History near Intersection of US 169 and CR 7 at West Range Site**

Location	2001	2002	2003	2004	2005
US 169	5	3	6	1	10
CR 7	4	5	2	5	4

Source: Itasca County, 2006

As indicated in Table 3.17-2, the number of accidents on key roads remained more or less steady over the five-year period, except for US 169 in 2005, which showed a marked increase. After reviewing the reports, it appears that approximately half of the accidents in 2005 were caused by icy/snowy conditions. There were no recorded fatal accidents within the one-mile radius of this intersection over the five-year period. In general, Itasca County has experienced slope stability problems with CR 7 near its intersection with US 169. According to the County Engineer, this intersection is dangerous for heavy truck hauls because of the steep approach to US 169 (Excelsior, 2006b).

### **East Range**

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 2,553 total vehicular crashes that occurred in **St. Louis** County during 2004, 21 were fatal. The year 2005 showed a decrease in accidents with 2,364 total crashes, 19 of which were fatal.

According to accident data from the St. Louis County's Public Works Department, there have been three accidents in the past five years (2001 through 2006) at the intersection of CR 666 and CR 110 in Hoyt Lakes (St. Louis County, 2006). There were no accidents reported at the intersection of CR 110 and Hampshire Drive (Hoyt Lakes) during this same period. From 2000 to 2005, there were 11 accidents reported on CR 110 between CR 665 in Aurora (now referred to as CR 130) and CR 666 in Hoyt Lakes. Five of these accidents were related to poor visibility or icy roads as a result of weather conditions.

### **3.17.2.2 Railroad Safety**

The extensive network of roads crisscrossing over railroads within the region facilitates the potentially dangerous interaction between motor vehicles and freight trains. Each day, thousands of vehicles using local roads cross over active railroad tracks. Including private crossings, there are a total of approximately 740 railroad crossings within the northeastern Minnesota region. Given the fact that some of the high-speed railroads within the region have been experiencing increasing volumes, railroad safety planning has become increasingly important in providing safe interaction between trains and motor vehicles.

A structure that allows one track to cross another track or a highway at the same elevation is referred to as an *at-grade crossing*. A structure or set of structures allowing two tracks, or one or more tracks, and a highway to cross each other at different elevations is referred to as a *grade-separated crossing*. Grade-separated crossings are provided by either a bridge over highway or bridge over rail. At-grade rail-highway crossings can contribute to traffic bottlenecks depending on their location.

As of 2002, Minnesota ranked 17<sup>th</sup> in the nation for the highest number of collisions and 14<sup>th</sup> in overall deaths and injuries from crashes at highway-rail intersections. Minnesota has worked actively with counties, cities, townships and railroads to improve safety for at-grade crossings. Active warning devices have been installed at over 1,300 of the approximately 4,500 public grade crossings in the state. The number of at-grade rail crossings with high exposure ratings and hazard ratings has increased significantly from 1996 to 2000 (Excelsior, 2006b). In 2000, 22 percent of the 363 at-grade crossings in the region had high hazard ratings, up from 3 percent in 1996. It is likely that this growth is attributable primarily to increased vehicle traffic rather than increased train traffic. All of the at-grade intersections on

trunk highways are guarded with gates and signals. Safety improvements for at-grade crossings are funded through a shared cost negotiated between Mn/DOT and the railroad company.

According to the *2005 Minnesota Motor Vehicle Crash Facts*, 17 percent of all vehicle/train crashes in Minnesota resulted in a fatality in 2004 (train collisions with pedestrians or bicyclists were not counted in these crashes). Over the years, the number of vehicle/train crashes in Minnesota has been declining. Seventy-two crashes were reported in 2004, an 18 percent decrease from the 1995-2002 average of 87. Fourteen of the 72 vehicle/train crashes, including three of the 12 fatal crashes, occurred at a railroad crossing signed by a railroad crossbuck. An additional 11 crashes (including three fatal crashes) occurred at crossings with a railroad crossing stop sign. Combined, these two types of traffic control devices were present at 35 percent of the crashes and accounted for nearly half of the fatalities.

Motor vehicle crashes involving a train were a predominantly rural phenomenon, defined as an area with less than 5,000 population. In 2004, 69 percent of the total crashes, 74 percent of the injuries, and 85 percent of the fatalities occurred in rural areas. Furthermore, for the motor vehicles involved in train crashes, failure to yield ROW, driver inattention or distraction, and disregard for traffic control device were the three contributing factors cited most often by officers at the scene. These three reasons accounted for 74 percent of all contributing factors cited.

The locations of at-grade crossings and existing traffic volumes at these crossings near the West Range and East Range Sites are discussed in Section 3.15.3.2 and 3.15.3.3, respectively.

### 3.17.3 Community Health Issues

Information from health profiles for Itasca County and St. Louis County were compiled from the Minnesota Department of Health. The health profiles comprise an overview of the health status of Minnesota residents at the state and county levels.

Minnesota statistics for adults with behavioral health risks (shown as a percentage of the adult population considered at risk due to a particular behavior) on a state-wide and county basis are shown in Table 3.17-3. These behavioral health risk factors of adults are similar rates for both counties and state-wide. Cancer statistics for the state and counties is provided in Table 3.17-4.

**Table 3.17-3. Estimated Percent of Adults with Behavioral Health Risk Factors (2004)**

Behavioral Health Risk Factors of Adults	Minnesota (percent)	Itasca County (percent)	St. Louis County (percent)
Overweight	59.6	60.0	58.9
Current Smokers	20.8	19.7	20.3
Acute Drinking	19.9	18.0	19.1
Chronic Drinking	5.6	5.5	5.7
Perceiving health status as fair or poor	10.0	11.3	10.7
Limitation of activities due to any impairment or health problem	21.8	23.7	22.7
No exercise	15.9	16.6	16.3
Hypertension	28.5	28.5	26.5

Source: MDH, 2004

Leading causes of mortality (as a total for 2004 and a percent of total deaths) for the state and each county are provided in Table 3.17-5. Overall, health risk factors and mortality rates (percentages) are similar in both counties and to state-wide statistics. Both counties have higher cancer incidence rates when compared to state-wide rates, although this may not be statistically significant due to the small sample size (population) of each county. Itasca County has a slightly higher cancer incident rate than St. Louis County, however, this data may be skewed due to the large difference in the population between the two counties (St. Louis County's population is over four times that of Itasca County).

**Table 3.17-4. Estimated Number of Adults with Cancer Incidences (2004)**

Type of Cancer	Minnesota Men	Minnesota Women	Itasca County Men	Itasca County Women	St. Louis County Men	St. Louis County Women
Cancer Incidence -all types	14,049 (0.56%) <sup>1</sup>	13,524 (0.53%) <sup>1</sup>	208 (0.94%) <sup>1</sup>	166 (0.75%) <sup>1</sup>	812 (0.83%) <sup>1</sup>	702 (0.70%) <sup>1</sup>
Colon and Rectum Cancer	1,290	1,436	14	21	74	68
Lung Cancer	3,748	3,033	63	43	210	152
Breast Cancer	20	2,054	1	24	2	114
Prostate Cancer	1,797	0	35	0	110	0
Other Types	7,194	6,731	95	78	416	368

<sup>1</sup> Percentages are based on 2000-2002 cancer numbers divided by reported 2003 populations.  
 Source: MDH, 2002a.

**Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)**

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Malignant Neoplasms (Cancer)	24.6	24.3	24.5
Diseases of the Heart	21.3	22.1	24.3
Cerebrovascular Diseases (stroke)	6.9	7.0	6.3
Accidents	5.0	4.7	4.7
Chronic Lower Respiratory Diseases	5.0	4.0	5.1
Alzheimer's Disease	3.3	4.0	3.3
Diabetes Mellitus	3.1	3.4	3.4
Influenza and Pneumonia	2.0	3.2	1.8
Nephritis, Nephrotic Syndrome and Nephrosis	1.8	0.6	1.6
Intentional Self-Harm	1.4	2.3	1.8
Essential Hypertension and Hypertensive Renal	1.3	1.9	0.9

**Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)**

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Disease			
Parkinson's Disease	1.1	0	0
Chronic Liver Disease and Cirrhosis	0.9	1.3	1.6
Aortic Aneurysm and Dissection	0.8	0	0
Septicemia	0.7	1.1	0.6
All Other Causes	20.8	20.1	20.1

Source: MDH, 2003

### 3.17.4 Sensitive Receptors and Chemicals of Potential Concern

#### 3.17.4.1 Sensitive Receptors

Sensitive receptors include populations that are the most vulnerable to adverse health effects associated with air pollutants and chemical exposure, such as the elderly and the very young. Sensitive receptor locations are typically associated with residential areas, hospitals, long-term health care facilities, playgrounds, and schools. Additionally, farms, **Native American tribal communities** and fishable bodies of water are also considered significant receptor locations because potential chemical or pollutant deposition at these sites can affect food supplies. Aerial photography, current as of 2003, was used to identify significant receptors in Itasca County and St. Louis County in relation to the proposed West Range Site and East Range Site, respectively.

#### 3.17.4.2 West Range Site and Corridors

There are no farms, schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within 0.5 miles of the West Range Site.

The residences nearest to the West Range Site are located to the southeast on the north shore of Big Diamond Lake and the southeast shore of Dunning Lake (approximately 0.6 to 0.8 miles from the West Range **plant footprint**). The residences along the lakes are a mix of seasonal and year-round dwellings. The City of Taconite, located approximately 1.7 miles from the West Range **plant footprint**, has both single-family and multi-family residential houses that are occupied year-round. Based on a review of aerial photography, there are as many as 214 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed HVTL corridors, and a maximum of 935 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed natural gas pipelines associated with the West Range Site. No hospitals, long-term health care facilities, playgrounds, schools, farms or fishing areas were noted to be within 0.5 miles of the centerline of the proposed HVTLs based on aerial photographs, however, one church and four cemeteries were identified within 0.5 miles of the centerline of the proposed natural gas pipeline corridors associated with the West Range Site.

### **3.17.4.3 East Range Site and Corridors**

The nearest residences to the East Range **plant footprint** are located about 1 mile directly south in the City of Hoyt Lakes. No sensitive receptors such as schools, daycare centers, recreation centers, playgrounds, nursing homes or hospitals are located within 0.5 miles of the East Range **plant footprint**. Based on a review of aerial photography, residential areas are located along the corridors proposed for the HVTLs (maximum 962 residences) and natural gas pipelines (856 residences). In addition, two schools (Fayal School and Lincoln School), the Mamrelund Church, Forbes Cemetery, Camp Olcott, and Eveleth Scout Camp are located along the proposed HVTL corridor within 0.5 miles of the HVTL ROW centerline. A 4H Camp and the Eveleth-Virginia Airport are located within approximately 0.5 miles of the natural gas pipelines. No hospitals, long-term health care facilities, playgrounds, or fishing areas are noted within 0.5 miles of the proposed HVTLs or natural gas pipeline corridors.

### **3.17.4.4 Chemicals of Potential Concern**

Exposure to certain chemicals, or chemicals of potential concern, can adversely affect human health through toxic and/or carcinogenic effects. Chemical exposure can occur as a result of a variety of human activities ranging from the use of household chemicals and products to the fueling of a motor vehicle. In addition, exposure can result from chemicals that could be present in the air, water, soil, or the food chain through air emissions or other discharges from industrial sources to the environment.

The EPA has developed cancer and non-cancer toxicity values for chemicals of potential concern that serve as the basis for many of the regulatory standards for emission and exposure limits that have been established to protect human health and the environment. In addition, EPA has established standards for evaluating risks of exposure to chemicals related to specific project and site conditions. For a chemical exposure to occur at a specific site, several conditions must be met, including: (1) a chemical or exposure source; (2) a release mechanism; (3) a migration pathway; (4) an exposure route; and (5) a receptor population. Consequently, if either a chemical-specific (toxic) effect or exposure pathway is not present, there is no unacceptable carcinogenic risk (or non-carcinogen hazard).

To calculate potential risks associated with chemical exposures, categories of sensitive receptor populations are defined. These populations reflect persons with potentially high exposure rates due to the frequency and duration of exposure, or increased sensitivity due to health or age. To estimate the potential risk associated with an action, risk calculations are conducted for the most susceptible populations, including resident/home gardener (adult and child), farmer (adult and child), and fisherman (adult and child).

## **3.17.5 Electromagnetic Fields**

### **3.17.5.1 Electric and Magnetic Field Primer**

High-voltage AC transmission lines produce extremely low frequency (60 Hertz [Hz]) alternating electric and magnetic fields. Electric fields are lines of force exerted on electrically charged particles. Magnetic fields, on the other hand, are lines of force exerted on moving charged particles (current). Magnetic fields are generally considered to have more potential for affecting human health than electric fields, in part because electric fields are more easily reduced by shielding. The intensity of the electric field is related to the voltage of the line. However, the intensity of the magnetic field is directly related to the amount of current flowing through the conductors, not the voltage. Therefore, a higher-voltage transmission line does not necessarily produce stronger magnetic fields than lower voltage lines.

Electric fields are characterized by their wavelength, frequency, or energy. The frequency of an electromagnetic wave is simply the number of oscillations which pass a fixed point per unit of time. Frequency is measured in cycles per second, or Hz. One cycle per second equals one Hz. Typically, the shorter the wavelength, the higher the frequency. An electromagnetic wave consists of very small packets

of energy called photons. The energy in each packet or photon is directly proportional to the frequency of the wave; the higher the frequency, the larger the amount of energy in each photon.

The voltages on the conductors of transmission lines generate electric fields in the space between the conductors and the ground. Directly under transmission lines, the electric field is nearly constant in magnitude and direction over distances of several feet. Electric fields are vector quantities; that is, they have both magnitude and direction. The direction corresponds to the direction that a positive charge would move in the field. In general, the field decreases with distance from the conductors. If an energized conductor (source) is inside a grounded conducting enclosure, then the electric field outside the enclosure is zero, and the source is said to be shielded.

The strength of the electric field is measured in volts per meter (V/m), and is calculated at a height of 3.28 feet (1 meter) above an un-vegetated, flat earth under straight parallel transmission lines.

In contrast to electric fields, a magnetic field is only produced once a device is switched on and current flows. The higher the current, the greater the strength of the magnetic field. Like electric fields, magnetic fields are strongest close to their origin and rapidly decrease at greater distances from the source. Magnetic fields are not blocked by common materials such as the walls of buildings. In the case of transmission lines, distribution lines, house wiring, and appliances, the 60-Hz electric current flowing in the conductors generates a time-varying, 60-Hz magnetic field in the vicinity of these sources. The strength of a magnetic field is measured in terms of magnetic lines of force per unit area (amperes per meter (A/m)), or magnetic flux density (measured in units of gauss [G], or milligauss [mG]).

The uniformity of a magnetic field depends on the nature and proximity of the source, just as the uniformity of an electric field does. Transmission-line-generated magnetic fields are quite uniform over horizontal and vertical distances of several feet near the ground. However, for small sources such as appliances, the magnetic field decreases rapidly over distances comparable with the size of the device.

The magnetic field generated by currents on transmission-line conductors extends from the conductors through the air and into the ground. The magnitude of the field at a height of 3.28 feet (1 meter) is frequently used to describe the magnetic field under transmission lines. As previously mentioned, the distance from the transmission-line conductors is inversely proportional to the magnetic field.

Electromagnetic waves can be classified as either ionizing radiation or non-ionizing radiation:

- Ionizing radiation consists of extremely high frequency electromagnetic waves (X-rays and gamma rays), which have enough photon energy to produce ionization (create positive and negative electrically charged atoms or parts of molecules) by breaking the atomic bonds that hold molecules in cells together.
- Non-ionizing radiation is a general term for that part of the electromagnetic spectrum, which has photon energies too weak to break atomic bonds. They include ultraviolet radiation, visible light, infrared radiation, radiofrequency and microwave fields, extremely low frequency fields, as well as static electric and magnetic fields.

### **3.17.5.2 Current Standards**

Regulations that apply to transmission-line electric and magnetic fields fall into two categories: safety standards/codes and field limits/guidelines. Safety standards or codes are intended to limit or eliminate electric shocks that could seriously injure or kill persons. Field limits or guidelines are intended to limit electric- and magnetic-field exposures that can cause nuisance shocks or may cause health effects. In no case has a limit or standard been established because of a known or demonstrated health effect. The majority of the national standards draw on the guidelines set by the International Commission on Non-Ionizing Radiation Protection. This non-governmental organization evaluates scientific results from

all over the world. The International Commission on Non-Ionizing Radiation Protection has included a safety factor of 10 for occupational exposure levels and a safety factor of 50 for public exposure levels.

An important point is that there is no specific level above which exposures become hazardous to health. Instead, the potential risk to human health gradually increases with higher exposure levels. Guidelines indicate that, below a given threshold, EMF exposure is safe according to scientific knowledge. However, it does not automatically follow that, above the given limit, exposure is harmful.

At low frequencies, exposure guidelines ensure that the level of currents induced by EMFs is below that of natural body currents. The main effect of radiofrequency energy is the heating of tissue. Consequently, exposure guidelines for radiofrequency fields and microwaves are set to prevent health effects caused by localized or whole-body heating.

In the United States, there are no Federal standards limiting occupational or residential exposure to 60 Hz EMF. Only six states (Florida, Minnesota, Montana, New Jersey, New York, and Oregon) have set standards for electric fields, and two states (Florida and New York) have standards for magnetic fields as shown in Table 13.17-6.

### **3.17.5.3 Electromagnetic Field Health Concerns**

Some people have attributed a diverse collection of symptoms to low levels of exposure to EMFs at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to EMFs (WHO, 2006).

Scientists are also investigating the possibility that effects below the threshold level for body heating occur as a result of long-term exposure. To date, no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area (WHO, 2006).

Some initial epidemiological studies of 60 Hz EMF levels showed a weak but possible correlation between magnetic fields and childhood leukemia. However, after over 20 years of research there is general scientific consensus that there is no evidence that power line EMF causes biological responses and health effects in humans. Recent research indicates:

- There is little evidence that power lines are associated with an increase in cancer.
- Laboratory studies have shown little evidence of a link between power-frequency fields and cancer.
- An extensive series of studies have shown that life-time exposure of animals to power-frequency magnetic fields does not cause cancer.
- A connection between power line fields and cancer is physically implausible (Moulder, 2005).

**Table 3.17-6. State Transmission Line Standards and Guidelines**

State	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Florida	8 kV/m <sup>1</sup>	2 kV/m	NA	150 mG <sup>1</sup> (max load)
	10 kV/m <sup>2</sup>	NA	NA	200 mG <sup>2</sup> (max load)
	NA	NA	NA	250 mG <sup>3</sup> (max load)
Minnesota	8 kV/m	NA	NA	NA
Montana	7 kV/m	1 kV/m <sup>5</sup>	NA	NA
New Jersey	NA	3 kV/m	NA	NA
New York	11.8 kV/m	1.6 kV/m	NA	200 mG (max load)
	11 kV/m <sup>6</sup>	NA	NA	NA
	7 kV/m <sup>4</sup>	NA	NA	NA
Oregon	9 kV/m	NA	NA	NA

<sup>1</sup> For lines of 69-230 kV

<sup>2</sup> For 500 KV lines

<sup>3</sup> For 500 KV lines in certain existing ROW

<sup>4</sup> Maximum for highway crossings

<sup>5</sup> May be waived by the landowner

<sup>6</sup> Maximum for private road crossings

ROW = right-of-way; NA= not applicable: kV/m=kilovolts per meter ; mG= miligauss

Source: NIEHS, 2002

In 1999, the National Institute of Environmental Health Sciences (NIEHS) issued its final report on “Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields” in response to the 1992 Energy Policy Act. NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern (NIEHS, 2002).

In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from the Minnesota Department of Health, the Department of Commerce, the Public Utilities Commission, the Minnesota Pollution Control Agency, and the Environmental Quality Board. In September 2002, the Working Group published its findings in a White Paper on Electric and Magnetic Field Policy and Mitigation Options (MDH, 2002b). The following summarizes the findings of the Working Group.

Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (MDH, 2002b).

Despite this consensus, however, there are still concerns. For example, California’s Department of Health Services published a report by the California EMF Program in 2002 that concluded there was a weak, but probably real association between EMF and cancer. In addition, on June 3, 2005, the British Medical Journal released a paper entitled “Childhood Cancer in Relation to Distance from High Voltage

Power Lines in England and Wales: A Case-Control Study” (Draper, 2005). This paper contained findings from a study on childhood cancer carried out by Oxford University that analyzed and compared 33 years of data (from 1962 to 1995) on 29,000 children diagnosed with cancer. The study found slightly elevated rates of childhood leukemia in children whose residence at birth was close to power lines. Proponents of the EMF health connection have argued that the magnetic fields produced by the power lines are responsible for this correlation.

The British study found elevated rates of childhood leukemia at distances less than 0.5 miles (approximately 600 meters) from the lines. At such distances, the magnetic fields in homes due to power lines are negligible compared to existing background levels. Moreover, the authors of the study found no causal link between childhood leukemia and EMF, stating “we emphasize again the uncertainty about whether this statistical association represents a causal relation.” In addition, the authors state “neither the association reported here nor previous findings relating to level of exposure to magnetic fields are supported by convincing laboratory data or any accepted biological mechanism” (Draper, 2005).

Additional studies and areas of concern include:

- Effects on pregnancy outcome. Many different sources and exposures to EMFs in the living and working environment, including computer screens, water beds, and electric blankets, radiofrequency welding machines, diathermy equipment, and radar, have been evaluated by the World Health Organization (WHO) and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to EMFs, such as reports of premature births and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures (as opposed to factors such as exposure to solvents) (WHO, 2006).
- Cataracts. General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. There is no evidence that these effects occur at levels experienced by the general public (WHO, 2006).
- EMFs and cancer. Over the last 20 years, research has been conducted in the United States and around the world to examine whether exposures to electric and magnetic fields at 50/60 Hz from electric power lines are a cause of cancer or adversely affect human health. The research included epidemiology studies that suggested a link with childhood leukemia for some types of exposures, as well as other epidemiology studies that did not; it also included lifetime animal studies, which showed no evidence of adverse health effects. Comprehensive reviews of the research conducted by governmental and scientific agencies in the U.S. and in the United Kingdom did not find a basis for imposing additional restrictions (NIEHS, 1999; IEE, 2000).
- Electromagnetic hypersensitivity and depression. Some individuals report “hypersensitivity” to electric or magnetic fields. In the past, residents have questioned whether their reported symptoms (e.g., aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures) could be associated with EMF exposure near their homes. There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of EMF exposure. Currently, there is not an accepted biological mechanism to explain hypersensitivity (WHO, 2006).

- **Henshaw Effect.** Researchers in England have suggested that the AC electric fields from power lines might affect health indirectly, by interacting with the electrical charges on certain airborne particles. This phenomenon, sometimes referred to as the Henshaw Effect, relates to the hypothesis that particles would be deposited on the skin by a strong electric field, or in the lung by charges on particles (Henshaw et al., 1996; Fewes et al., 1999a, 1999b). In their laboratory, Henshaw and colleagues have developed models to test the physical assumptions of their hypothesis: that an electric field can change the behavior of particulates in the air. For example, they measured the deposition of radon daughter particles on metal plates, in the presence of an electric field at intensities found under or near power lines. Under these conditions, deposition of particles on surfaces was slightly increased, an occurrence that implies that the deposition might also occur on other surfaces, such as skin. However, Henshaw and colleagues have not tested the most speculative parts of their hypothesis: that such changes in deposition rate of particles would lead to an important increase in human exposure and that the increased skin exposure would be sufficient to affect human health. Henshaw et al. also hypothesized that AC electric fields at the surface of power line conductors lead to increased charges on particles, and thereby increases the likelihood that inhaled particles (including radon daughters) would be deposited on surfaces inside the lungs and airways, even at considerable distances from a power line. Outside air generally contains particles of various sizes, including aerosols from emissions from vehicles and manufacturing, as well as natural sources such as radon from soil, rock, and building materials. If, as hypothesized, charges on aerosol particles were increased, and if this change were to increase deposition in the lungs when inhaled over long periods of time, in theory these events could lead to increases in respiratory disease and other diseases. **However, a recent study (Jeffers, 2007) could not support the hypothesis that ion exposure from HVTL charges increases lung deposition of airborne particles.**

**Radon daughters** are short-lived radioactive decay products of radon that decay into longer-lived lead isotopes that can attach themselves to airborne dust and other particles and if inhaled, damage the lining of the lungs.

An **aerosol** is a mixture of microscopic solid or liquid particles in a gaseous medium. Smoke, haze, and fog are examples of aerosols.

There are many sources of more detailed information on the potential health effects of EMF. For example, the Minnesota Department of Health maintains information on its web site: <http://www.health.state.mn.us/divs/eh/radiation/emf/index.html>. Another extensive site maintained by a University of Wisconsin medical research faculty is found at: <http://www.mcw.edu/gcrc/cop/powerlines-cancer-FAQ/toc.html#19N>.

**Scientific literature clearly evidences that substantial research has been, and continues to be, conducted by academic laboratories, as well as the most qualified health research organizations in the world, including NIEHS (within the National Institutes of Health) and the WHO, into the potential health risks from EMF exposure. In spite of these efforts, there are no established health criteria or quantifiable impact assessment methods currently accepted for determining adverse effects to human health with respect to EMF exposure or the Henshaw Effect. In a very recent publication, the New Zealand National Radiation Laboratory (NZNRL, 2008) concluded: “In spite of all the studies that have been carried out over the past thirty years there is still no persuasive evidence that the [EMF] fields pose any health risks. The results obtained show that if there are any risks, they must be very small.”**

### **3.17.5.4 Existing Sources of EMF**

Existing sources of EMF near each proposed site include HVTLs and substations. A description of these sources is provided below. However, the electric and magnetic field strengths for these sources are not available.

### **West Range Site and Corridors**

The West Range Site is bounded by CR 7 to the west and the Iron Range Township to the east. MP currently owns an existing 115-kV HVTL (designated as 28Line), located north of the power plant footprint and buffer land (hereafter, all HVTLs will be identified by their number followed by the letter “L” for “Line,” e.g., 28L). The line runs between the Clay Boswell Generating Station and a 115-kV substation near Nashwauk, Minnesota.

MP also owns the 83L, a 230-kV HVTL that connects the Clay Boswell Station with the Blackberry Substation, and the 20L, an 115-kV HVTL that interconnects the Grand Rapids and Blackberry Substations. The Blackberry Substation is the major HVTL hub in the area.

Finally, MP operates two 115-kV HVTLs known as 62L and 63L between the Nashwauk and Blackberry Substations. At one time, two 115-kV tap lines identified as 45L ran along the east side of the Project Site and connected 28L to the Greenway 115-kV Substation (just north of Holman Lake). The two 115-kV tap lines have since been de-energized and the Greenway Substation retired.

Two HVTL corridors traverse the West Range Site, one in a north/south direction and a second in an east-west direction. The HVTLs that occupy the north-south corridor are not currently used.

### **East Range Site and Corridors**

The East Range Site comprises approximately 800 acres of undeveloped property **formerly** owned by CE, within the City Limits of the Hoyt Lakes in St. Louis County, Minnesota. This site is bounded by CR 666 to the east, the Superior Natural Forest to the north, and an existing 138-kV HVTL corridor leading to MP’s Syl Laskin Energy Center Substation (Laskin Substation) to the west.

Three existing transmission lines emanate from the Laskin Station, located approximately 2 miles southwest of the generating station footprint, and connect with the Forbes and Virginia substations. The three 115-kV lines connect the Laskin Substation (34L, 38L, and 39L) with the Forbes and Virginia substations. These facilities are part of the MP transmission network known as the “North Shore Loop.”

The 38L that interconnects directly to the Forbes Substation is about 35.5 miles in length, is rated at 146 Mega Volt-Amps, and has one intermediate distribution load service substation (the Peary Substation). For the 39L and 34L routes that connect to the Virginia Substation, there are existing 115-kV lines (37L directly to the Forbes Substation and 16L/18L to the Forbes Substation via United Taconite).

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### 3.18 NOISE

This section presents the current noise conditions at and near the proposed Mesaba Energy Project. It provides background information about noise principles, guidelines, and regulations; noise measurement methods and criteria; and existing noise levels and sources in the West Range and East Range Sites.

#### 3.18.1 Background

##### 3.18.1.1 Noise Principles

###### Definitions

Noise, simply defined as unwanted sound, can have an adverse effect on humans and their activities as well as the natural environment. Sound pressure (loudness) is the physical force from a sound wave that affects the human ear, and is typically discussed in terms of decibels (dB), which is a logarithmic unit of the sound pressure level (SPL). Zero dB represents the threshold of hearing.

The impact of noise is highly dependent upon the characteristics of the noise (i.e., loudness, pitch, time of day, duration, etc.) and the sensitivity (or perception) of the noise receptor. The EPA has classified noise levels for several common sounds along with typical human responses or perceptions for these noises (Table 3.18-1).

**Table 3.18-1. Noise Levels for Common Sounds**

Sources <sup>1</sup>	Noise Level (dBA)	Response
Carrier deck, jet operation	140	Painfully loud
Live rock music	130	Limits amplified speech
New York subway station	90	Hearing damage (8 hours)
Dishwasher	80	Annoying
Freeway traffic (50 ft)	70	Telephone use difficult
Air conditioning unit (20 ft)	60	Intrusive
Light auto traffic (100 ft)	50	Quiet
Breathing	10	Just audible
Silence	0	Threshold of hearing

<sup>1</sup>Noise levels decrease with distance from the source and are reduced by barriers, both man-made (e.g., sound walls) and natural (forested areas, hills, etc.).

Sound can be quantified in terms of its amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the dB; however, since the human ear is not equally sensitive to sound at all frequencies, four weighted scales (A through D) have been developed to measure noise from different sources. Typically, the A-weighted scale is used to measure noise as it relates human sensitivity, by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Sound pressure presented in the A-weighted decibel scale is designated with the symbol dBA. Generally, a change of less than 3 dBA in noise levels with respect to existing conditions is not perceptible to humans in ambient situations. Noise levels for combinations of sounds are added and subtracted based on a logarithmic scale. As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95 dBA), would result in a cumulative sound level of 101.2 dBA, not 195 dBA. In most cases,

where the addition of decibels only needs to be accurate by  $\pm 1$  dB, the following rule of thumb can be used to add decibels:

When two decibel values differ by:	Add the following amount to the higher value:
0 or 1 dB	3 dB
2 or 3 dB	2 dB
4 or 9 dB	1 dB
10 dB or more	0 dB

Because the decibel scale is logarithmic, a relative increase of 10 decibels represents a sound pressure level that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder; they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- $\pm 3$  dBA change is the threshold of change detectable by the human ear, in ambient environments;
- $\pm 5$  dBA change is readily noticeable;
- +10 dBA increase is perceived as a doubling of noise level/loudness; and
- +20 dBA increase is perceived as a fourfold increase in noise level/loudness.

The SPL that humans experience typically varies from moment to moment. Therefore, a variety of descriptors are used to evaluate noise levels over time. Some typical descriptors are defined below:

- $L_{eq}$  is the continuous equivalent sound level. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the average energy or intensity level. High noise levels during a monitoring period will have greater effect on the  $L_{eq}$  than low noise levels. The  $L_{eq}$  has an advantage over other descriptors because  $L_{eq}$  values from different noise sources can be added and subtracted to determine cumulative noise levels.
- $L_{dn}$  is the day-night equivalent sound level. It is similar to a 24-hour  $L_{eq}$ , but with 10 dBA added to SPL measurements between 10:00 pm and 7:00 am to reflect the greater intrusiveness of noise experienced during these hours.  $L_{dn}$  is also termed DNL.
- $L_{min}$  is the lowest SPL measured during a given period of time and  $L_{max}$  is the highest.
- $L_{10}$  is the SPL exceeded 10 percent of the time. Similar descriptors are the  $L_{50}$ ,  $L_{01}$ , and  $L_{90}$ .

### **Noise Loss Over Distance**

Sound travel over distance is acted upon by many factors. Temperature, humidity, wind direction, barriers, and absorbent materials such as soft ground and light snow are all factors in how sound will be perceived at different distances.

Sound energy is lost at higher humidity conditions due to the combined action of the viscosity and heat conduction of the air, and the behavioral state of the molecules therein. When humidity rises, there is an increase in the high frequency absorption of air. Thus, in the summer months, and assuming a higher relative humidity, less of the high frequency noise will be heard. As well, leaves and shrubs while in bloom during the summer months will further serve to attenuate propagated noise.

Noise from a fixed location (e.g., industrial equipment) is termed a stationary or point source. Point sources of noise attenuate at a rate of 6 dBA per doubling of distance when traveling through air over a hard surface and up to 7 or 8 dBA when traveling over a soft surface. These attenuation rates are general rules for total noise levels from a given source.

A roadway or railway is considered a line source because a motor vehicle or diesel engine moves from one point to another along a fixed linear route, and the receiver experiences noise from all points along the line. Noise from a line source typically attenuates at the rate of 3 dBA per doubling of distance based on a reference distance of 50 feet. Thus, traffic noise level of 65 dBA at a distance of 50 feet from a roadway would be 62 dBA at a distance of 100 feet from the roadway, and it would be 59 dBA at a distance of 200 feet from the roadway. The 3-dBA attenuation rate is used for noise traveling through the air or over a hard surface. Noise traveling over a soft surface, such as grass or other vegetation, may attenuate at a more rapid rate of approximately 4.5 dBA.

### **Vibration**

Ground vibration is commonly viewed as the major concern for off-site damage to existing structures. The measurement of ground vibration is Peak Particle Velocity, which is the maximum speed (measured in inches per second or millimeters per second) at which a particle in the ground is moving relative to its inactive state. The U.S. Bureau of Mines and the Office of Surface Mining have conducted extensive research over the last 40 years to develop acceptable vibration standards, vibration damage criteria, and techniques to predict and control blast vibrations that greatly reduce the risk of off-site impacts.

The Office of Surface Mining initially found that if Peak Particle Velocity were limited to 1 inch per second, then 95 percent of the damage to surrounding houses and structures would be prevented. After more recent research, the Peak Particle Velocity limit was changed to 0.5 inches per second to avoid off-site damage.

A Peak Particle Velocity of 0.5 is generally equivalent to the vibration caused by a loaded truck or bus passing by 50 to 100 feet away. As a general rule, a person will begin to feel blast vibrations at levels as low as 0.02 inches per second. This is well below the level at which research has shown that damage may occur.

#### **3.18.1.2 Methodology**

### **Ambient Noise**

In order to describe baseline noise conditions, ambient noise monitoring was performed in key areas throughout the West Range and East Range Sites, including areas of common use by residences. Descriptions of the noise monitoring locations (i.e., receptor locations) are detailed in subsequent paragraphs in this section under respective site-specific discussions.

MPCA guidelines for noise equipment calibration and monitoring procedures were followed in order to establish accuracy and consistency (MPCA, 1999). All monitoring was completed using a Type II, American National Standards Institute-approved noise level meter with calibration being performed before and after each monitoring cycle. A windscreen was also used to counter any wind effects and no monitoring was performed during times when winds greater than 15 miles per hour were measured or when precipitation was occurring.

The results of the ambient noise levels discussed in this section were used to predict traffic noise levels at chosen virtual receptor sites as a result of the Proposed Action. Virtual receptor sites refer to sites that were not included in the original ambient noise monitoring, but nonetheless, were modeled to describe future noise levels (i.e., no actual field measurements were taken at these locations). The virtual receptor locations and predicted noise levels are discussed in Section 4.18.

**Guidelines and Regulations**

Several agencies have noise regulations for different noise sources. Noise regulations are either source standards or receiver-based standards. The MPCA has a receiver-based standard intended to limit noise levels and protect the health and welfare of the general public. These standards were used for comparison in describing baseline noise conditions measured at each of the receptor locations.

The MPCA noise standards are grouped according to land activities by the noise area classification (NAC) system (MPCA, 1999). The NAC has four classes. NAC-1 includes household units, including farmhouses, as well as religious activities. NAC-2 applies to more commercial development, such as retail, businesses, government services, and parks. NAC-3 and NAC-4 are less stringent and are composed primarily of industrial uses.

The MPCA guidelines, measured in dBA, are stipulated in the form of L<sub>10</sub> and L<sub>50</sub>. Simply stated, L<sub>10</sub> means that the measured SPL (in dBA) must not exceed a certain threshold more than 10 percent of the time (for a 1-hour survey), and L<sub>50</sub>, being a level that must not be exceeded more than 50 percent of the time (again, for a 1-hour survey). The thresholds for NAC-1 and NAC-3 are listed in Table 3.18-2 (revised since Draft EIS) as SPL maximums by the MPCA. **All of the receptors that were analyzed for this project are represented by NAC-1, except for R1 at the East Range Site, which is represented by thresholds under NAC-3.**

**Table 3.18-2. Noise Area Classification (NAC) Thresholds**

	NAC-1		NAC-3	
	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
Daytime (7:00 a.m. to 10:00 p.m.)	65 dBA	60 dBA	80 dBA	75 dBA
Nighttime (10:00 p.m. to 7:00 a.m.)	55 dBA	50 dBA	80 dBA	75 dBA

Source: MPCA, 1999

For this project, ambient monitoring at each location was performed for no less than one hour and during both times specified as “night” (i.e., 10:00 pm to 7:00 am) and “day” (7:00 am to 10:00 pm) by the MPCA classification.

Other agency noise guidelines that were reviewed include guidelines under the Federal Highway Administration (FHWA) and the Federal Rail Administration (FRA) for traffic- and rail-related noise, respectively. The FHWA does not provide actual noise standards, but has guidelines of an L<sub>10</sub> of 70 dBA, which are used to trip a Federal funding mechanism for noise abatement on highway projects. The FRA provides noise impact criteria for railroad projects, which are dependent on land use categories as defined by the DOT. Further details on these agencies’ requirements are discussed in Section 4.18 as these were examined in relation to predicted noise levels as a result of the Proposed Action.

Investigations regarding noise ordinances at the West Range and East Range sites revealed little to no written local noise ordinances. In general, noise is dealt with on a complaint basis and is determined by general annoyance and disruption of the common peace. Discussions with local officials at both sites confirmed that the MPCA regulations should be used for noise monitoring and analysis (SEH et al., 2005 and SEH, 2005b).

### 3.18.2 Existing Noise Levels

As stated earlier, to establish and characterize the baseline noise environment, a noise monitoring program was developed and implemented. The program focused on potential noise-sensitive receptors in areas near proposed project activities in the West Range and East Range Sites. Noise sensitive receptors are defined as homes, schools, hospitals, etc., which are especially sensitive to high noise levels. The monitoring results and descriptions of the significant receptors are provided below.

#### 3.18.2.1 West Range Site

Existing noise levels were monitored at five receptor locations near the proposed plant site, the railroad and roadways, or both. Monitoring events took place during the months of June and July 2005. **Locations of the noise receptors for the West Range site are shown in Figure 3.18-1 (added in Final EIS).**

Results of the ambient noise monitoring during the daytime and nighttime for the West Range Site are provided in Table 3.18-3 (**updated for the Final EIS; exceedances of state thresholds are indicated in italicized and underlined typeface**). It is presumed that noise levels that equaled or exceeded the MPCA noise thresholds occurred because of a receptor location's proximity to a major transportation corridor (i.e., CR 7).

**Table 3.18-3. Existing Noise Levels at Ambient Noise Receptors for West Range Site**

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub> dB over State Compliance	L <sub>50</sub> dB over State Compliance
Receptor 1, Reclaimed County Landfill	1,870 ft south	9:15 am –10:15 am	53 dBA	52 dBA	0 dB	0 dB
		10:04 pm – 11:04 pm	51 dBA	49 dBA	0 dB	0 dB
Receptor 2, Residence Big Diamond Lake	4,025 ft southeast	3:15 pm –4:15 pm	54 dBA	53 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, 31950 CR7	4,110 ft west	1:03 pm –2:04 pm	59 dBA	55 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	<u>58 dBA</u>	<u>53 dBA</u>	3 dB	3 dB
Receptor 4, 32423 CR7	4,650 ft west	2:30 pm –3:30 pm	59 dBA	52 dBA	0 dB	0 dB
		11:45 pm – 12:45 pm	<u>56 dBA</u>	<u>53 dBA</u>	1 dB	3 dB
Receptor 5, Dunning Lake	4,300 ft southeast	4:00 pm –5:00 pm	51 dBA	50 dBA	0 dB	0 dB
		correlated with Receptor 2	50 dBA	49 dBA	0 dB	0 dB

**Table 3.18-3. Existing Noise Levels at Ambient Noise Receptors for West Range Site**

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub> dB over State Compliance	L <sub>50</sub> dB over State Compliance
Receptor 6. Lutheran Church	18,060 ft southeast	Daytime – correlated with nearby receptors	52 dBA	50 dBA	0 dB	0 dB
		Nighttime – correlated with nearby receptors	50 dBA	49 dBA	0 dB	0 dB
Receptor 7. Catholic Church	9,940 ft northwest	Daytime – correlated with nearby receptors	52 dBA	50 dBA	0 dB	0 dB
		Nighttime – correlated with nearby receptors	50 dBA	49 dBA	0 dB	0 dB
Receptor AAC-6, AAC-6. Near Beasley Ave., City of Taconite	9,100 ft southwest	N/A	N/A	N/A	N/A	N/A
AAC-7. North side of Twin Lakes; near City of Marble	15,000 ft southeast	N/A	N/A	N/A	N/A	N/A
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	11,050 ft northwest	N/A	N/A	N/A	N/A	N/A

**Note:** Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint); Values in italics and underlined typeface indicate areas in which MPCA noise thresholds have been reached or exceeded. **N/A – Not Available:** Note that AAC-6, AAC-7, and AAC-8 were used in construction and rail noise impact analyses and not used for the predictive plant noise modeling discussed in Section 4.18 – no ambient noise measurements were taken for these locations.

Source: Noise Analysis, West Range Site; SEH et al., 2005; AAC, 2009

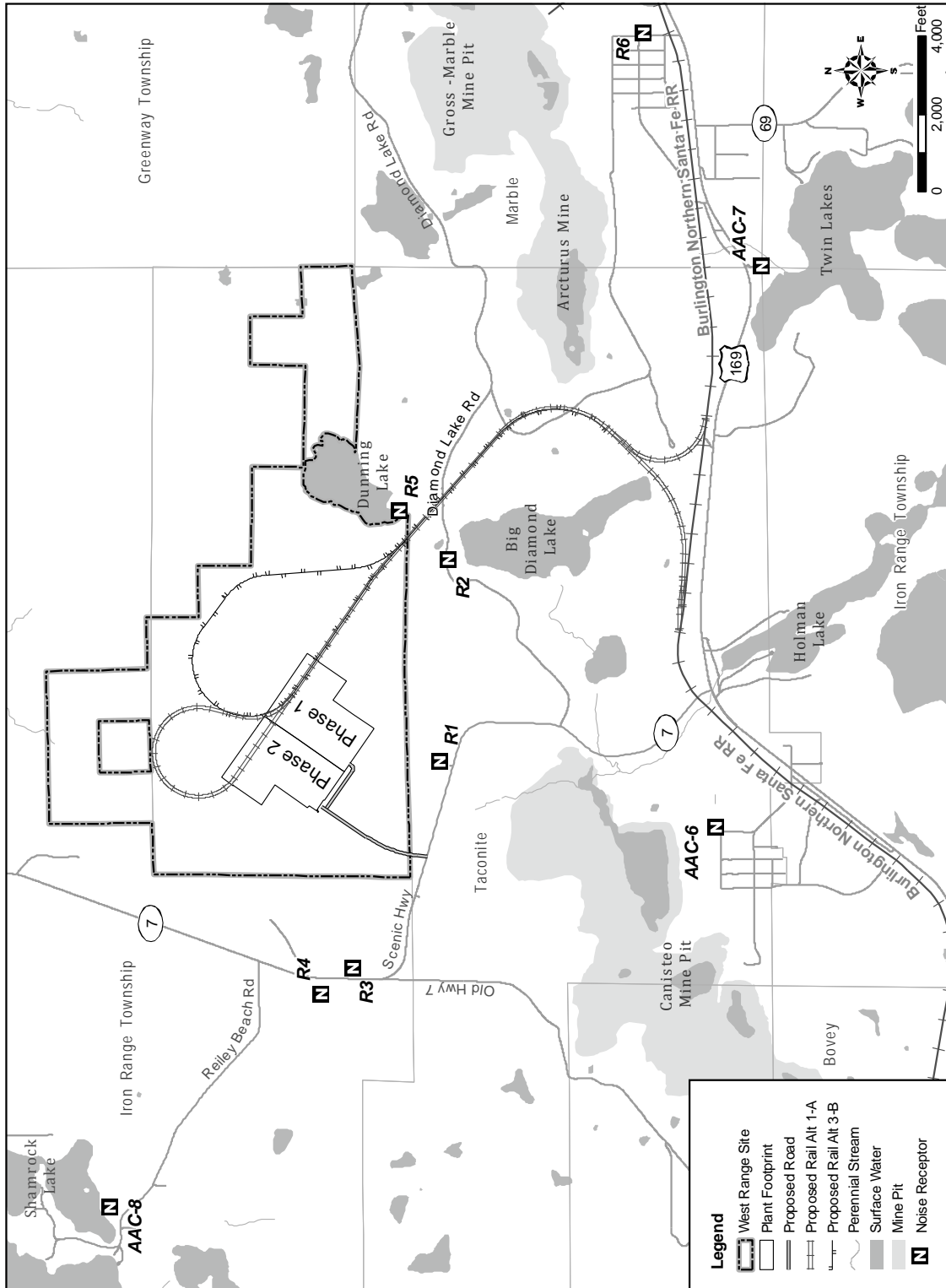


Figure 3.18-1. Noise Receptors at West Range

In general, results of the monitoring at the West Range Site indicate noise levels typical of townships and locales of this size and are below those of typical urban environments that are in close proximity to major transportation corridors. Since the setting surrounding the West Range Site can generally be described as a quiet, rural area with sparsely-spaced residential areas, any significant increases in noise levels could result in substantial acoustical impacts to surrounding receptors.

### **Receptor Location 1, Reclaimed County Landfill**

Receptor 1 was the closest measurement point towards the proposed facility; however its proximity to CR 7 accounted for a small amount of traffic noise especially during the daytime monitoring event. The area where this receptor resides is within a reclaimed waste management sight. Although no residences are within this area, monitoring at this location was performed in an attempt to collect readings as close to the proposed facility as possible.

Ambient noise recorded during the daytime event consisted mainly of slight winds through the surrounding woods, and car and truck passes along CR 7. Ambient noise during the nighttime hours consisted mainly of insect noise, slight winds through the surrounding woods, and three cars passing along CR 7. Results from both monitoring events fall within the MPCA thresholds for acceptable noise daytime and nighttime criteria.

### **Receptor 2, Residence Big Diamond Lake**

Receptor 2 was located along a cluster of residential and summer homes along the northern edge of Big Diamond Lake. These homes are situated along an undeveloped roadway with access off of CR 7 and proceeding east north of Big Diamond Lake. The roadway itself (**Diamond Lake Road**) consists of dirt and red clay and is, at times, difficult to navigate without a four-wheel drive vehicle.

Daytime ambient noise consisted of slight winds through the surrounding woods, some slight traffic along the adjacent roadway and insect noise. Since winds were calm and there was no traffic along the adjacent roadway, ambient noise during the nighttime event almost exclusively consisted of insect noise. Results from both monitoring events fall within the MPCA thresholds for acceptable noise for daytime and nighttime criteria.

### **Receptor 3, 31950 CR 7**

Receptor 3 was located at 31950 CR 7 within the property of a medium-sized residential home with a small hobby farm attached. The residents run a small tourist-orientated horse-riding business.

Traffic during the daytime monitoring event was consistent with car passes 2 to 3 times per minute, and cement trucks proceeding south and exiting CR 7 and proceeding south along CR 7. The cement trucks were counted traveling both north and south (presumed laden and then empty) at a consistent rate of two passes every 2 to 3 minutes for a large part of the daytime monitoring event. These cement trucks were also observed traveling at a relatively high rate of speed, which also heightened pavement noise. Noise levels during the nighttime monitoring event exceeded MPCA noise thresholds **by up to 3 dB**, presumably due to their proximity to CR 7.

### **Receptor 4, 32423 Scenic Highway 7**

Receptor 4 was located along CR 7 near a residential area. Traffic-related noise along CR 7 was the predominant noise source during times of monitoring. Noise levels during the nighttime monitoring event exceeded MPCA noise thresholds **by up to 3 dB**, presumably due to their proximity to CR 7.

### **Receptor Location 5, Dunning Lake**

Receptor 5 was located along the southern end on Dunning Lake and represented one residential location and the location of future potential residential expansion. Because of its remote location and the fact that there was a locked and gated roadway, no nighttime measurements were made (i.e., after 10:00 pm). Nighttime measurements are therefore correlated with the nearest receptor, Receptor 2.

The results of the daytime monitoring event fall within the MPCA thresholds for acceptable noise for daytime criteria.

### **Receptor Location 6 (Lutheran Church) and Receptor Location 7 (Catholic Church)**

For purposes of the noise modeling, R6, a Lutheran Church located 18,600 feet southeast in Marble, and R7, a Catholic Church located 9,940 feet northwest and along CR 7, were added as these locations could be classified as the closest sensitive receptors (churches) other than residential units. No measurement data for ambient conditions were taken for R6 and R7. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.

#### **3.18.2.2 East Range Site**

Existing noise levels were monitored at four receptor locations throughout the East Range Site and within areas of common use by residences. These areas included one residential location and three locations surrounding the proposed plant site. Monitoring events took place during the month of July 2005. **Locations of the noise receptors for the East Range are shown in Figure 3.18-2 (added in Final EIS).** Results of the ambient noise monitoring during the daytime and nighttime for the East Range Site are provided in Table 3.18-4 (**updated for the Final EIS**).

In general, Hoyt Lakes and the surrounding areas are in relatively quiet places. During daytime hours there is little to no manufacturing noise other than from the Laskin power plant across Colby Lake. There are limited traffic passes along Kennedy Memorial Drive proceeding through town and very few school related noise sources such as buses and playgrounds.

The preponderance of noise observed during daytime monitoring events related to lawn mowers in the distance, a small amount of light plane passes overhead, and distant noise from the Laskin power plant when in the vicinity of Colby Lake. Nighttime monitoring events were equally quiet with readings 1-2 decibels lower than daytime readings in most instances. Daytime and nighttime noise levels fluctuated slightly due to insect noise during evening events, and higher traffic and wind noise generated during the day.

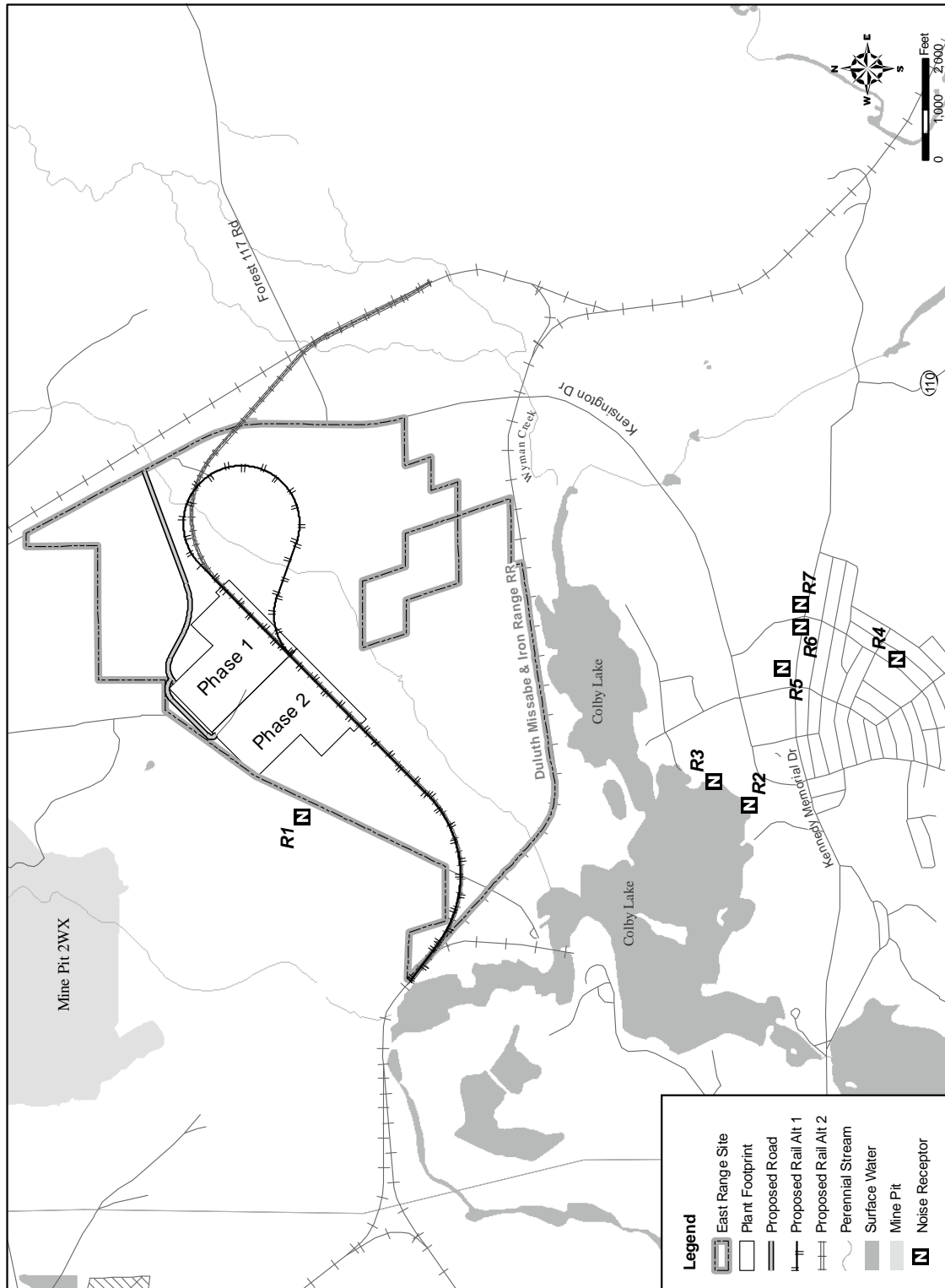


Figure 3.18-2. Noise Receptors at East Range

**Table 3.18-4. Existing Noise Levels at Ambient Noise Receptors for East Range Site**

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub> dB over State Compliance	L <sub>50</sub> dB over State Compliance
Receptor 1, Access Road Southeast of Plant	800 ft northwest	8:23 a.m.–9:23 a.m.	50 dBA	50 dBA	0 dB	0 dB
		10:12 a.m.–11:13 p.m.	49 dBA	49 dBA	0 dB	0 dB
Receptor 2, Boat Landing and Park	9,200 ft southwest	9:50 a.m.–10:50 a.m.	52 dBA	51 dBA	0 dB	0 dB
		11:30 p.m.–12:30 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, Colby Ridge Development	8,300 ft southwest	10:23 a.m.–11:23 a.m.	53 dBA	51 dBA	0 dB	0 dB
		12:40 a.m.–1:40 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 4, 321 Kent St, Hoyt Lakes, MN	11,500 ft south	12:30 p.m.–1:30 p.m.	52 dBA	50 dBA	0 dB	0 dB
		1:45 a.m.–2:45 a.m.	49 dBA	48 dBA	0 dB	0 dB
Receptor 5. Faith Lutheran Church	8,400 ft south	<b>Daytime – correlated with nearby receptors</b>	<b>53 dBA</b>	<b>50 dBA</b>	<b>0 dB</b>	<b>0 dB</b>
		<b>Nighttime – correlated with nearby receptors</b>	<b>50 dBA</b>	<b>49 dBA</b>	<b>0 dB</b>	<b>0 dB</b>
Receptor 6. Queen of Peace Catholic Church	8,800 ft south	<b>Daytime – correlated with nearby receptors</b>	<b>53 dBA</b>	<b>50 dBA</b>	<b>0 dB</b>	<b>0 dB</b>
		<b>Nighttime – correlated with nearby receptors</b>	<b>50 dBA</b>	<b>49 dBA</b>	<b>0 dB</b>	<b>0 dB</b>
Receptor 7. Trinity Methodist Church	8,800 ft south	<b>Daytime – correlated with nearby receptors</b>	<b>53 dBA</b>	<b>50 dBA</b>	<b>0 dB</b>	<b>0 dB</b>
		<b>Nighttime – correlated with nearby receptors</b>	<b>50 dBA</b>	<b>49 dBA</b>	<b>0 dB</b>	<b>0 dB</b>

**Note: Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint). Source: Noise Analysis, West Range Site, SEH et al., 2005**

### **Receptor Location 1, Access Road Southeast of Plant**

Receptor 1 was the closest measurement point from the East Range Site. This location is fairly remote residing on an old township highway (6401) with no throughway.

Daytime monitoring conditions were calm with light cloud cover and variable winds. Any slight noise that was collected by the sound level meter during daytime hours was from leaves rustling through the trees and one small plane pass. Ambient noise during the nighttime hours consisted mainly of insect noise and slight winds through the surrounding woods. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

### **Receptor Location 2, Boat Landing and Park**

Receptor 2 was located along a public boat landing and city park (**Birch Cove Park**) on the south shore of Colby Lake. The sound level meter was placed near the waters edge and away from the park users.

There was no traffic entering and exiting the park. Daytime ambient noise consisted of slight winds through the surrounding woods, some slight boating traffic, and water noise. Ambient noise during the nighttime event consisted of insect noise and slight wind noise (leaves rustling). Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

### **Receptor Location 3, Colby Ridge Developments, Pospeck Lane**

Receptor 3 was within a newly developed area along the southern end of Colby Lake on Pospeck Lane, adjacent the property of a medium sized residential lake home and 50 ft from the waters edge. The existing Laskin plant across the lake was a continual source of noise.

Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

### **Receptor Location 4, 321 Kent St, Hoyt Lakes**

Receptor 4 was located within the southeastern neighborhoods of Hoyt Lakes, directly south of the proposed plant site.

Both daytime and nighttime monitoring sessions were quiet with the occasional car passing though the neighborhood. Additionally, during daytime monitoring, lawn mower noise was slightly evident in the distance. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

### **Receptor Locations 5, 6, and 7, Kennedy Memorial Drive, Hoyt Lakes**

For purposes of the noise modeling, three other sensitive receptors (churches) were located within the Hoyt Lakes city limits. These included:

- **R5 - Faith Lutheran Church located at the northwest corner of Dorchester Drive and Kennedy Memorial Drive.**
- **R6 - Queen of Peace Catholic Church at the northwest corner of Hampshire Road and Kennedy Memorial Drive.**

- **R7 - Trinity Methodist Church located at the northeast corner of Hampshire Road and Kennedy Memorial Drive.**

**No ambient noise measurements were taken for these locations. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.**

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